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Tap the Potential of Tap Block: A Schematic Representation

Uma Hariharan[1], Vinodh Natarajan[2]

[1]Assistant Professor [2]Senior Resident, Dept. of Anesthesiology, Dr Ram Manohar Lohia Hospital & Post Graduate Institute of Medical Education and Research, Baba Kharak Singh Marg, New Delhi 110001, India.

Abstract

Transversus abdominis plane (TAP) block is an abdominal or truncal field block. Its popularity has increased in the recent times, mainly because its widespread applicability in several abdominal surgeries and less incidence of complications. The advent of ultrasound (USG) has revolutionised regional anaesthesia, in general and TAP blocks, in particular. There are various types of TAP block which can be utilised in various abdominal surgeries for effective analgesia, especially after caesarean sections. This article aims to elucidate in a pictorial format, the nerves traversing the TAP plane (Figure 1), the nerve supply of the abdominal wall (Figure 2), the various positions of TAP block (Figure 3) and the sono-anatomy of the USG-guided TAP block (Figure 4). The potential of this block is tremendous and can be useful in patients with coagulopathies, where epidural block is contraindicated. With improved accuracy of USG-guidance, the volume of local anaesthetic injected has also been reduced, bringing down the toxicity rates. Various adjuvants can also be added to local anesthetics for improving efficacy and duration of analgesia with TAP blocks. It is an analgesic boon in the era of minimally-invasive surgeries, especially laparoscopic and robotic surgeries.

Keywords: TAP Block; Abdominal Surgery; Analgesia; Sonoanatomy; USG-Guidance.

The TAP [1] (Transversus Abdominis Plane) lies between the internal oblique and the transversus abdominis muscle. The anterior border of TAP is formed by the *linea semilunaris* extending from the ninth rib cartilage to pubic tubercle. The superior border is formed by the subcostal margin, from the 9th to the 12th costal cartilage. The inferior border is formed by the inguinal ligament, iliac crest and posterior border of lumbar triangle of Petit. TAP block can be performed either blind, or by LOR (loss of resistance) technique and by ultrasound-guidance, for greater accuracy. USG-guided TAP block can be utilized for insertion of continuous catheter for continued postoperative analgesia with electronic patient controlled analgesia pumps (PCA).

In this article, the TAP plane, the nerves traversing it, the various forms of TAP block according to nerve supply of abdominal wall and the relevant sono-anatomy of the TAP space is elucidated diagrammatically, rather than in words. This can serve as a starting point for resident anaesthesia training on truncal blocks. It is an extremely useful block, whose potential is yet to be fully tapped.

The Figure 1 represents the nerves traversing the plane between various muscles of the abdominal wall, from the vertebra posteriorly to the rib, anteriorly. The Figure 2 identifies the nerve supply of the anterior abdominal wall at various points, which can be useful in identifying the point of injection.

There are various sites where TAP block can be administered, depending upon the surgical requirements. The following are the broad types of TAP block, as represented pictorially in the Figure 3.

Corresponding Author: Uma Hariharan, Assistant Professor, Dept. of Anesthesiology, Dr Ram Manohar Lohia Hospital & Post Graduate Institute of Medical Education and Research, Baba Kharak Singh Marg, New Delhi 110001, India.
E-mail: uma1708@gmail.com

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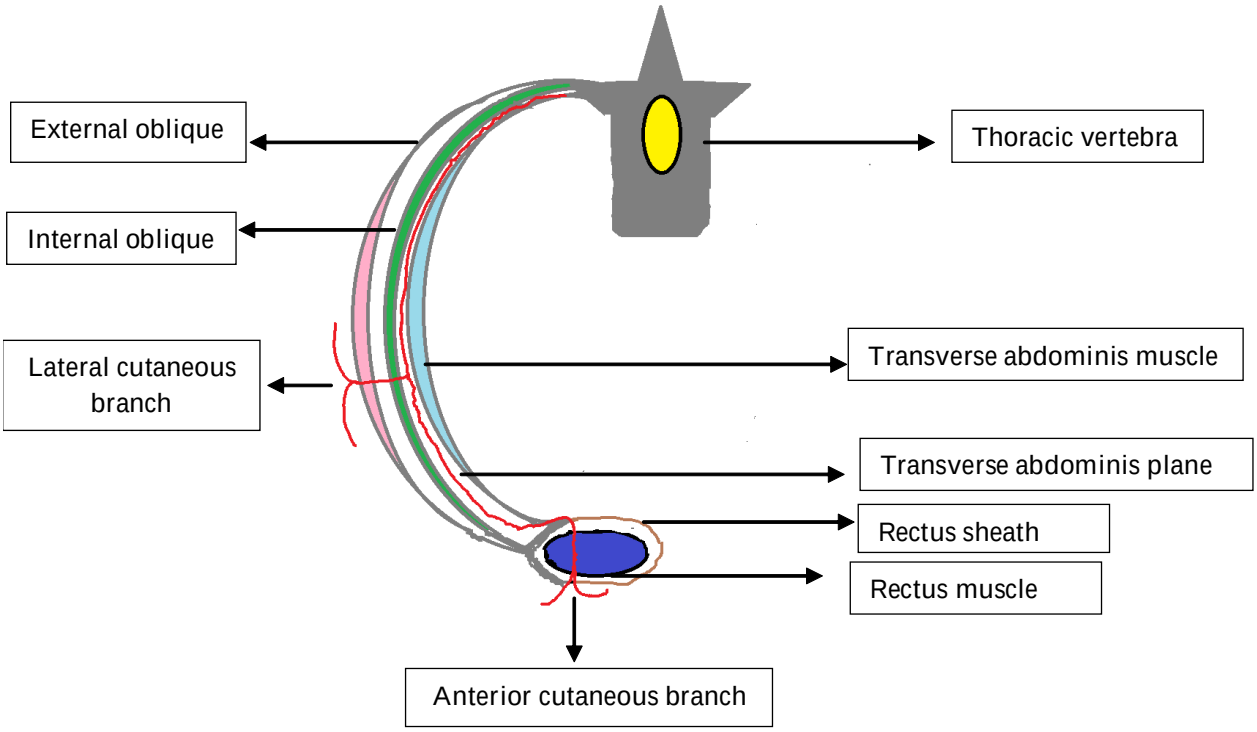

Fig. 1: Transverse Section of abdominal wall showing the path of nerves T7-T12 from spine to anterior abdomen

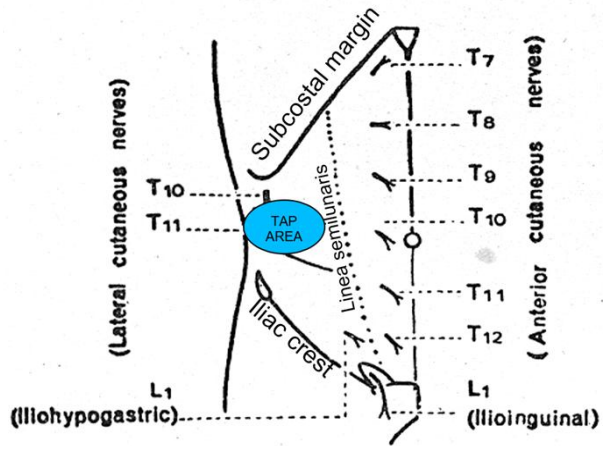

Fig. 2: The cutaneous nerve distribution of anterior abdominal wall with TAP area highlighted

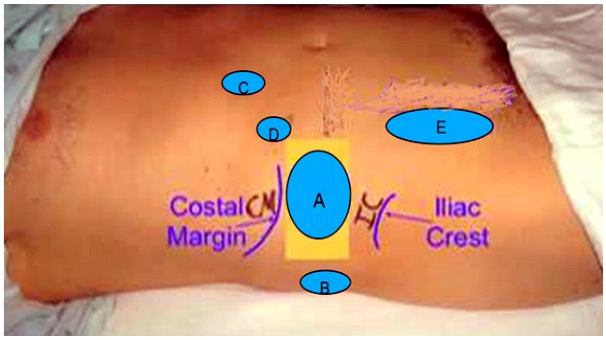

Fig. 3: Diagram of proposed TAP zones A) Lateral TAP, B) Posterior TAP, C) Upper subcostal, D) Lower subcostal, E) Ilioinguinal / hypogastric TAP

1. Upper subcostal TAP (deep to rectus, mainly covering T7 and T8)
2. Lower subcostal TAP (lateral to rectus, mainly T9)
3. Lateral TAP (midway between costal margin and iliac crest, in mid-clavicular line covering T11- T12)
4. Posterior TAP (in area of triangle of petit)
5. Ilio –inguinal and ilio-hypogastric TAP.

The Figure 4 is a photographic, labelled representation of the various muscles and facial planes of the abdominal wall as seen in an ultrasound image, including the location of the TAP plane injection.

There have been several recent researches, studying the efficacy of TAP blocks in various abdominal surgeries [2], with excellent results and minimal complications, as compared to epidural blocks. The main advantages of TAP block include its lack of haemodynamic disturbances avoidance, dural puncture, motor blockade or urinary retention.This is especially true following Caesarean sections [3], where TAP block is given bilaterally. Many of the clinical research in parturients undergoing Cesarean deliveries showed that TAP block is an effective analgesic option when intrathecal opioids are contraindicated and are not

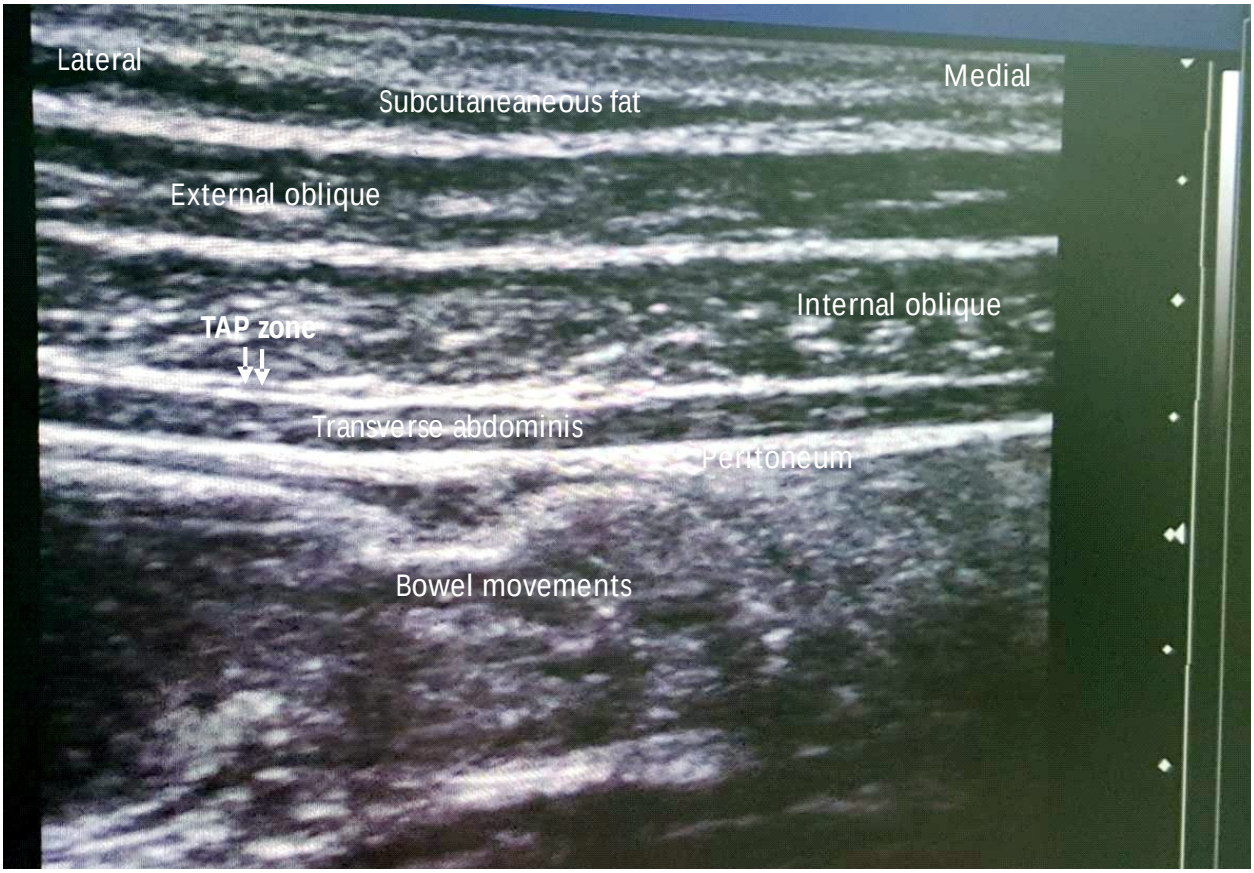

Fig. 4: Ultrasonography picture of TAP area showing different layers of anterior abdominal wall muscles

used. Sharkey A et al, in his meta-analysis, found that TAP block in cesarean section is a viable alternative to reducing opioid consumption and opioid related side effects [3]. R Champneria et al also suggested that TAP block is a very effective pain relief method whenever cesarean section was carried out in general anesthesia [4]. Adjuvants like fentanyl, clonidine and dexmedetomidine can be successfully added in TAP block to prolong the duration of analgesia. In an Indian study, Prashant et al studied the effects of addition of dexmedetomidine (alpha-2 agonist) with ropivacaine (local anesthetic) in TAP block for postoperative pain relief in cesarean deliveries and concluded that Dexmedetomidine prolongs the duration of analgesia due to its slower systemic absorption [5].

Incidence of inadvertent intravascular injections of local anesthestics are much lesser as TAP is relatively an avascular zone. But, care should be given not to cause the underlying organ or bowel injury or hematomas. Ultrasound-guided TAP [6] block is particularly useful in such situations, helping us to visualize the path of needle throughout the procedure. Ultrasound guided and Lap-assisted TAP block are gaining popular in surgeries for hernia repairs (both open and laparoscopic), laparoscopic cholecystectomies, laparoscopic nephrectomies and laparoscopic sleeve gastrectomy (bariatric surgery).

It has recently found use as an analgesic in the state of the art, robotic surgeries [7] as well, which also employ pneumoperitoneum. When given preoperatively, it can reduce intra-operative anaesthetic requirements. Excellent postoperative analgesia can be accomplished with continuous catheter techniques, inserted under USG-guidance. The various types of TAP [8] can be utilised in different settings for maximal efficacy, in both laparotomies and laparoscopic surgeries.

The future of TAP blocks is bright, as more and more research is surfacing, highlighting its immense utilities and enhanced accuracy with ultrasound guidance [9]. Further randomised controlled trials are required to cement its efficacy in robotic surgeries, especially in minimally-invasive radical cancer surgeries.

References

1. Yarwood J, Berril A. Nerve blocks of the anterior abdominal wall. Contin Educ Anaesth Crit Care Pain 2010;10(6):182-186.
2. Charlton S, Cyna AM, Middleton P et al. Perioperative transversus abdominis plane (TAP) blocks for analgesia after abdominal surgery. Cochrane Database Syst Rev 2010;12:007705.
3. Sharkey A, Finnerty O, McDonnell JG. Role of transversus abdominis plane block after caesarean delivery. Curr Opin Anesthesiol. 2013;26:268-72.
4. Champaneria R1, Shah L2, Wilson MJ3 et al. Clinical effectiveness of transversus abdominis plane (TAP) blocks for pain relief after caesarean section: a meta-analysis. Int J Obstet Anesth. 2016;28:45-60.
5. Rai P, Negi DS, Singh SK, Malviya D, Bagwan MC. Effect of Addition of Dexmedetomidine To Ropivacaine In Transversus abdominis Plane Block on Post-Operative Pain In Lower Segment Caesarean Section: A Randomized Controlled Trial. IOSR-JDMS. 2016;15(2):122-125
6. Ripollés J, Mezquita SM, Abad A. Analgesic efficacy of the ultrasound-guided blockade of the transversus abdominis plane - a systematic review. Braz J Anesthesiol. 2015;65:255-80.
7. Mahran E, Hassan ME. Ultrasound-guided transversus abdominis plane block for control of postoperative pain for laparoscopy-assisted robotic abdominal cancer surgery. Ain-Shams J Anaesthesiol 2016;9:558-62.
8. Hebbard P. TAP block nomenclature. Anaesthesia 2015;70:112-13.
9. Mishra M, Mishra SP. Transversus abdominis plane block: The new horizon for postoperative analgesia following abdominal surgery. Egypt. J Anaesth 2016;32:243-7.

Original Research Article

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Dexmedetomidine for Awake Bronchoscopy: Our Experience

Valluri Anil Kumar[1], Vaddineni Jagadish[2]

[1,2]Assistant Professor, Department of Anaesthesia, Narayana Medical College, Nellore, Andhra Pradesh 524003, India.

Abstract

Background: Respiratory physicians are showing interest in using Dexmedetomidine for awake sedation, since, it is safe and useful when the patient is having spontaneous breathing and also cost-effective. We evaluated the safety and efficacy of dexmedetomidine in a small cohort of thirty patients undergoing awake bronchoscopy under topical anaesthesia using 10% Xylocaine. *Methods:* Premedication was with midazolam and rescue medication was fentanyl. Dexmedetomidine was infused at one μg/kg infused over 10 minutes. The bronchoscope was inserted after bolus infusion followed by maintenance infusion of Dexmedetomidine started with 0.2μg/kg/h and titrated optionally to 0.7μg/kg/h. We recorded the pre- and intraprocedural vital signs and Ramsay sedation score were recorded every 10 minutes, in addition to adverse events, duration of the procedure, use of rescue sedation with fentanyl one μg/kg, and physicians and patient's satisfaction. Patients were discharged as per the modified post-anesthetic discharge scoring system. *Results:* Mean Duration of procedure was 30±10 min. Percentage of patients requiring rescue sedation was 3/30 (10%). 3/30 (10%) of patients had hypotension, 6/30 (20%) had bradycardia and 1/30 (3.3%) had amnesia. The mean time to recovery was 25±10 min. The physician and patient's satisfaction score (range, 1 to 5) were five and four respectively. *Conclusion:* Dexmedetomidine alone is safe, provides satisfaction to both doctors and patients, with fewer anticipated and spontaneously recoverable side effects.

Keywords: Awake Bronchoscopy; Patient Satisfaction; Dexmedetomidine**.**

Introduction

Flexible bronchoscopy is an endoscopic procedure for diagnosis and therapeutic manipulations of airway disease. Respiratory physicians commonly perform it under topical anaesthesia. However, physicians are now showing interest in using sedation as an adjunct to topical anaesthesia [1]. Sedation has proved to improve procedural tolerance and patient satisfaction [2] and conscious sedation is now commonly used for such procedures [3-5]. Dexmedetomidine, an alpha2 agonist, has features of sedation, sympatholysis, antisialagogue, analgesia, minimal effect on respiration, and additionally opioid sparing effect [6]. Moreover, dexmedetomidine recipients were calmer and easier to arouse more co-operative and better able to communicate [7-8]. Physicians are showing interest in using dexmedetomidine for sedation, since, it is safe and useful when the patient is having spontaneous breathing and also cost-effective [1,9]. Even a Single-dose dexmedetomidine attenuates airway and circulatory reflexes during extubation [10].

Methods

This study was conducted on patients undergoing awake diagnostic bronchoscopy, both male and female patients in the age group 20-60 years

Corresponding Author: Vaddineni Jagadish, Assistant Professor, Department of Anesthesia, Narayana Medical College & Hospital, Nellore, Andhra Pradesh 524003, India.
E-mail: vaddineni.jagadish@gmail.com

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satisfying ASA criteria I & II were included. This procedure was carried out under topical anaesthesia using 10% Xylocaine; Premedication was with midazolam and rescue medication was fentanyl. Dexmedetomidine was infused at one μg/kg infused over 10 minutes. The bronchoscope was inserted after bolus infusion followed by Maintenance infusion of Dexmedetomidine was started with 0.2μg/kg/h and titrated optionally to0.7μg/kg/h [6] to achieve a Ramsay Sedation Scale score of 3 (Table-1)[11].

The demographic data were collected, and the pre- and intraprocedural vital signs and Ramsay sedation score were recorded every 10 minutes. Additionally, we also recorded adverse events, duration of the procedure, recovery time defined as the time from tracheal extubation and emergence from anaesthesia, use of rescue sedation with fentanyloneμg/kg. Patients were discharged as per the Modified Postanesthetic Discharge Scoring System (Table 2)[12]. Physicians and patient's satisfaction were measured on five points Likert scale-1-5 where one is no satisfaction, 2-somewhat, 3-better, 4-good and 5-excellent.

Statistical Analysis

Data was entered into Microsoft Excel spread sheat 2007, cleaned and mined for further computations using SPSS. Descriptive statistics were mean, median, SD, numbers and percentages. ANOVA and chi-square were the inferential statistical tests. A two-tailed probability value less than 0.05 was considered significant

Results

The mean age of the patients was 44±8 years. There were 22 Males and eight females. Mean

Table 1: Ramsay sedation scale[11]

Score	Response		Score	Response	
1	Anxious or restless or both	Awake	4	Brisk response to stimulus	Asleep
2	Cooperative, orientated and tranquil		5	Sluggish response to stimulus	
3	Responding to commands		6	No response to stimulus	

Table 2: Modified Postanesthetic Discharge Scoring System[12]

Vital signs	Activity
BP and HR ± 20% of baseline value-2	Steady gait, no dizziness -2
BP and HR ± 20%-40% of baseline value-1	Requires assistance-1
BP and HR ± 40% of baseline value-0	Unable to ambulate-0
Nausea and vomiting	Pain
No, or minimal/treated with oral. Medication-2	Minimal or no pain=2
Moderate/treated with parenteral medication-1	Moderate =1
Severe/continues despite treatment-0	Severe =0
Surgical bleeding	Total score
None or Minimal (not requiring intervention)-2	Patients' scoring -≥9 for two consecutive measurements
Moderate (1 episode of bleeding)-1	are considered fit for discharge home
Severe (≥2 episodes of bleeding)-0	

Table 3: Clinical Parameters and outcomes of patients undergoing awake bronchoscopy

Age	44±8 years
Gender (M/F)	22/8
Mean Duration of procedure	30±10 min
Mean Time to Recovery	25±10 min
Median Physicians Satisfaction	5
Median Patients Satisfaction	4
Percentage use Rescue sedation	3/30 (10 %)
Complications	
Failed bronchoscopy	0/30 (0 %)
Pain during injection	0/30 (0 %)
Vomiting	0/30 (0 %)
% of patients with drop in oxygen saturation	1/30 (3.3%)
% of patients with Apnea	0/30 (0 %)
% of patients with Amnesia	1/30 (3.3 %)
% of patients with Hypotension	3/30 (10 %)
% of patients with Bradycardia	6/30 (20 %)

Table 4: Dynamics of vital parameters during dexmedetomidine infusion

Dose	Time (min)	Heart Rate (/min)	SBP(mmHg)	DBP(mmHg)	SpO2100 (%)
Baseline	0	88±8	130±6	80±8	100±0
Bolus dose	10	82±6	140±8	78±5	100±0
Maintenance	20	70±7	120±8	70±4	99±1
dose	30	66±6	114±7	74±7	98±2
	40	64±7	108±5	72±6	98±3
	50	68±6	100±6	68±5	99±2
	60	64±7	102±6	76±6	97±2
P value	-	P<0.05	P<0.05	P<0.05	P>0.05

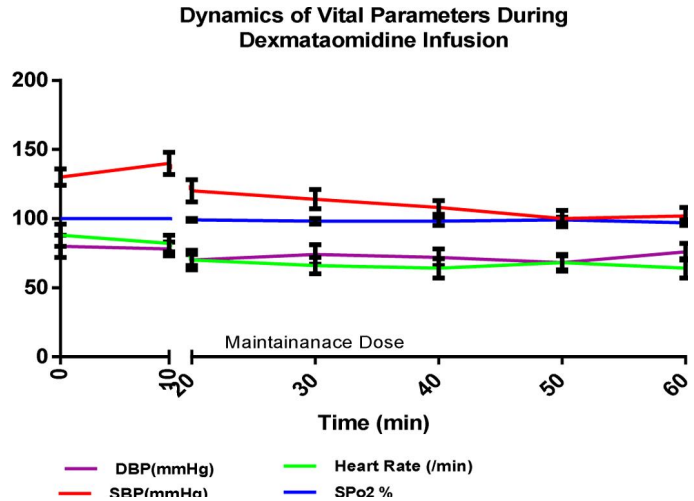

Fig. 1: Dynamics of vital parameters during dexmedetomidine infusion

Duration of procedure was 30±10 min. Percentage of patients requiring rescue sedation was 3/30 (10%). 3/30 (10%) of patients had hypotension, 6/30 (20%) had bradycardia and 1/30 (3.3%) had amnesia. The mean time to recovery was 25±10 min. The physician and patient's satisfaction score (range, 1 to 5) were five and four respectively (Table 3 & 4).

Discussion

Dexmedetomidine, an active Dextro- isomer of medetomidine, a selective alpha (2)-adrenergic receptor agonist, is used for the sedation of mechanically ventilated adult patients [7] and patients before and during surgical and other procedures in non-intubated adults [7]. The literature says that hemodynamic and respiratory stability can be achieved even as a single sedative agent [13]. In our study, we evaluated the safety and effectiveness of dexmedetomidine in patients undergoing awake bronchoscopy and found that 10% of patients developed hypotension and 20% bradycardia. However, these features recovered spontaneously without intervention. A similar report says that hypotension and bradycardia are common with dexmedetomidine usually resolve without intervention [7].

Only 10% of our patients required addition sedation with fentanyl. Similarly, a study says that the patients who were given dexmedetomidine required less propofol or intravenous midazolam as rescue sedation to achieve and maintain optimal sedation during the procedures [7].

A study reported that only 3% of patients receiving dexmedetomidine experienced delirium whereas it was 50%, propofol and 50% midazolam and such a patients require longer hospitalisation causing economic burden [14]. None of our patients developed delirium except for one patient developed amnesia, and he came to normalcy with reassurance.

A report demonstrates that, as compared to fentanyl, Dexmedetomidine is more efficient during intubation, inducing sedation, maintaining hemodynamic stability and less oxygen desaturation [15]. We also observed that none of our patients developed apnoea, only one patient had dropped in oxygen saturation. An additional notable feature found in our study that, both

physicians and patients reported a high satisfaction. Dexmedetomidine was more effective in attenuating airway reflex responses to tracheal extubation and maintaining hemodynamic stability without prolonging recovery compared with fentanyl [16]. In our study, all patients recovered within 25±10 min.A study has reported that as compared with midazolam, dexmedetomidine provided better oxygen saturation and is equally well tolerated for conscious sedation in postoperative patients undergoing bronchoscopy [17]. Dexmedetomidine shortened the time to extubation as compared with standard sedatives and the savings potential of dexmedetomidine results primarily from shorter time to extubation [8].

Conclusion

We found that for awake bronchoscopy Dexmedetomidine alone is safe, provides satisfaction to both physicians and patients, with fewer spontaneously recoverable adverse effects such as hypotension in 10%, bradycardia in 20% and amnesia in 3.3%.

Conflict of Interest: None

References

1. Jose, R.J., S. Shaefi, and N. Navani, Sedation for flexible bronchoscopy: current and emerging evidence. Eur Respir Rev, 2013;22(128):106-16.
2. Smyth, C.M. and R.J. Stead, Survey of flexible fibreoptic bronchoscopy in the United Kingdom. European Respiratory Journal, 2002;19(3):458-463.
3. Chadha, M., M. Kulshrestha, and A. Biyani, Anaesthesia for bronchoscopy. Indian J Anaesth, 2015. 59(9):565-73.
4. Putinati, S., et al., Patient satisfaction with conscious sedation for bronchoscopy. CHEST Journal, 1999. 115(5):1437-1440.
5. Ni, Y.-L., et al., Conscious sedation reduces patient discomfort and improves satisfaction in flexible bronchoscopy. Chang Gung Med J, 2010;33(4): 443-452.
6. Lee, K., et al., Prospective pilot trial of dexmedetomidine sedation for awake diagnostic flexible bronchoscopy. J Bronchology Interv Pulmonol, 2010;17(4):323-8.
7. Hoy, S.M. and G.M. Keating, Dexmedetomidine: a review of its use for sedation in mechanically ventilated patients in an intensive care setting and for procedural sedation. Drugs, 2011;71(11):1481-501.
8. Turunen, H., et al., Dexmedetomidine versus standard care sedation with propofol or midazolam in intensive care: an economic evaluation. CritCare, 2015;19:67.
9. Shukry, M. and J.A. Miller, Update on dexmedetomidine: use in nonintubated patients requiring sedation for surgical procedures. Ther Clin Risk Manag, 2010;6:111-21.
10. Guler, G., et al., Single-dose dexmedetomidine attenuates airway and circulatory reflexes during extubation. Acta Anaesthesiol Scand, 2005;49(8):1088-91.
11. Kaur, S., et al., Arousal from sedation in lower abdominal surgeries under spinal anesthesia: Comparison between dexmedetomidine and clonidine. Anesth Essays Res, 2016;10(1):98-103.
12. Palumbo, P., et al., Modified PADSS (Post Anaesthetic Discharge Scoring System) for monitoring outpatients discharge. Ann Ital Chir, 2013;84(6):661-5.
13. Makary, L., et al., Prolonged recovery associated with dexmedetomidine when used as a sole sedative agent in office-based oral and maxillofacial surgery procedures. J Oral Maxillofac Surg, 2010;68(2): 386-91.
14. Maldonado, J.R., et al., Dexmedetomidine and the reduction of postoperative delirium after cardiac surgery. Psychosomatics, 2009;50(3):206-17.
15. Mondal, S., et al., Comparison between dexmedetomidine and fentanyl on intubation conditions during awake fiberoptic bronchoscopy: A randomized double-blind prospective study. J Anaesthesiol Clin Pharmacol, 2015;31(2):212-6.
16. Aksu, R., et al., Comparison of the effects of dexmedetomidine versus fentanyl on airway reflexes and hemodynamic responses to tracheal extubation during rhinoplasty: A double-blind, randomized, controlled study. Curr Ther Res Clin Exp, 2009;70(3): 209-20.
17. Liao, W., et al., Dexmedetomidine versus midazolam for conscious sedation in postoperative patients undergoing flexible bronchoscopy: a randomized study. J Int Med Res, 2012;40(4):1371-80.

Original Research Article

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Comparative Study of Dexmedetomidine vs Midazolam Infusion for ICU Sedation

Akhilesh Kumar Singh[1], Amarjeet Kumar[2], Lakshmi Sinha[3], Chandni Sinha[4], Vijay Kumar Gupta[5]

[1,2]Senior Resident [4]Associate Professor, Department of Anaesthesia [3]Senior Resident, Department of General Surgery, All India Institute of Medical Sciences, Patna, Bihar 801507, India. [5]Professor & Head, Department of Anaesthesia, Patna Medical College and Hospital, Patna, Bihar 800004, India.

Abstract

Introduction: Sedation & Analgesia are generally taken as one entity in intensive care unit and disproportionate use of sedative is associated with adverse outcomes including patients restlessness, excessive sedation, longer ICU (intensive care unit) and hospital stay, an increased incidence of ventilator-associated pneumonia and greater hospital costs. Pain was considered as the 1st cause of inadequate analgesia/sedation. Dexmedetomidine possesses anxiolytic, hypnotic, analgesic and easy arousability properties. *Aim of the study:* was to Compare the effectiveness of sedation with Dexmedetomidine and midazolam in Critically ill patients admitted in ICU and their haemodynamic and respiratory parameter. *Methods:* The patients were randomly divided into two groups, 20 in each group. Group A receive loading dose of dexmedetomidine 1µg/kg body weight over 10 minutes followed by 0.2 to 0.7 µg/kg/hr of maintenance infusion dose. Group B receive Intravenous midazolam with loading dose of 0.05 mg/kg body weight; followed by 0.05 to 0.1 mg/kg/hr of maintenance dose. Analgesia with tramadol bolus doses 1 to 2 mg/kg body weight was given as per need. *Observation:* Heart rate (HR), Mean arterial pressure (MAP), Oxygen saturation (SPO_2), Respiratory rate (RR), Quality of sedation using Ramsay sedation score (RSS). *Result:* The mean total sedation requirement was 495±185 µg in dexmedetomidine group and 55.7±21.7 mg in midazolam group. The mean hourly dose of sedative was 0.34±0.13 µg/kg/hr in dexmedetomidine group and 0.042±0.017 mg/kg/hr in midazolam group. *Conclusion:* Dexmedetomidine provide more acceptable sedation compared to midazolam. Patients remained hemodynamically stable in Dexmedetomidine group when compared to midazolam group.

Keywords: Dexmedetomidine; Midazolam; ICU; Sedation.

Introduction

Critically ill patients in the intensive care unit subjected to many adverse clinical situations because of their coexisting disease or the ICU environment that produce harmful psychological and physiological changes. These changes are due to increased levels of catecholamines and other stress hormones. The critically ill patients in the ICU are subjected to pain and discomfort due to endotracheal intubation and mechanical ventilation, intermittent physiotherapy, tracheal suction etc. Nursing procedures can also be unpleasant for them [1]. The noise level produced by the monitoring and support equipments are usually high and irritating and the lighting in the ICU surroundings are not pleasant rather it is unsoothing to the eyes, enhancing the adverse reactions [2].

Sedation and analgesia are generally taken as one entity in intensive care unit and disproportionate use of sedative is associated with adverse outcomes including patients restlessness, excessive sedation, longer ICU and hospital stay, an increased incidence of ventilator-associated pneumonia and greater hospital costs.

An ideal sedative should provide a rapid onset and a rapid recovery, having sedative, analgesic, amnesic property, easily titratable, without any

Corresponding Author: Amarjeet Kumar, Senior Resident, Department of Anaesthesia, All India Institute of Medical Sciences, Patna, Bihar 801507, India.
E-mail: amarjeetdmch@gmail.com

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haemodynamic disturbances, no any respiratory depression and devoid of withdrawal effects [3].

Dexmedetomidine, a unique sedative agent, alfa-2 adrenergic agonist, provides proper sedation with easy arousability and has also analgesic effect. It does not have a respiratory depressive action. It is now established as a novel approach to intensive care sedation and has the potential to reshape patient care in the ICU [4].

Aim of the Study

Aim of this study was to evaluate the sedation characteristics of dexmedetomidine and midazolam in postoperative mechanically ventilated patients in our ICU.

Methods

This prospective randomized double blinded study was done in P.M.C.H, Patna. Forty adult Patients (ages 18 to 60 years), between ASA grade I to III, who were intubated and expected to be mechanically ventilated for a period of approximately twenty four hours were included in the study. After approval by hospital ethical committee, informed consent was obtained from one of patient's close relatives. The patients were randomly divided into two groups, 20 in each group.

Group A: Received a loading dose of dexmedetomidine 1µg/kg body weight over 10 minutes followed by 0.5 µg/kg/hr of maintenance infusion dose.

Group B: Received a loading dose midazolam 0.05 mg/kg body weight; followed by 0.06 mg/kg/hr of maintenance infusion dose.

Exclusion Criteria

Known or suspected allergy to Dexmedetomidine or midazolam**,** Severe hepatic or renal disease, Requirement of muscle relaxants except for intubation (succinylcholine), Pregnancy or lactation, Severe pulmonary or cardiac disorder. Analgesia with tramadol bolus doses 1 mg/kg body weight was administered as per need. Throughout the study, the efficacy of sedation was assessed by using the Ramsay sedation score. Three levels of sedation were considered : (1) Adequate, when the sedation level was grade 2,3,4 or 5 on Ramsay scale (2) Insufficient when the sedation level was grade 1 and (3) Excessive, when the sedation level was grade 6 on Ramsay scale. The aim of our study was to achieve a target sedation of grade 3 on Ramsay scale for most of the sedation hours and with no pain at rest and minimal pain at movement. Whenever the sedation was not considered adequate, the rate of continuous infusion of the sedative was increased or decreased by 10% at a time and efficacy of sedation was reassessed 15 minutes later. Pain was considered as the 1st cause of inadequate analgesia/sedation and was treated first with low dose of tramadol before further increasing the dose of Dexmedetomidine or midazolam.

All the patients were mechanically ventilated and the ventilatory parameters were adjusted so as to maintain normocapnia and a partial pressure of oxygen in arterial blood (PaO_2) between 75 to 100 mmHg. At the end of each shift, the nurse attending the patient was interviewed regarding the efficacy and overall quality of sedation. In patients considered fit for weaning from mechanical ventilation, weaning was started while the patients were still sedated. The infusion of dexmedetomidine or midazolam was discontinued when clinical assessment showed that sedation was no longer required, or when a maximum period of 24 hours was reached, to allow assessment of post sedation responsiveness. When sedation was required thereafter, the usual regimen of our ICU was followed. Post sedation responsiveness was assessed after stoppage of sedation, until the patient could obey simple but specific command. The following parameters were monitored during the study: Quality of sedation using Ramsay sedation score (RSS), electrocardiogram (ECG), heart rate (HR), means blood pressure (MAP), central venous pressure(CVP), Oxygen saturation (SPO2), and adverse effects

Statistical Analysis

Data were expressed as mean ±SD. Group means were compared using student's t-test. A 'P' value of <0.05 was considered statistically significant.

Observations

Forty patients were entered into this study. Twenty patients were in dexmedetomidine group and twenty in midazolam group. Demographic data shown in Table 1.

The mean age in dexmedetomidine groups was 40.1±15.46 yrs and that in midazolam group was 41.1±21.36 yrs (p=0.8662). The mean weight was

53.15±6.60 and 54.65±6.11kg respectively (p=02387). The male to female ratio was 13:7 in dexmedetomidine group and 14:6 in midazolam group. There was no difference between the two groups with regards to age, weight, sex and ASA grades. The patient population in both the groups were also similar with regards to the type of surgery done.

The mean total sedation requirement was 495±185 µg in dexmedetomidine group and 55.7±21.7 mg in midazolam group. The mean hourly dose of sedative was 0.34±0.13 µg/kg/hr in dexmedetomidine group and 0.042±0.017 mg/kg/hr in midazolam group shown in Table 2.

Patients in midazolam group required more number of boluses of analgesics compared to dexmedetomidine group as shown in Table 3.

Heart Rate

The mean heart rate at the start of infusion was 118.25±31.93 bpm in dexmedetomidine group and 116.5±31.38 in midazolam group (P=0.862). Following the start of infusion heart rate was lowered in both the groups. The lowest heart rate in both groups was observed at 24 hrs of infusion. At the end of 24 hour, the heart rate in dexmedetomidine group was 95.35±51.72 and that in midazolam group was 106.5±52.28 (P=0.501) .The heart rate was lowered to a greater extent in dexmedetomidine group than in midazolam group at the end of 24 hour of infusion. This was however statistically not significant as shown in Figure 1.

The baseline MAP (mmHg) in the dexmedetomidine and midazolam Group were 105.95±6.58 and 106.2±11.50 mmHg respectively (P=0.933). Patient in dexmedetomidine group had a mean MAP of 102.65±6.40 mmHg compared to101.2+12.85 observed in the Midazolam group at 10 min from start of infusion(P=0.654). At one hour from start of infusion, the corresponding values were 100.65±6.53 and 103.2 ±13.95 mmHg in dexmedetomidine group and midazolam group respectively (P=0.463). The maximum fall in MAP in dexmedetomidine group was from baseline values of 105.95±6.58 mmHg to 97.45±6.80 mmHg at 8 hours from start of infusion. The maximum fall in midazolam group was from baseline values of 106.2±11.50 mmHg to 100.2mmHg at 12 hours of infusion. Throughtout the period of study, patients in dexmedetomidine group maintained a lower MAP than patients in midazolam group at corresponding times .The fall of MAP in both the groups over the period of study was found to be statistically significant at all time points from the baseline values, in both the groups as shown in Figure 2.

The baseline CVP in the dexmedetomidine and midazolam Groups were 11.25±1.51 and 9.9±2.03

Table 1: Showing demographic characteristics of study population

Parameters	Dexmedetomidine (N=20)	Midazolam (N=20)	P Value
Age	40.1 ± 15.46	41.1 ± 21.36	0.8662
Weight	53.15 ± 6.60	55.65 ± 6.61	0.2387
ASA grades I/II	8/9/3	11/7/2	
Male : Female	13:7 (65/35%)	14:6 (70/30%)	
Type of surgery	Gen. Surgery		

Table 2: Showing sedative requirements in both the group

Parameters	Dexmedetomidine (n=20)	Midazolam (n=20)
Total dose of sedative in 24 hour	495±185 µg	55.7±21.7 mg
Hourly dose of sedative	0.34±0.13 µg/kg/hr	0.042±0.017 mg/kg/hr
No. of patients in whom the rate of infusion had to be changed in 24 hour		
< 2 times	2	0
2 – 5 times	9	11
≥ 6 times	9	9

Table 3: Showing analgesic requirements in both the groups

Parameters	Dexmedetomidine(n=20)	Midazolam(n=20)
Number of patients who needed bolus dose of analgesics		
≤ 3 times	14	10
≥ 4times	6	10
Total no. Of boluses used	58	69

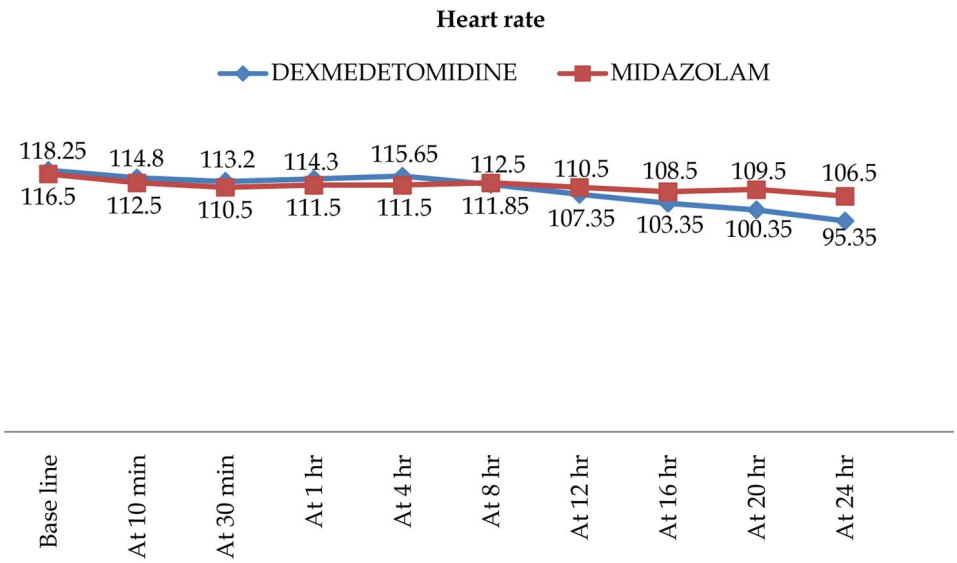


Fig. 1: Line Graph showing HR in Dexmedetomidine and midazolam group

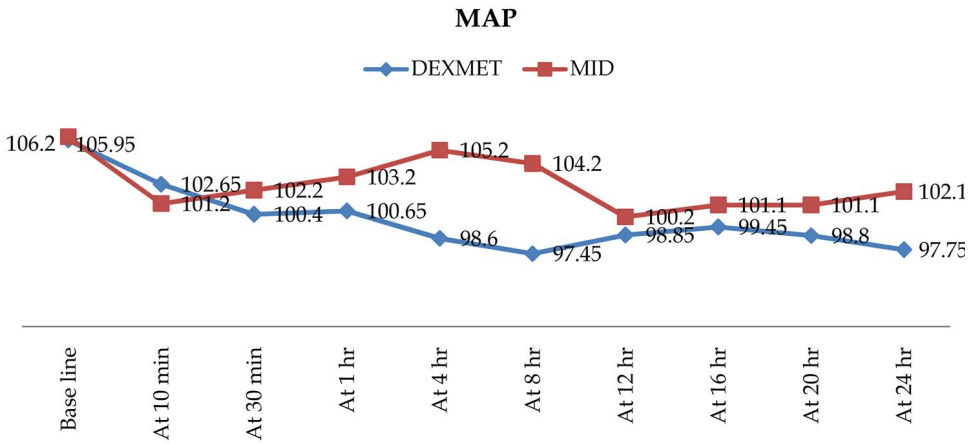
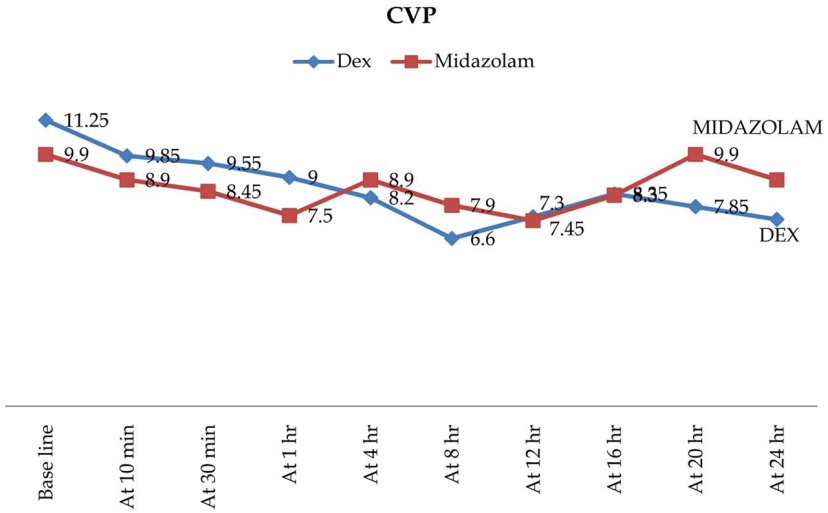


Figure 2: Line Graph showing mean arterial Blood Pressure (mmHg) in Dexmedetomidine and Midazolam Group



Central Venous Pressure

Fig. 3: Line Graph showing CVP in Dexmedetomidine and midazolam group

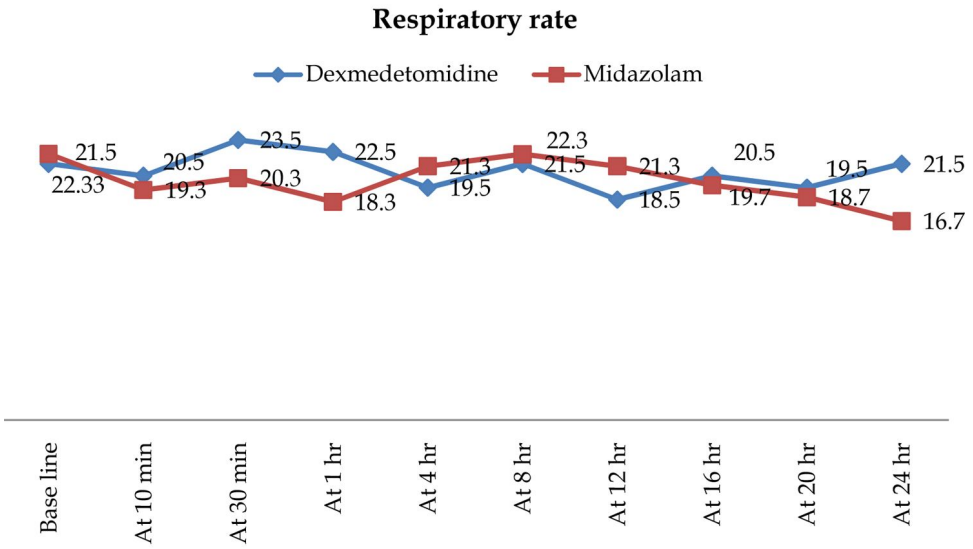


Fig. 4: Line chart showing Respiratory Rate (per minute) in the Dexmedetomidine and Midazolam group

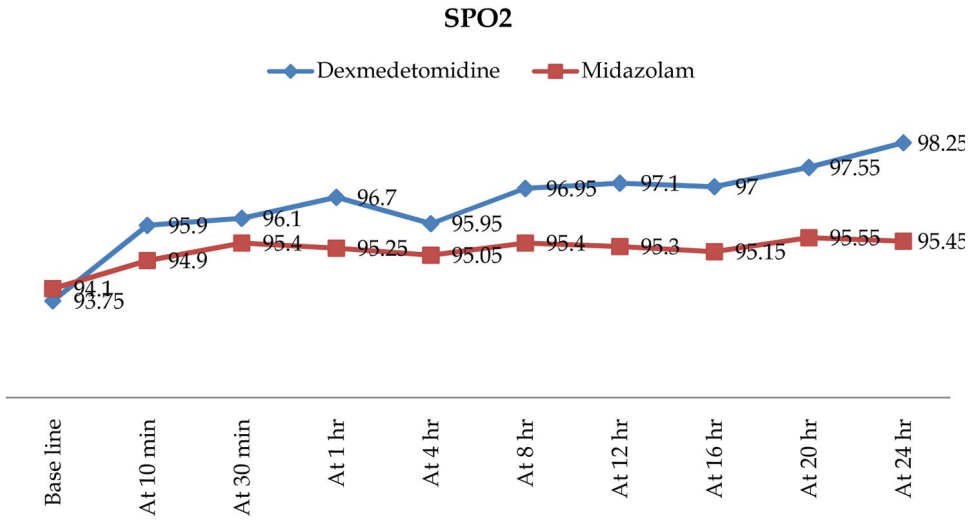


Fig. 5: Line graph showing SpO2 (%)

mmHg respectively(P=0.022). In both the groups there was a significant fall in CVP with time. The lowest value of CVP was recorded at 8 hours of infusion in dexmedetomidine group and at 12 hours in midazolam group. The fall of CVP in dexmedetomidine group over the period of study was found to be statistically significant at all time points from the baseline values. The fall in CVP from baseline value in midazolam group was statistically significant at 30 minutes, 1 hour, 8 hours, 12 hours and 16 hours as shown in Figure 3.

Respiratory Rate

The mean baseline spontaneous respiratory rate at the start of infusion was 21.5 breaths per minute in dexmedetomidine group and 22.33 breaths per minute in midazolam group. At the end of study, the respiratory rate in dexmedetomidine group was 21.5 breaths per minute compared to 16.7 breaths per minute in midazolam group. There was minimal change in RR in dexmedetomidine group while in midazolam group changes were greater as shown in Figure 4.

SpO_2

All the patients in both groups maintained a percentage saturation of oxygen around 95% while on spontaneous breathing throughout the study shown

Table 4: Ramsay sedation score with time

Time period	Dexmedetomidine			Midazolam		
	Agitated (RSS=1)	Adequate (RSS=2-5)	Excessive (RSS=6)	Agitated (RSS=1)	Adequate (RSS=2-5)	Excessive(RSS=6)
Base line	8	12	0	6	14	0
1 hr	1	19	0	3	17	0
4 hr	0	20	0	2	18	0
8 hr	0	20	0	1	18	1
12 hr	0	19	1	0	18	2
16 hr	0	20	0	1	17	2
20 hr	0	19	1	0	18	2
24 hr	0	20	0	0	20	0

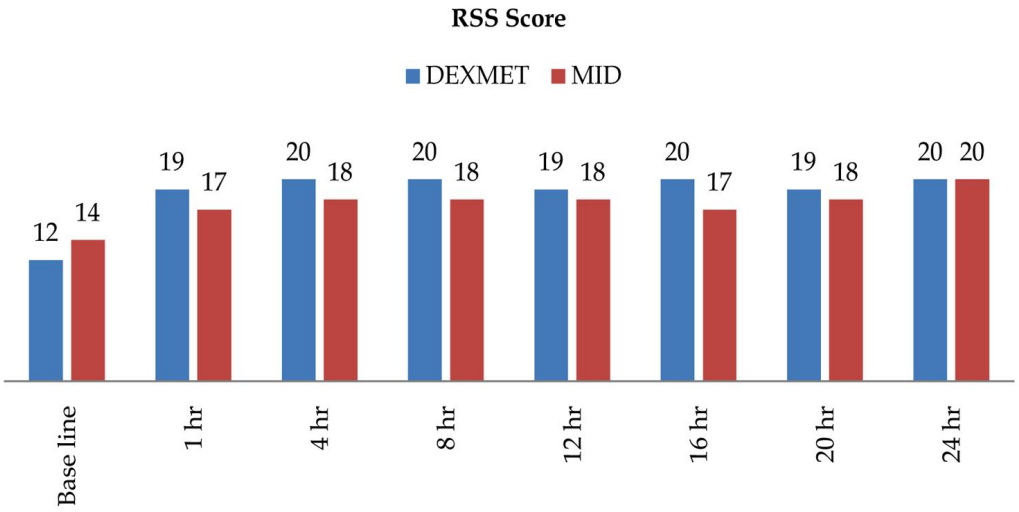


Fig. 6: Acceptable:Ramsay sedation score 2-5

in Figure 5. Respiratory rate (in minutes) is maintained in both Dexmedetomidine and Midazolam Group. The change in respiratory rate was similar in both the groups and was not found to be statistically significant

Quality of Sedation

We compared the quality of sedation using Ramsay sedation score. At the start of the study 8 patients in dexmedetomidine group and 6 patients in midazolam group were agitated (RSS=1). By 1 hour from start of sedation the numbers had decreased to 1 in dexmedetomidine where as 3 patients in midazolam group were still agitated. Eighteen patients in the dexmedetomidine group had a baseline Ramsay sedation score of less than optimal (RSS=3), compared to 16 patients in midazolam group. By the end of 1 hour from start of infusion, 9 patients in dexmedetomidine group had achieved the sedation score of 3 in contrast to only 5 patients in midazolam group as shown in Table 4.

While comparing the incidence of inadequate and excessive sedation in both the groups, we observed a similar trend in inadequate sedation in both the groups. However the patients in dexmedetomidine group remained in excessive sedation on considerably fewer occasions compared to patients in midazolam group. This was considered statistically significant. The patients in midazolam group needed more frequent changes in their infusion rate than patients in dexmedetomidine group.

A total of 480 observations about the quality of sedation was made in both groups. Patients in dexmedetomidine group achieved a target Ramsay score of 3 on statistically more number of occasions compared to patients in midazolam group. However the total number of observations made within the acceptable sedation score of 2 to 5 was similar between both the groups as shown in Figure 6.

By 4th hour of study all patients in dexmedetomidine group had achieved adequate sedation while patients in midazolam group did so only near the end of the study. The distribution of inadequate sedation was found to be similar between both the groups. However, patients in midazolam group tended to have excessive sedation

more often than patients in dexmedetomidine group. This was found to be statistically significant.

Recovery from Sedation

The recovery from sedation was significantly rapid in dexmedetomidine group. Patients in dexmedetomidine group were easily aroused and gripped observer's hand earlier after stoppage of sedation. In contrast patients in the midazolam group took a longer time to achieve eye opening on command and gripped observer's hand.

Adverse Effects

Two patients in midazolam group developed respiratory depression at 1 hours of infusion.

Discussion

ICU sedation becomes an integral part in ICU management. Hypnotics most commonly used are propofol, midazolam and lorazepam. Among hypnotics midazolam appeared to be most titratable drug. It has lowest incidence of over and under sedation [5]. Nonpharmacologic and pharmacologic means can be used to provide comfort and safety to ICU patients. The former include communication, frequent reorientation and maintenance of a day-night cycle, noise reduction and ensuring ventilation synchrony. Pharmacologic agents include hypnotic-anxiolytics, opiods, antipsychotics or a combination of these. Over the years, many drugs have been tried for the purpose of sedation of ICU patients.

Now newer drugs are being used for sedation in critically ill patients which have benefits over the conventionally used drugs like midazolam etc. However prolonged use of midazolam has been associated with delayed elimination, accumulation and prolonged sedation even after withdrawal of the drug, especially in elderly patient. Dexmedetomidine, a unique sedative agent, alfa-2 adrenergic agonist, provides proper sedation with analgesia, easy arousability without any respiratory depression. It is now established as a novel approach to intensive care sedation and has the potential to reshape patient care in the ICU and weaning from mechanical ventilation [4]. Its Opiods spairing effects results in reduced opiods-related side effects like respiratory depression, nausea and no risk of physical dependence.

The primary objective of this study was to evaluate the sedation characteristics of dexmedetomidine and midazolam in postoperative mechanically ventilated patients in our ICU. The study was conducted for a period of 24 hours.

In our study, more number of patients in dexmedetomidine group achieved the optimal sedation (Ramsay score 3) earlier and remained for a significantly longer time period than patients in midazolam group. However the acceptable sedation level (Ramsay score 2 to 5) was similar between both the groups. The patients in the midazolam group had significantly more incidences of excessive sedation than patients in dexmedetomidine groups.

The dose of dexmedetomidine used in our study was lower than doses used in earlier studies. For short term sedation of postoperative patients, the dose ranged between 0.2 to 0.7 µg/kg/hr. Our mean dose of midazolam was also lesser than the dose used in many earlier studies. In our studies both the groups had a lower requirement, compared to other studies.

The assessment of the recovery of level of consciousness and weaning time has been favourable to dexmedetomidine in most studies. We did not assess weaning time and time of extubation in our study, only wake up time and time to perform a simple but specific motor function were assessed. Further as a part of our ICU protocol, extubation were avoided in the night time. The length of ICU stay was thus influenced primarily by the underlying disease and not by wake up time. However, our results regarding efficacy and reliability of sedative agents are similar to those reported in the above cited studies.

In our study patients in dexmedetomidine groups were easily aroused and gripped observer's hand earlier than the patients in midazolam group. This difference was found to be statistically significant and could be clinically important when a rapid recovery from sedation is necessary to assess neurologic functions.

In our study both dexmedetomidine and midazolam had a significant fall from baseline values of systolic and mean arterial pressure, the fall being greater in dexmedetomidine group.

We observed a lower heart rate in dexmedetomidine group patients than midazolam group patients. This was consistant with the observations made by others.

The CVP fell more sharply in dexmedetomidine group. This is consistant with the observations made by others.

In our study , both sedative drugs were easy to titrate and infuse through a central line. No patients in either group experienced excitatory effect, wheezing, bronchospasm, hypotention of >20% fall from baseline, flushing or urticaria. The haematological and coagulation values were similar to those at start of study. The screening of biochemical parameters did not demonstrate worsening in renal function or in any of the studied parameters.

Althesin [6] and Etomidate [7,8] were tried for the purpose of sedation but soon fell out of favour because of anaphylactoid reaction and adrenal suppression caused by them. Inhalational agents like nitrous oxide [9] and Isoflurane [10] had limited application in ICU as sedative agents because of ICU environmental pollution and difficulty in the scavenging process of these effects.

Joseph F. Dasta et al [11] studied a cost minimisation analysis of dexmedetomidine compared with midazolam for long term sedation in intensive care unit. They concluded that the dexmedetomidine provides pharmacologic and economic advantage compared with midazolam for mechanically ventilated ICU patients requiring sedation. The reduction in total ICU cost can be explained primarily by decreased costs associated with reduced mechanical ventilation duration and ICU length of stay.

Rchard R. Riker; Yahya Shehabi; Paula M. Bokesch; et al [12], JAMA 2009 compare Dexmedeto-midine and Midazolam for sedation of critically ill patients . They concluded dexmedetomidine-treated patients spent less time on the ventilator, experienced less delirium, and developed less tachycardia and hypertension. The most notable adverse effect of dexmedetomidine was bradycardia.

Jack Depriest et al [13], JAMA 2009 Compared Dexmedetomidine with midazolam for sedation of patients in the ICU. They concluded Patients receiving dexmedetomidine had a lower prevalence of delirium and were extubated almost 2 days earlier than the midazolam group. They believe the safety data from the trial suggest that clinicians should be concerned about using dexmedetomidine in the study's primary patient population, those with severe sepsis.

Jen A. Tan , Kwok M. Ho in 2010 studied Use of dexmedetomidine as a sedative and analgesic agent in critically ill adult patients . They conclude dexmedetomidine might reduce the length of ICU stay in some critically ill patients. The risk of bradycardia was, higher when both a loading dose and high maintenance doses of dexmedetomidine were used.

Although the cost of dexmedetomidine was higher in our study, the ease of titrability, optimal sedation and rapid recovery offered by it makes it a superior choice over midazolam. Cost may not be a concern in situation where sedation needs to be frequently interrupted to assess neurological functions and it is in such circumstances that dexmedetomidine prove to be superior agent. Our use of RSS had some limitations. The scale is a compromise between accuracy, simplicity and ease of use. As a result, most series do not differentiate between sedation, anxiety, depression and pain, but provides an overall patient comfort. Differences between the two drugs may not have become apparent in our study because of low concentrations, short duration of infusion and small sample size.

Conclusion

Both dexmedetomidine and midazolam were effective in providing adequate level of sedation, However dexmedetomidine provided significantely higher occasions of optimal sedation compared to midazolam. Midazolam treated patients tended to remain in excessive sedation on more number of occasions than dexmedetomidine treated patients. Weaning from mechanical ventilation was significantly better in dexmedetomidine than midazolam sedation. Dexmedetomidine treated patients had a significantly better profile of recovery from sedation than patients treated with midazolam. The cost of dexmedetomidine sedation was significantly higher than midazolam sedation.

References

1. Aitkenhead AR, Pepperman ML, Willatts SM et al. Comparison of propofol and midazolam for sedation of critically ill patients. Lancet 1989;11:704-709.
2. Easton C, McKenzie F. Sensory perceptual alterations in the intensive care unit. Heart Lung 1988;17:229-35.
3. Coursin DB, Coursin DB, Maccioli GA. Dexmedeto-midine. Curr Opin Crit care 2001;7:221-226.
4. Ebert JT Current strategies in ICU sedation; Dannenmiller Memorial Education Foundation. 12500 Network Blvd, Suite 101, San Antonio, TX. USA.
5. Bethea JW. Clinical anesthesia, 6th edition. Anesthesiology 2010;112:767–8.
6. Clarke RSJ, Fee JPH Dundee JW. Factors predisposing to hypersensitivity to intravenous anaesthetics. Proc R Soc Med 1977;70:782.

7. Preziosi p, Etmidate, Sedative and neuroendocrine changes. Lancet 1983;ii:276.
8. Watt I, Ledingham IMA. Mortality amongst multiple trauma patients admitted to an intensive therapy. Anaesthesia 1984;39:973-81.
9. Amos RJ, Amess JAL, Hind CJ, Mollin DL. Duodence and pathogenesis of acute megaloblastic bone marrow chagers in patients receiving intensive care. Lancet 1982;ii.835-39.
10. Kong KL, Willatts Sm, Prys-Roberts C. Innsoflurance compared with midazolam for sedation in intensive care unit. Br Med J 1989;298:1277-31.
11. Dasta JF, Kane-Gill SL, Durtschi AJ. Comparing dexmedetomidine prescribing patterns and safety in the naturalistic setting versus published data. Ann Pharmacother. 2004;38:1130–1135.
12. Riker RR, Shehabi Y, Bokesch PM, et al Dexmedetomidine vs Midazolam for Sedation of Critically Ill Patients A Randomized Trial. *JAMA.* 2009;301(5):489–499.
13. DePriest J, Gonzalez L. Comparing Dexmedetomidine With Midazolam for Sedation of Patients in the ICU. *JAMA.* 2009;301(23):2439–2442.
14. Tan JA, Ho KM. Use of dexmedetomidine as a sedative and analgesic agent in critically ill adult patients: a meta-analysis. Intensive Care Med. 2010 Jun;36(6):926-39.

Original Research Article

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Comparison of Buprenorphine and Tramadol as an Adjuvant to Bupivacaine in Supraclavicular Brachial Plexus Block

Manisha Taware[1], Amol Singam[2], Ashok Chaudhari[3]

[1]Senior Resident, Department of Cardiac Anaesthesia [2]Associate Professor [3]Professor, Department of Anaesthersia, Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha, Maharashtra 442001, India.

Abstract

Background: Supraclavicular brachial plexus block is a good alternative to general anaesthesia for upper limb surgery below shoulder as it avoids the untoward effects of general anaesthesia. Block when given only with local anaesthetic can't prolong postoperative analgesia. Presence of opioid receptors in the peripheral nervous system allows us to use various opioids as an adjuvant to achieve prolong postoperative analgesia. This study was done to compare tramadol and buprenorphine as an adjuvant to 0.35% bupivacaine in supraclavicular brachial plexus block in terms of efficacy and safety. *Methods*: A prospective, randomized study was done in 80 patients of American Society of Anaesthesiologist (ASA) class I and II undergoing elective upper limb orthopedic surgeries under supraclavicular block. Patients were randomized into two groups of 40 each. Group B- Patients received inj. bupivacine 0.35%, 2mg/kg + inj. buprenorphine 6μg/kg. while in group T- Patients received inj. bupivacine 0.35% 2mg/kg+ inj. tramadol 2 mg/kg. Onset and duration of sensory and motor block, duration of postoperative analgesia and adverse effects of study drugs were compared in both the groups. *Results*: Sensory and motor block onset times were shorter in group B than in group T ($p < 0.05$). Motor block duration was longer in group B than in group T ($p < 0.05$).Similarly, duration of analgesia was longer in group B compared to group T (942.83±124.51 min vs 478.31±52.60 min) ($p<0.001$). *Conclusion*: Buprenorphine when added to bupivacaine in supraclavicular block shortened the onset of sensory and motor block , enhances the duration of motor block and duration of analgesia compared to tramadol without significant side effects.

Keywords: Buprenorphine; Tramadol; Supraclavicular Block.

Introduction

Surgeries of the upper extremity are routinely done under brachial plexus anesthesia, as it is well known to provide surgical anesthesia and postoperative analgesia. Supraclavicular brachial plexus block is mainly used for any surgery in the upper extremity below shoulder, because it is a safe technique with rapid onset, reliable anesthesia and avoids the untoward effects of general anesthetic drugs and upper airway instrumentation [1].

Local anesthetic of a choice for brachial plexus anesthesia is inj.bupivacaine because it offers the advantage of providing a long duration of action with adequate sensory and motor neural block [2]. The problem solely with local anesthetics is that they cannot provide prolonged postoperative analgesia.

The aim of management of postoperative pain is minimizing the dose of medications in turn lessen side effect and still providing adequate analgesia. Management of postoperative pain relievers sufferings and leads to early mobilization, shortened hospital stay, reduce ospital coast and increase patient satisfaction [3].

Significant prolongation of brachial plexus analgesia can be achieved with placement of

Corresponding Author: Amol Singam, Associate Professor, Dept. of Anaesthesia, Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha, Maharashtra 442001, India.
E-mail: dramolsingam@gmail.com

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continuous catheters. For moderate prolongation of analgesia, various adjuvant drugs can be admixed with local anesthetic including opioids such as morphine, fentanyl, tramadol, buprenorphine, sufentanil and calcium channel blockers such as verapamil and α-agonists such as clonidine to prolong the duration of postoperative analgesia without prolonging motor blockade or causing systemic side effects [4].

The demonstration of presence of opioid receptors in the peripheral nervous system by Fields et al [5], prompted many investigations on the use of opioids either alone or combined with local anaesthetics for regional anaesthesia procedures. Important factors determining the duration of action include lipid solubility and the affinity of different opioids for their receptors [6].

Several studies have shown that the addition of buprenorphine, an agonist antagonist opioid to bupivacaine produces longer postoperative analgesia compared to other opioids [6,7].Tramadol, a μ receptors agonist has also been shown to improve postoperative analgesia when used as an adjuvant in brachial plexus block with less respiratory depressant effect due to weak μ receptor affinity [8].

The aim of this study was to evaluate and compare the efficacy of buprinorphine 6 µg / kg and tramadol 2mg / kg added to bupivacaine 0.35% regarding onset and duration of sensory motor block and total duration of post operative analgesia as a primary outcome , hemodynamic variables and side effects such as sedation, pruritus and nausea-vomitting associated with the study drugs were also evaluated.

Patients and Methods

This study was conducted in Department of Anaesthesiology, Acharya Vinobha Bhave Rural Hospital (AVBRH) affiliated to Jawaharlal Nehru Medical College, Sawangi (M), Wardha over the period of two years. After obtaining hospital ethics committee permission and written informed consent, 80 patients belonging to American Society of Anaesthesiologists (ASA) physical status class I and II and aged between 20 to 60 years, weighing between 40 to 70 kgs, scheduled for elective hand, forearm or arm orthopedic surgeries under supraclavicular block were included in this study. Exclusion criteria included history of allergic reaction to local anaesthetics and study drugs, coagulopathy, pregnant women, local sepsis or deformity, severe neurologic disorders.

Pre-anesthetic checkup of the patients were done a day prior to surgery. After taking detailed history, thorough general, physical and systemic examination was done. Weight & routine investigations of the patient were recorded. Informed consent was taken and patients were asked to have 8 hours of fasting. Patients did not receive any pre-medications.

On arrival in operation theater, 18G i.v. cannula was secured in opposite limb and infusion of Ringer's lactate was started at the rate of 80 ml / hr. Standard monitors including non-invasive blood pressure, pulse oxymetry and ECG were attached to the patient and baseline pulse rate, systolic & diastolic blood pressure and SpO_2 values were recorded. Emergency drugs and equipments including facilities for GA were kept ready. Study drug was prepared in a sterile bowl by taking 28 ml 0.5% inj. bupivacaine + 12 ml normal saline (40 ml 0.35% inj. bupivacaine) + inj. tramdol 100mg / inj. Buprinorphine 0.3 mg.

Patients were randomly allocated by computer generated random number table in one of the two groups of 40 patients each.

Group B (Buprenorphine): Patients received inj. bupivacine 0.35% 2mg / kg + inj. buprenorphine - 6 µg / kg.

Group T (Tramadol): Patients received inj. bupivacine 0.35% 2mg / kg + inj. tramadol-2mg / kg.

Block was given by subclavian perivascular technique using nerve locator. The nerve locator utilized was the Stimuplex DIG (B. Braun, Allentown, PA). A 22-gauge, 2-inch, short-bevel insulated needle (Stimuplex; B. Braun) was used for all blocks. Patients were made to lie down supine with head turned to opposite side. Under all aseptic precautions a skin wheal was raised 1 finger breadth over the lowermost palpable portion of the interscalene groove lateral to subclavian artery pulsations and the block needle was inserted through it. The intensity of stimulating current was initially set to deliver 0.9 mA with stimulation frequency was set at 1 Hz, the needle was advanced directly caudadly until a flexor or extensor response of all the fingers was obtained, at this point current was gradually decreased to 0.4 mA. If the response was still visible, the local anesthetic solution according to group was injected in 3-5 mL increments with repeated aspirations between each increment. If any arterial puncture was noted, the block needle was withdrawn slightly and its direction was changed. The time of administration of drug was noted. Visual and verbal contact with

the patient was maintained throughout the procedure.

Vital parameters such as pulse rate, respiratory rate, SpO_2 and blood pressure were monitored every 5 min for first 30 min and thereafter every 15 min till end of surgery.

Two minutes after performance of block, Sensory block was evaluated at 1 min interval by the response to pinprick testing over 4 major nerve distribution areas (radial, ulnar, median and musculocutaneous) on a three-point scale (0 - normal sensation; 1 - blunt sensation; 2 - no sensation) [9] and motor block was evaluated with Modified Bromage Scale (MBS; 0 - Normal muscle function, 1 - Elbow flexion, 2 - Wrist flexion, 3 - Full motor block) [7].

Onset of Sensory Block: Time from end of injection of study drug to pinprick test score of 1.

Onset of Motor Block: Time from end of injection of study drug to appearance of MBS grade 1.

Complete Sensory Block: Time from end of injection of study drug to pinprick test score of 2.

Complete Motor Block: Time from end of injection of study drug to appearance of MBS grade 3.

Duration of Surgery: The duration between first skin incision and complete closure was the duration of surgery.

Duration of Motor Block: Time between motor block onset and full arm mobility (MBS grade 0).

Total Duration of Analgesia (Duration of Sensory Block): The duration between sensory block onset and first injection of rescue analgesic.

The duration of analgesia was noted according to the 0-10 visual analogue scale (VAS) [10] where 0 represents no pain and 10 means worst possible pain. VAS assessment was done postoperatively half hourly for 12 h then every 1 hourly till patient complained of pain. Rescue analgesic Inj. diclofenac 75 mg IM was administered when VAS was 4 and above.

In case of pain sensation during the surgery, local anesthetic infiltration by inj.lignocaine 1.5%, 5–10 ml was done. If pain persisted, 50 μg fentanyl along with 1 mg midazolam was given IV. The doses was recorded if administered.

All patient complaints during and after block, all block-related complications and side effects of drugs were recorded.

Statistical Analysis

As a result of the power analysis we performed, it was decided that each group should have at least a minimum of 26 cases (80% power and 0.05% α error). Considering possible data loss due to technical reasons, both groups were admitted 40 patients.

Statistical analysis was done by using descriptive and inferential statistics using chisquare test and student's unpaired t test. Software used in the analysis was SPSS 17.0 version and $p<0.05$ is considered as level of significance.

Results

The mean onset of motor block was significantly faster in Group B (4.01±0.22 min) than Group T (6.14 ± 1.13 min).While, the mean onset of sensory block

Table 1: Demographic Data

Patients Characteristics	Group B	Group T	p- value
Age (years)	36.79 ± 10.23	33.62 ± 11.80	t= 1.28, p = 0.20,NS
Weight (kilograms)	55.42 ± 9.82	58. 69 ± 7.02	t= 1.71, p = 0.090,NS
Gender (male/ female)	29 / 11	27 / 13	χ^2 =0.23, p = 0.62,NS
ASA (I/ II)	18 / 22	21 / 19	χ^2=0.44, p = 0.50,NS
Duration of surgery	79.57 ± 19.33	86.28 ± 15.28	t= 1.72, p = 0.089,NS

Table 2: Block Characteristics and Duration of Analgesia

Block Characteristics	Group B	Group T	t-value	p- value
Onset of Motor block(min)	4.01± 0.22	6.14 ± 1.13	11.70	0.0001,**S**
Onset of Sensory block(min)	7.10 ± 0.75	11.32 ± 1.41	19.55	0.0001,**S**
Complete Motor block(min)	9.74± 3.02	15.04 ± 3.17	7.65	0.0001,**S**
Complete sensory block(min)	12.41± 5.21	19.15± 4.87	5.97	0.0001,**S**
Duration of Motor block(min)	343.28 ± 47.82	305.49± 45.86	3.60	0.0006,**S**
Total Duration of Analgesia(min)	942.83±124.51	478.31 ± 52.60	50.62	0.0001,**S**
VAS at 12 hours	2.01± 0.63	4.00	19.97	0.0001,**S**

Table 3: Adverse Effects

Adverse Effects	Group B	Group T	p- value
Nausea & vomiting	2	2	
Pruritus	1	0	
Sedation	0	0	κ^2 value=0.21
Urinary retention	0	0	
Respiratory depression	0	0	p= 0.64, NS
Pnemothorax	0	0	
Phrenic nerve palsy	0	0	
Horner's syndrome.	0	0	

was significantly longer in Group T (11.32±1.41 min) than in Group B (7.10±0.75 min). Similarly, time required to achieve complete motor block was faster in Group B (9.74±3.02 min) than Group T (15.04±3.17min) and the time to achieve complete sensory block was significantly longer in Group T (19.15±4.87min) than in Group B (12.41±5.21 min).

The mean duration of motor block was more in Group B (343.28 ± 47.82 min) than Group T (305.49± 45.86 min) with $p<0.05$ which was statistically significant.

The duration of analgesia (i.e. onset of block to VAS>4) was much longer in Group B (942.83±124.51 min) than in Group T (478.31±52.60 min) with p< 0.001. In Group B 23 (57.5%) patients had duration of analgesia lasting for about 14-18 hrs, whereas in Group T only 18 (45%) patients had duration of analgesia lasting for about 6-8 hrs.VAS score was 4 at 12th postoperative hour in group T where as in group B it was only 2.01±0.63 (Table 2). No statistically significant changes were observed in hemodynamic and respiratory parameters in either group. No supplementation of block was required in any of the group.

Two patients each in group B and in group T out of 40 (5%) had nausea & / or vomiting. In group B, 1 patient had pruritus was mild, treated with cetirizine hydrochloride. No patient in either group was sedated or had any evidence of urinary retention postoperatively. No technique related adverse events like pneumothorax, phrenic nerve palsy or Horners syndrome was seen in either group (Table 3).

Discussion

There has always been a search for adjuvant in regional nerve block that prolong the duration of analgesia but associated with lesser side effects. The search for the ideal additive continues and leads us to try and compare commonly used opioids tramadol and buprenorphine.

All surgical procedures are associated with some degree of pain, it is a well-accepted fact that pain is maximum with orthopedic surgeries. Supraclavi-cular block is accepted as mode of regional analgesia for upper limb surgeries as it provides anesthesia for surgeries around elbow, forearm and hand. With this technique, landmarks are easy to locate and tourniquet pain is better tolerated [11]. With advent of opioid receptors, variety of opioid agents is used for postoperative analgesia via brachial plexus block [5].

In this study, 80 patients were enrolled, 40 in each group. Both the groups were comparable with respect to the demographic profile in terms of age, weight, gender ratio and ASA physical status. The duration of surgery was similar in both the groups. (Table 1).

We observed a 100% success rate in our study and none of our patients were supplemented with additional analgesics or local anaesthetics at surgical site or general anaesthesia. This is in accordance with the study by Jeon et al [12], wherein they concluded that the elicitation of a twitch on the fingers was more effective in increasing the success rate (93.7% versus 75.0%).

Onset time of the motor and the sensory blocks was delayed in the tramadol group compared to buprinoprphine group. Similarly, the time required to achieve complete motor and the sensory blocks were also longer in tramdol group compared to buprinorphine group (Table 2). These findings correlate with the study done by Yadav et al [8], they used tramadol and achieved the complete motor and the sensory blocks at 13.07± 1.36 min and 18.20±1.47 min, respectively. While , Mathew et al [6] used buprinorphine and achieved the onset of the motor and sensory blocks at 3.25±0.086 min and 6.17±0.081 min, respectively. Similar results cited by other researchers were also comparable with the results of our study [13,14]. Onset of motor block was earlier than the onset of sensory block, which can be explained by the "core and mantle" concept i.e. the outer motor fibers are blocked earlier than the sensory fibers which are situated deeper in the brachial plexus at the level of trunk and division [15].

Duration of analgesia was maximum in the buprenorphine group (942.83±124.51 min), as compared to that in tramadol group (478.31± 52.60 min).

Table 4: Duration of analgesia in other studies on Brachial Plexus Block by adding Buprenorphine or Tramadol with LA

Studies	Drug used	Approach	Duration of Analgesia
Bazin et al[16] 1997	0.5% Bupivacaine 1mg / kg + 1% Lignocaine. with Adr.1:200000 2mg / kg + buprenorphine 3µgm / kg	Supraclavicular	20 hours
Regmi et al[17] 2015	28 ml of 0.5% bupivacaine with 2 ml. (100 mg.) tramadol	Suraclavicular	456 ± 64.19 minutes
Mitra [18] 2007	38 ml of 0.25% bupivacaine + 2 ml tramadol (100 mg)	Supraclavicular	410 ± 95.1 minutes.
Thakur et al[19] 2015	15 ml 0.5% bupivacaine, 15 ml 2% lignocaine with adrenaline 1:200000, 9 ml normal saline (NS) plus 2 µg/kg buprenorphine	Axillary	20.61 ± 1.33 hours

Mean VAS score at 12 hr was 4 in tramadol group while it was only 2.01± 0.63 in buprenorphine group. This shows that quality of block was better in buprenorphine group.

Tramadol is centrally acting analgesic and has dual mechanism of action. It is µ receptors agonist, which are responsible for nociception. At the same time, in CNS it inhibits the reuptake of nor-epinephrine and serotonin which inhibits pain transmission in the spinal cord [8]. Buprenorphine, exhibits mixed agonist-antagonist activity at classical opioid receptors. Its analgesic effect is due to partial agonist activity at µ-receptors and antagonist activity at κ-receptor which results in hyper-polarization and reduced neuronal excitability. Importantly, buprenorphine slowly dissociates from its receptor which is responsible for the longer duration of action compared to other opioids [20].

It is unlikely to have systemic adverse effects with perineural administration of drugs, but the systemic absorption of the drug may have a central effect. Adverse effect profile of both groups did not exhibit any significant difference. (Table 3) The results were in accordance with studies done by Candido & Winnie [21] , Robaux et al [22] and Bono et al [23].

From the above findings, we can suggest that opioids can be safely and effectively used in the brachial plexus block for improving post operative analgesia. We compared buprenorphine and tramadol as an adjuvant to bupivacaine in supraclavicular brachial plexus block and found that buprenorphine group had earlier onset of sensory, motor blockade and longer duration of post operative analgesia than tramadol group.

A limitation of our study was the incorporation of an ultrasound guided localization of brachial plexus technique. It could have drastically decreased the total volume of the local anaesthetics.

Conclusion

We conclude that buprenorphine besides shortening the onset time of sensory and motor block, prolongs the duration of motor block, post-operative analgesia and enhances the quality of block compared to tramadol when used as an adjuvant to bupivacaine in supraclavicular brachial plexus block without any significant side effects.

References

1. Sudani C, Rao SM, Munta K. A comparative study of ropivacaine alone versus ropivacaine with dexmedetomidine in supraclavicular brachial plexus block. Anesthesiol Open J. 2016;1(1):28-34.
2. De Jong R. Local anesthetic pharmacology. In: Brown DL, editor. Regional Anaesthesia and Analgesia. Philadelphia, PA: Saunders; 1996.pp.124–42.
3. Kumar S, Palaria U, Sinha AK, Punera DC, Pandey V. Comparative evaluation of ropivacaine and ropivacaine with dexamethasone in supraclavicular brachial plexus block for postoperative analgesia. Anesth Essays Res 2014;8:202-8.
4. Sarma BA, Sundari MR, Suman KVJ, Rao DBVM. Low dose dexmedotomidine as an adjuvant to bupivacaine in supraclavicular brachial plexus block. IOSR Journal of Dental and Medical Sciences (IOSR-JDMS). 2015;14(6)Ver.II:104-07.
5. Fields HL, Emson PC, Leigh BK, Gilbert RFT,Iversen LL. Multiple opiate receptor sites on primary afferent fibres. Nature 1980;284:351-353.
6. Mathew A, Balamurugan B, Gowthaman R. Buprenorphine as an Adjuvant to Bupivacaine in Supraclavicular Brachial Plexus Block. Chettinad Health City Medical Journal; 2014;3(2):39-43.
7. Sarkar D, Khurana G, Chaudhary A, Sharma J P. A Comparative Study on the Effects of Adding Fentanyl and Buprenorphine to Local Anaesthetics in Brachial

Plexus Block. Journal of Clinical and Diagnostic Research 2010;4:3337-3343.

8. Yadav C, Saini P.Comparison of Tramadol and Dexamethasone as an adjuvant to Bupivacaine in Supraclavicular brachial plexus block: A Randomised Comparative Study in Patients undergoing Elective Upper limb surgeries. Sch. J. App. Med. Sci., 2016; 4(6D):2153-2158.
9. Nallam SR, Chiruvella S, and Karanam S.Supraclavicular brachial plexus block: Comparison of varying doses of dexmedetomidine combined with levobupivacaine: A double-blind randomised trial. Indian J Anaesth. 2017 Mar;61(3):256–261.
10. Haefeli M, Elfering A: Pain assessment. Eur Spine J. 2006;15:S17-S24. 10.1007/s00586-005-1044.
11. Vinod C, Talikoti D. Comparison of butorphanol and buprenorphine as an adjuvant to local anaesthesia in supraclavicular brachial plexus block for post-operative analgesia. Journal of evaluation of medical and dental sciences; 2014;3(16):4287-4293.
12. Jeon DG, Kim WI. Comparison of a supraclavicular block showing upper arm twitching response with a supraclavicular block showing wrist or finger twitching response. Korean J Anesthesiol. 2010; 58(5):464-7.
13. Jadon A, Panigrahi M, Parida S, Chakraborty S, Panda A. Buprenorphine improves the efficacy of bupivacaine in subclavian perivascular brachial plexus block.The internet journal of anaesthesiology 2008;16(2).
14. Shrestha B.R, Maharjan S.K, Shrestha S, Gautam B, Thapa C, Thapa PB et al.; comparative study between tramadol and dexamethasone as an admixture to bupivacaine. JNMA, 2007;46(168).
15. Winnie AP, Ramamoorthy S, Tay CH, Patel KP, Durrani Z. Pharmacokinetics of local anaesthetics during brachial plexus blocks. Anesthesia and Analgesia 1977;56:852-861.
16. Bazin JE, Massoni C, Bruelle P, et al. The addition of opioids to local anaesthetics in brachial plexus block: the comparative effects of morphine, buprenorphine and sufentanil. Anaesthesia 1997;52:858–62.
17. Regmi NK , Subba S , Sharma UC. A comparative clinical evaluation of efficacy of tramadol as an adjuvant to bupivacaine en brachial plexus block for upper limb surgery. Journal of Nepalgunj Medical College; 2015;13(2);13-16.
18. Mitra LG; Tramadol as an adjunct for Brachial plexus block. J Anaesth Clin Pharmacol 2007;23(2):187-9.
19. Thakur D and Malde A. Buprenorphine for postoperative analgesia: Axillary brachial plexus block versus intramuscular administration in a placebo-controlled trial. J Anaesthesiol Clin Pharmacol. 2015 Jul-Sep;31(3):360–364.
20. Ohatani M. Basic Pharmacology of Buprenorphine. European journal of Pain supplements; 2007;1(s1): 69-73.
21. Candido KD, Winnie AP, Ghaleb AH, Fattouh MW, Franco CD. Buprenorphine added to the local anaesthetic for axillary brachial plexus block prolongs post operative analgesia. Regional anesthesia and pain medicine 2002;27:162-167.
22. Robaux S Blunt C, Viel E, Cuvillon P. Tramadol added to 1.5% Mepivacaine for brachial plexus block improves post operative analgesia dose dependently. Anesth Analg 2004;98:1172-1175.
23. Bono AV, Cuffari S. Effectiveness and tolerance of tramadol in cancer pain. A comparative study with respect to buprenorphine. Service d' Urologie,Hopital di Circolo, Varese, Italie. Drugs 1997;53 Suppl 2:40-9.

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Evaluation of Low Dose Fentanyl-Midazolam Premedication on Sevoflurane Induction for Ease of LMA Insertion in Adults

Arin Choudhury[1], Meena Singh[2], Dootika Liddle[3]

[1]Assistant Professor, Dept. of Anaesthesia, Pandit Bhagwat Dayal Sharma Post Graduate Institute of Medical Sciences, Rohtak, Haryana 124514, India. [2]Assistant Professor, Dept. of Anaesthesia, BPS Government Medical College, Khanpur Kalan, Sonepat, Haryana 131305, India. [3]Professor and Head, Dept. of Anaesthesia, Christian Medical College, Ludhiana, Punjab 141008, India.

Abstract

Background: Sevoflurane, a halogenated volatile anesthetic agent and premedication with fentanyl and midazolam are both helpful in deepening the plane of anaesthesia. When used in synergism, these can aid in a smooth laryngeal mask airway (LMA) insertion. *Materials and Methods:* 80 patients of ASA I and II status, posted for minor elective surgery were randomized in a double-blind study to compare the conditions for LMA insertion following premedication with fentanyl 0.6µg/kg and midazolam 9µg/kg with Sevoflurane (Group I) and Sevoflurane alone (Group II). The time to loss of eye reflex, time for LMA insertion, ease of LMA insertion was noted and hemodynamic variables (heart rate, mean arterial blood pressure) were recorded prior to induction of anaesthesia, prior to LMA insertion and every minute after LMA insertion for 5 minutes. Secondary outcomes included evaluation of adverse effects in two groups. *Results:* The groups were comparable with respect to the demographic profile and baseline parameters. The time to loss of eye reflex as well as time taken for insertion of LMA was significantly lower in the study group as compared to the control group ($p<0.001$). The composite scoring system (comprising Jaw opening, ease of insertion, coughing, gagging, laryngospasm, movement at insertion) was higher in the study group, demonstrating better LMA insertion conditions in the study group as compared to control group, even though it is not statistically significant. Adverse effects like apnea, movement, cough, nausea, shivering were comparable in both the groups. *Conclusion:* Addition of low dose fentanyl and midazolam intravenously preceding vital capacity induction with Sevoflurane *8%* in O2 6l/min provides better conditions for LMA insertion with insignificant hemodynamic effects.

Keywords: Volatile Induction; Sevoflurane; LMA; Premedication; Midazolam; Fentanyl.

Introduction

The laryngeal mask airway (LMA) is a popular alternative to the face mask or endotracheal tube for securing the airway in patients undergoing elective surgery under general anaesthesia [1,2]. The advantages include less invasion of the respiratory tract, avoidance of laryngoscopy, endobronchial or esophageal intubation. However, satisfactory insertion of the laryngeal mask airway after induction of anaesthesia requires sufficient depth for suppression of airway reflexes else, it may lead to coughing, gagging and laryngeal spasm. Propofol is commonly used for LMA insertion but it is associated with hypotension, apnea and pain on injection.

The introduction of volatile anaesthetic agent sevoflurane, led to resurgence of interest in Inhalational induction of anaesthesia in adults [3-5]. Sevoflurane is a halogenated volatile anesthetic agent with a pleasant odour and low blood gas solubility which allows rapid, smooth inhalational induction with excellent recovery. Induction of comparable to intravenous propofol

Corresponding Author: Meena Singh, Assistant Professor, Dept. of Anaesthesia, BPS Government Medical College, Khanpur Kalan, Sonepat, Haryana 131305, India.
E-mail: minkee3@gmail.com

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[6]. Sevoflurane, when used as maintenance anaesthesia allows rapid recovery and is associated with an acceptably low incidence of post-operative nausea and vomiting [6,7].

Various adjuvants when added to propofol have shown to further improve LMA insertion conditions. These include lignocaine, midazolam, low dose of muscle relaxant and opioid [8-13]. Concomitant administration of opioids such as fentanyl, alfentanyl improved conditions for LMA insertion [14,15]. Benzodiazepines like midazolam lowers anxiety levels in addition to deepening the plane of anaesthesia.

We conducted this study with the objective to compare the effect of low dose fentanyl and midazolam premedication on the ease of insertion of LMA during sevoflurane induction.

Materials and Methods

This was a randomized, double blind, comparative, prospective study. After approval from the institutional ethical committee and written informed consent, eighty adult patients in the age group of 18 to 75 years, of either sex and of ASA (American Society of Anaesthesiologists) [1] grade I or II, posted for minor elective surgery under general anaesthesia were randomly allocated into two groups using computer generated randomization list.

Group I (FM): Patients received premedication with fentanyl 0.6 µg / kg and midazolam 9 µg / kg to which normal saline was added to obtain a volume of 2.5 ml given intravenously, five minutes before tidal volume sevoflurane (8%) induction with 6L / min O2.

Group II (Placebo): Patients received 2.5 ml of normal saline given intravenously, five minutes before tidal volume sevoflurane (8%) induction with 6L / min O2.

Patient with upper respiratory tract infection, anticipated difficult airway,morbid obesity BMI > 32 kg / m2, full stomach or taking opioids, sedatives or antiepileptics were excluded. Surgeries requiring full relaxation, shared airway and head and neck surgeries were excluded.

All patients were kept eight hours fasting and given tab Ranitidine 150 mg and T. Metoclopromide 10mg HS. In the operating room, before induction of anaesthesia, intravenous access was secured and crystalloid infusion was commenced. Standard monitoring included ECG, non-invasive blood pressure, SpO2 and EtCO2.

Patients were randomized into one of the two groups of 40 each and premedication was given as per group allocation. Magill's circuit was primed with sevoflurane 8% and O2 (flow rate 6L / min) for 30 seconds. Patient was asked to exhale maximally and the primed circuit was then connected to the face mask. They were asked to take vital capacity breaths (Vital capacity technique). Loss of consciousness was defined as the time the patient stops rhythmically tapping their fingers and was confirmed by loss of the eyelash reflex. After loss of consciousness, muscle tone of the patient's jaw was assessed at every 10 seconds. The LMA was inserted by an experienced anaesthesiologist who was blinded to the drugs used. The position of the LMA was confirmed. LMA insertion conditions were graded on a 3 point scale using 6 variables and the overall conditions for LMA insertion was assessed.

Table 1: Grading of conditions for Laryngeal Mask Airway insertion

Introduction of the LMA	**3**	**2**	**1**
Jaw opening	Full	Partial	Nil
Ease of insertion	Easy	Difficult	Impossible
Patient response	**3**	**2**	**1**
Coughing	Nil	Minor	Severe
Gagging	Nil	Minor	Severe
Laryngospasm	Nil	Partial	Total
Patient movement	Nil	Moderate	Vigorous
Total score			
18	Excellent		
16-17	Satisfactory		
<16	Poor		

If the first attempt was unsuccessful, repeat administration of sevoflurane was used to deepen the plane of anaesthesia before reattempting LMA insertion. Successful insertion of the LMA denotes the end of induction of anaesthesia and commencement of the maintenance phase.

The time of induction i.e. the time (in sec) taken from induction of anaesthesia to the loss of eye lash reflex, and the time for LMA insertion was recorded in both the groups. Heart rate (HR), mean arterial pressure (MAP),Respiratory (RR), and oxygen saturation (SpO2) was recorded prior to induction of anaesthesia, prior to LMA insertion and every minute after LMA insertion for 5 minutes in both the groups. Hereafter, anaesthesia was maintained at the discretion of the anaesthesia care provider.

Bradycardia, hypotension or any other significant complications was recorded.

Statistical Analysis

The data collected was tested for normalcy. Normally distributed parametric data was analyzed using unpaired Student'st test while Chi square test was performed for categorical data. The data for which the distribution was not normal 'Mann-Whitney test was used. For comparison within the group, ANOVA test was used. p value <0.05 was considered statistically significant.

Observation and Results

The demographic variables and baseline hemodynamic parameters (HR, MAP) were statistically comparable in both thegroups (Table 2, 3).

Grading of conditions for LMA insertion was noted. Adequate jaw relaxation and low incidence of coughing, gagging was found in both the groups. Limb movements followed a similar trend. No incidence of laryngospasm was noted in either group (Table 4).

On comparing the overall condition for the LMA insertion in betweenthe two groups, it was found to be poor (<16) in 2 patients in group I and 4 patients in group II. However, it was satisfactory

Table 2: Distribution according to demographic variables

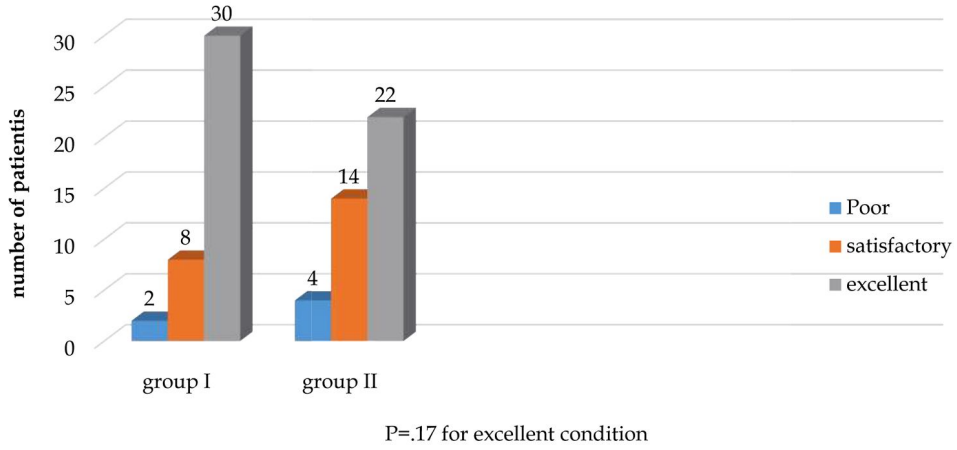
	Group I (N=40) Mean ± SD	Group II (N=40) Mean ± SD	P-value
Age	34.45±14.28	40.7±15.39	.06
Weight	57.73±11.74	61.68±17.21	.23
Height	1.62±0.092	1.51 ± 0.083	.32
BMI	21.77±4.37	22.58±6.72	.53
Sex			
Male	25(62.5%)	20(50%)	0.60
Female	15(37.5%)	20(50%)	

Table 3: Hemodynamic parameters

Heart Rate						
	Time after premedication (in minutes)					
	0	1	2	3	4	5
Group I	98.65±16.75	95.66±15.33	94.50±16.24	93.18±15.63	92.13±15.25	91.10±15.96
Group II	95.28±13.51	94.45±12.84	94.50±13.33	93.95±13.15	94.20±13.47	94.28±13.57
P Value		0.32	0.25	1.00	0.81	0.52
	Time after sevoflurane induction (in minutes)					
		1	2	3	4	5
Group I		92.58±15.37	91.25±16.51	90.38±16.72	90.20±16.47	90.40±18.20
Group II		93.15±13.67	91.78±14.04	90.93±14.56	90.13±15.29	89.40±14.43
P Value		0.34	0.86	0.87	0.88	0.98
Mean Arterial Pressure						
	Time after premedication (in minutes)					
	0	1	2	3	4	5
Group I	96.05±8.01	95.42±7.74	94.74±7.58	94.84±7.25	94.95±7.04	93.00±11.05
Group II	99.18±9.41	97.03±12.32	98.20±9.29	97.50±8.86	97.58±9.14	96.92±9.72
P Value		0.11	0.48	0.07	0.14	0.15
	Time after sevoflurane induction (in minutes)					
		1	2	3	4	5
Group I		90.53±6.64	90.03±6.86	89.03±7.06	88.38±7.29	87.29±7.32
Group II		94.65±9.07	93.21±9.58	91.70±8.27	91.00±9.77	90.93±9.81
P Value		0.02	0.09	0.12	0.17	0.06

Table 4: Grading of conditions for Laryngeal Mask Airway insertion

	Score		Group I – Group (n=40)	Group II – Group (n =40)	*P* value
Jaw Opening	1	Nil	2(5.00%)	0 (.000%)	***.82***
	2	Partial	3(7.50%)	6(15.00%)	
	3	Full	35(87.30%)	34(85.00%)	
Ease of Insertion	1	Impossible	2(5.0%)	3 (7.5%)	***.30***
	2	Difficult	1(2.5%)	3 (7.5%)	
	3	Easy	37(92.5%)	34(85.0%)	
Cough	1	Severe	2(5.0%)	2(5.2%)	***.76***
	2	Minor	3(7.3%)	4(10.0%)	
	3	Nil	35(87.5%)	34(85.0%)	
Gagging	1	Severe	0(.0%)	0(0.0%)	***.49***
	2	Minor	0(.0%)	2(5.0%)	
	3	Nil	40(100.0%)	38(95.0%)	
Laryngospasm	3	Nil	40(100%)	40 (100%)	-
	2	Minor	0(0.0%)	0(0.0%)	
	1	Severe	0(0.0%)	0(0.0%)	
Patient movement	1	Vigorous	2(5.0%)	2(5.0%)	***.32***
	2	Moderate	2(5.0%)	6(15.0%)	
	3	Nil	36(90%)	32(80%)	



Graph 1: Overall conditions for Laryngeal Mask Airway Insertion

Table 5:

	Group I (N = 40) Mean± SD (sec)	Group II (N =40) Mean± SD (sec)	P Value
Time to Loss of Eye Reflex	50±0.30	72±0.38	<0.0001
LMA Insertion Time	80±0.45	100±0.35	<0.001

(16-17)in 8 patients in group I as compared to 14 in group II. But 30 patients in group I had excellent insertion condition as compared to 22 in group II. Even though group I had more ease in insertion of LMA than group II, when compared statistically between the groups, it was found to be insignificant (p value >0.05) (Graph 1).

The time to loss of eye reflex in group I was 50±0.30 sec whereas in group II, it was found to be 72±0.38 sec. This was highly significant with a p value of < 0.0001 when compared statistically. Similarly, the mean time taken for LMA insertion was found to be statistically significant with a p value < 0.001. The mean time taken was 80±0.45 sec in group I and 100±0.35 sec in group II. (Table 5).

There was no statistically significant difference in the complications or adverse events observed during the study.

Table 6: Complications on insertion of LMA

	Group I (N =40)	Group II (N=40)	P value
No complication	19 (47.5%)	23 (57.5%)	0.37
Apnea	7 (17.5%)	4 (10%)	0.15
Cough	3 (7.5%)	3 (7.5%)	1
Movement	7(17.5%)	8 (19.5%)	0.76
Nausea	2 (5%)	2(5%)	1
Shivering	2(5%)	0	0.49
Inadequate depth of anaesthesia	0	2 (5%)	0.49

Discussion

The present study was done to determine the effect of premedication on sevoflurane induction in adults and to evaluate the conditions for the insertion of LMA. Premedication with Fentanyl (.06µg/kg) and midazolam (9µg/kg) with 8% sevoflurane were used in the study group and 8% sevoflurane was used in the control group.

In the study group i.e. FM group, the overall condition for LMA insertion was found to be better when compared to placebo group, where two patients required deepening of anaesthesia again for the insertion of LMA. In the study group, LMA was inserted in all patient in the 1st attempt where as in the control group 7 patients required a 2nd attempt for insertion of LMA. Similar findings were noted by Sivalingam et al [16] where alfentanyl was used as a premedication with sevoflurane or propofol induction. Excellent condition for LMA placement were noted in the alfentanyl – sevoflurane group followed by alfentanyl –propofol group.

In our study,the time from induction to loss of eye reflex in FM group was reduced by 22 seconds and the time required for LMA insertion was reduced by >20 seconds. These findings were highly significant when compared to the placebo group. The synergistic action of low dose fentanyl and midazolam with sevoflurane was supported inthe various studies done by Muziet al [5], Lesage et al [17], Paris et al [18], and Ben-shlomo et al [5]. They demonstrated that fentanyl and midazolam act synergistically in such a way that 25% of ED50 of fentanyl was required in combination with 23% of ED50 of midazolam to achieve the ED50 for the combination. The time to loss of eye reflex varied from 35 to 90 sec in the previous studies. This difference was attributed to the different ways of induction such as single breath inhalation technique, normal breathing technique, or the vital capacity technique.

LMA was used in our study instead of tracheal intubation which was used by Muzi et al [5]. Therefore, lower dosage of fentanyl and midazolam could be used in LMA insertion as it is less stimulating than direct laryngoscopy and endotracheal intubation.

The adverse effect profile was comparable in both the groups (apnea, cough, and movement). However, apneic episodes were noted in the FM group. Similar episodes were reported by Kelly et al [19] during desflurane inhalational induction with or without fentanyl- midazolam premedication. These episodes of apnea may be attributed to hyperventilation by the patient and lowering of arterial $PaCO_2$ below respiratory threshold. The combined effect of sevoflurane and hypocarbia could have provoked apnea. After loss of consciousness, none of the patients required assisted ventilation as breathing resumed spontaneously.

The intravenous FM combination attenuates the pressor response of LMA insertion. Premedication during sevoflurane induction lowers the heart rate and blood pressure but within normal limit [16,20,21,22]. This fall in heart rate and Blood pressure is attributed to the opioid usage. Asystolic episodes on use of sufentanyl [23] and remifentanyl [24,25] have been reported but none with fentanyl.

Conclusion

A low dose combination of intravenous fentanyl-midazolam premedication administered before sevoflurane induction accelerates loss of consciousness and facilitates LMA insertion .This combination results in minimum hemodynamic variability and fewer side effects like apnea, cough, and movement

References

1. Brain AY, McGhee TD, Mcateeraj, Thomas A, Abu Suad MAW, Bushiman JA: The laryngeal mask airway development and prelimary trials of a new type of airway. Anaesthesia 1985;90:356-361.

2. Acalovshi U I. Miclescu A, Bugov L. The effects of propofol on laryngeal reactivity and the haemodynamic response to laryngeal mask insertion. Eur J Anaesth 1995;12:35.
3. Tanaka S, Tsuchida H, Nakabayashi K, Soki S ,Namaki A. The effects of sevoflurane, isoflurane, halothane, and enflurane on hemody-narnic responses during an inhaled induction of anesthesia via a mask in humans. AnesthAnalg 1996;82:821-6.
4. Sloan MH, Conard PF, Karsunky PK, Gross JB. Sevoflurane versus isoflurane: induction and recovery characteristics with single-breath inhaled inductions of anesthesia. AnesthAnalg 1996;82:528-32.
5. Muzi M, Colinco MD, Robinson BJ, Ebert TJ, et al. Induction of anesthesia and tracheal intubation with sevoflurane in adults. Anesthesiology 1996;85: 536-43.
6. Smith I, White PF, Nathanson M, Gouldson R. Propofol. An update on its clinical use. Anesthesiology 1994;81:1005-43.
7. Smith I, Nathanson MH, White PF. The role of sevoflurane in outpatient anesthesia. AnesthAnalg 1995;81:S67-72.
8. Lion AT, Mark YHC, Tat LL. Comparison of Sevoflurane with Propofol for Laryngeal Mask Airway insertion in adults. AnesthAnalg. 1999;88:908-12.
9. Cheam EWS, Chui PT. Randomized double-blind comparison of fentanyl. mivacurium or placebo to facilitate laryngeal mask airway insertion Anaesthesia 2000;55:323-6.
10. Chui PT, Cheam EWS. The use of low dose mivacurium to facilitate insertion of the laryngeal mask airway. Anaesthesia 1998;53:486-501.
11. Goddiff L. Magee L, Park CR. Propofol versus propofol with midazolam for laryneal mask insertion. Eur J Anaesth 1995;12:35-40.
12. Stonenam MD, Bree SE. Sneyd JR. Facilitation of laryngeal mask insertion. Effects of lignocaine given intravenously before induction with propofol. Anaesthesia 1995;50:464-6.
13. Ang S, Cheong KF, Ng TI. Aifentanil co-induction for laryngeal mask airway insertion. Anaesth Intensive Care 1999;27:175-8.
14. Hui JKL, Critchley LAH, Karmarkar MK, Lam PKK. Co-administration of alfentanil-propofol improves laryngeal mask airway insertion compared to fentanyl-propofol. Can J Anaesth 2002;49:508-12.
15. Ben-shlomo I , Abd-el-khalim H ,EzryJ.Midazolam acts synergistically with fentanyl for induction of anaesthesia.Br J Anaesth 1990;64:45-7
16. Sivalingam P, Kandasamy R, Madhavan G, Dhakshinamoorthi P. Conditions for laryngeal mask insertion. A comparison of propofol versus sevoflurane with or without alfentanil.Anaesthesia. 1999;54(3):271-276.
17. Lesage-S, Drolet P, Donati F, Racine S,Fortier LP, Audy D. Low dose fentanyl-midazolam combination improves sevoflurane induction in adults, Can J Anesth. 2009;50:33-39.
18. Paris ST, Cafferky M, Tarling M, Hancock P, Yate PM, Flynn PJ . Comparison of Sevoflurane and halothane for outpatient dental anaesthesia in children. British Journal of Anaesthesia 1997;79(3):280-284.
19. Kelly RE,Hartman GS, Embree PB, Sharp G, Artusio JF jr. Inhaled induction of anaesthesia and emergence from desflursne anaesthesia in the ambulatory surgical patient: the effect of premedication. Anesth Analg 1993;77:540-3.
20. Nathan N,Vaudroux D, Benrhaiem M, Marquet P, Preux PM, Feiss P. Low alfentanyl target-concentrations improve hemodynamic and intubation conditions during induction with sevoflurane.Can J Anesth. 2004; 51:382-7.
21. Plastow S. E, Hall J. E, Pugh S.C. Fentanyl supplementation of sevoflurane induction of anasthesia. Anaesthesia 2000;55(5):475-8.
22. Joo H.S, Perks WJ, Belo SE. Sevoflurane with remifentanil allows rapid tracheal intubation without neuromuscular blocking agents.Can J Anesth. 2002;48(7):646-650.
23. Cardinal V, Martin R,Tetrault JP, Colas MJ, GagnonL, ClaproodY.Bradycardie severe et asystolielorsd' induction au sevoflurane et sufentanil a faibledose: asystole following laryngoscopy. Br. J Anaesth 1998; 81:994-5.
24. Wang J, Winship S, Russell G .Induction of anaesthesia with sevoflurane and low dose ramifentanil: asystole following laryngoscopy.Br J Anaesth. 1998;81:994-5.
25. Kurdi O, Deleuze A, Marrei E, Bonnet F .Asystole during anaesthetic induction with ramifentanil and sevoflurane. Br J Anaesth. 2001;87:943.

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Low Dose Dexamethasone Reduces Spinal Buprenorphine Associated Nausea and Vomiting

Purushothaman Athul M.[1], Pujari Vinayak S.[2]

[1]Senior Resident [2]Associate Professor, Department of Anaesthesiology, MS Ramaiah Medical College & Hospitals, New BEL Road, MSR Nagar, Bangalore-560054, India.

Abstract

Background: Intrathecal Buprenorphine is an adjuvant to spinal anaesthesia offers the advantage of providing good analgesia, but is associated postoperative nausea and vomiting. Dexamethasone is a potent steroid and has good antiemetic effect. The aim of this randomized controlled trial was to compare the antiemetic efficacy of dexamethasone 4 and 8mg. *Methods:* 180 patients of either sex undergoing elective lower extremities and infra umbilical surgeries were included in the study. The patients in group D0, D4 and D8 received 5ml normal saline, 4 mg and 8mg dexamethasone respectively before spinal anaesthesia. Spinal anaesthesia was established with a single bolus of 0.5% hyperbaric bupivacaine 15 mg and buprenorphine 60mcg. The primary end point of this study was the total nausea and vomiting rate for 8 hours post spinal anaesthesia. The secondary end points were the incidence of nausea, vomiting and the occurrence of adverse events like pruritis. *Statistical Analysis:* The incidence of nausea, vomiting and pruritus was analyzed using a series of 3×2 χ2 tests. *Results:* Demographic profile was similar between the groups. The incidence of nausea was 16% in group D0 and was 5% in the groupD4 and D8. The incidence of vomiting was 5%, 3.3%and 1.7% in the D0, D4 and D8 groups respectively. The incidence of nausea and vomiting was not very different in the D4 and D8 groups. *Conclusions:* Both doses of prophylactic dexamethasone 4 / 8 mg significantly reduces the nausea and vomiting associated with intrathecal Buprenorphine. A dose of 4mg of dexamethasone is as efficacious as 8mg.

Keywords: Buprenorphine; Dexamethasone; Intrathecal Opiates; Nausea and Vomiting.

Introduction

Opioids are potent centrally acting analgesic drugs for the treatment of pain. The discovery of spinal opioid receptors has led to the use of spinal opioids to produce dense segmental analgesia that is devoid of the dose-limiting side effects associated with systemic opioid administration [1]. Buprenorphine is a long acting, highly lipophilic opioid, which has proved to be an excellent analgesic adjuvant for neuraxial blocks. Intrathecal Buprenorphine as an adjuvant to spinal anaesthesia offers the advantage of providing good analgesia whilst allowing early ambulation of the patient by sparing sympathetic and motor nerves [2-7]. The use of Buprenorphine has been associated postoperative nausea and vomiting the incidence of which has been found to be as high as 34% [2,4].

Dexamethasone is a potent steroid and has good antiemetic effect [8]. The combination of low cost and apparent safety makes dexamethasone a first-line agent for prophylaxis against postoperative nausea and vomiting (PONV) [9]. The Society for Ambulatory Anaesthesia (SAMBA) guidelines for the management of PONV recommends a prophylactic dose of 4 mg to 5 mg for patients at high risk of PONV regardless of the surgical procedure [10]. There are some studies that have used 8mg of dexamethasone for PONV prophylaxis and treatment, it has been found to have additional

Corresponding Author: Vinayak S. Pujari, Associate Professor, Department of Anaesthesiology, MS Ramaiah Medical College & Hospitals, New BEL Road, MSR Nagar, Bangalore-560054, India.
E-mail: drvinayak@outlook.com

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benefits like it improved post discharge quality of recovery in addition to reducing nausea, pain, and fatigue [11-13]. There are no studies on the use of dexamethasone for prevention of PONV associated with intrathecal buprenorphine. The aim of this randomized controlled trial was to compare the antiemetic efficacy of dexamethasone 4 and 8mg, when compared with placebo in the prevention of nausea and vomiting associated with intrathecal buprenorphine.

Material and Methods

A prospective placebo controlled study was conducted in 180 patients of either sex undergoing elective lower extremities and infra umbilical surgeries. The patients of American Society of Anaesthesiologists(ASA) Grade 1-3 aged between 18-70 years were included in the study. Patients who had steroid use within last 48 hours, allergy to dexamethasone and intraopertative conversion to general anaesthesia were excluded from the study. The patients satisfying the inclusion criteria was selected by random number table during the study period from the operation theatre register on a daily basis. Institutional ethical clearance was obtained and after obtaining a written informed consent the patients were allotted into three groups of 60 each. The patients in group D0 received 5ml normal saline, the patients in groups D4 received 4 mg dexamethasone and patients in groups D8 received 8mg dexamethasone.

All the patients received oral pantoprazole 40mg as premedication. Perioperative monitoring included electrocardiogram, non-invasive blood-pressure monitor and pulseoximetry. An 18-gauge IV cannula was inserted, and normal saline infusion was instituted. Midazolam 1 mg was administered following placement of intravenous line. The study drugs were prepared, diluted to 5 ml with normal saline and was administered by slow (over 30 seconds) intravenously immediately before performing spinal anaesthesia by an independent investigator not involved in the further management of patient. Patients, anaesthesiologists involved in intraoperative care, and investigators who will collect postoperative data were blinded to patient group allocation.

A standardized anaesthetic technique was followed. Anaesthesia was instituted in the sitting position using an aseptic technique, a 25-gauge Quinke needle was inserted via a midline approach into the L2-3 or L3-4 interspace. Anaesthesia was established with a single bolus of 0.5% hyperbaric bupivacaine 15 mg and buprenorphine 60mcg. The level of sensory blockade was assessed regularly by the level of touch sensation before surgical incision (T6-8 was considered adequate). Additional midazolam 1–2 mg iv was administered for intraoperative sedation on attending anaesthesiologist's discretion.

Supplemental oxygen 5 L/min via a facemask was administered during the surgery. Estimated fluid requirement and maintenance fluid were replaced with ringer latacte or 0.9% normal saline. A standard postoperative analgesic regimen of Paracetamol 1 gram iv infusion 6th hourly and tramadol 50 mg intramuscularly as required was prescribed for postoperative pain relief.

The primary end point of this study was the total nausea and vomiting rate for 8 hours post spinal anaesthesia. The secondary end points were the incidence of nausea, incidence of vomiting and the occurrence of adverse events like pruritis or any other adverse events in 8 hours following spinal anaesthesia. All episodes of nausea or vomiting were recorded during the first 8 hours after anesthesia. An investigator, who was blinded to the study group allocation asked patients if vomiting had occurred and if they felt nauseated. Vomiting was defined as the forceful expulsion of gastric contents from the mouth. Ondansetron 4mg was administered intravenously as a rescue antiemetic drug when patients had a nausea or when they experienced vomiting, or at the patient's request.

Statistical Methods

Sample size calculation: Sample size calculation was performed before starting the trial by using a statistical power analysis. The incidence of PONV following intrathecal buprenorphine was found to be 25% in a study by Khan et al, expecting a 75% reduction in the PONV in the dexamethasone group, based on an α error of 0.05 and power of the study to be 80%, the sample size was estimated to be 57 in each group [11]. To compensate for patients not completing the study or loss of data, we randomized 60 patients to each group. The Parametric data were analyzed by using analysis of variance. The incidence of nausea, vomiting and pruritus was analyzed using a series of 3×2 $\chi 2$ tests to determine differences among the three groups, followed by 2×2 $\chi 2$ tests for intergroup differences. A p value < 0.05 was considered statistically significant.

Results

A total of 180 patients were enrolled in the study, the patient characteristics, ASA physical status grade and surgical duration was similar between the three groups (Table 1). The incidence of nausea was 16% in the saline group (D0) and was only 5% in the groups that received dexamethasone (D4 & D8). The incidence of vomiting was 5%, 3.3% and 1.7% in the D0, D4 and D8 groups respectively. As the numbers were very small for comparison between the groups, the total incidence of nausea and vomiting were compared between the groups and was found to be significant (p=0.0228). Intergroup comparison was then done, the group D0 had a 21.7% incidence of nausea and vomiting. The groups that received dexamethasone D4 and D8 had a significantly reduced incidence of nausea and vomiting at 8.3% and 6.7% respectively (Figure 1). The groups D4 and D8 had a 61.5% and 69.23% reduced incidence of nausea and vomiting compared to the placebo group. The incidence of nausea and vomiting was not very different in the D4 and D8 groups(p=0.7289). The incidence of pruritis was not very different between the groups (Table 2). One patient in the D8 group had severe vomiting that only subsided with ondansetron 8 mg and metaclopramide 10 mg.

Table 1: Demographic data

	D0	D4	D8	P value
Age in years	52.60 ± 14.35	53.72 ± 12.05	54.15 ± 13.66	.808
Sex	Male 75% female 25%	Male 63.3% female 36.7%	Male 68.3% female 31.7%	.383
Weight in kg	65.81±8.20	67.06±9.15	63.38±9.02	0.066
Duration of surgery(minutes)	70.83 ±31.32	71.75 ± 29.10	66.32±28.56	.563
ASA grade I	60 %	60%	59.4%	.977
II	40%	40%	40.6%	

Data are presented in Mean ± standard devaition

Table 2: Incidence of Nausea, vomiting and pruritis

	D0	D4	D8
Nausea	10(16.7%)	3(5%)	3(5%)
Vomiting	3(5%)	2(3.3%)	1(1.7%)
Total	13(21.7%)	5(8.3%)*	4(6.7%) †
Pruritis	6(10%)	5(8.3%)	6(10%)

*P value = 0.0408 significant between D0 and D4 † P value =0.0184 significant between D0 and D8

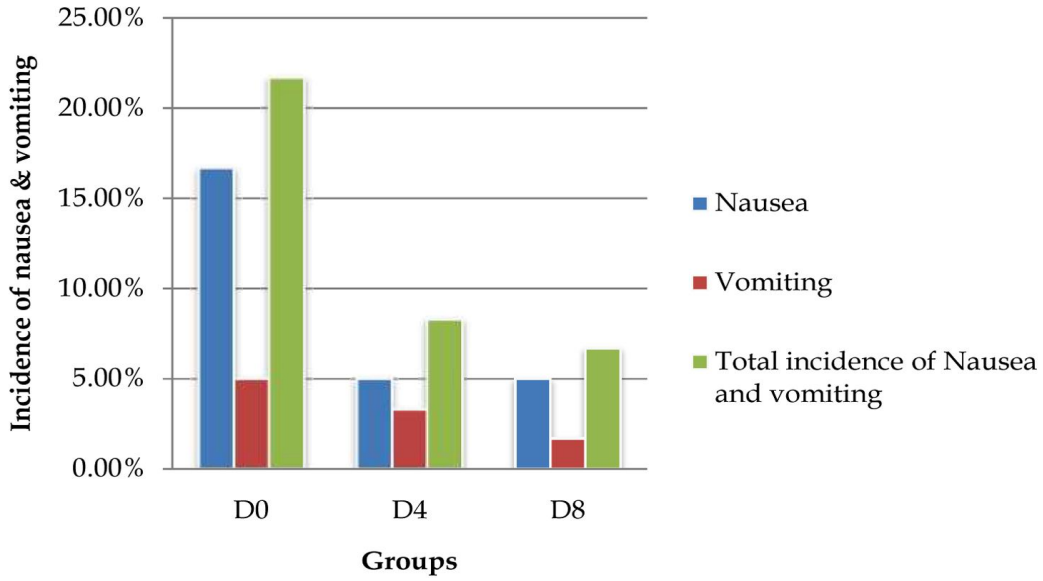

Fig. 1: Incidence of Nausea, vomiting and pruritis

Discussion

Neuraxial opioids are commonly used for providing postoperative analgesia and have many advantages over parentral narcotics. Although intrathecal opiates are an excellent means of providing post operative analgesia, but have troublesome side effects like nausea, vomiting and pruritis [1].

In the present study we found the incidence of nausea and vomiting following intrathecal buprenorphine to be 21.7% when no prophylactic dexamethasone was administered. Both doses of prophylactic dexamethasone 4/8 mg were effective in reducing the intrathecal bupernorphine associated nausea and vomiting, but had no effect on the incidence of pruritis.

Dexamethasone is used as an antiemetic in patients receiving highly emetogenic chemotherapy [14]. It has been found to significantly reduce the incidence of PONV. A prophylactic dose of 4 to 5 mg IV for patients at increased risk for PONV is recommended by SAMBA.[15] The efficacy of dexamethasone 4 mg IV for PONV prophylaxis has been found similar to ondansetron 4 mg IV and droperidol 1.25 mg IV [10].

Dexamethasone has been used for PONV prophylaxis following spinal anaesthesia. Khatiwada N et al. in a study involving patients undergoing total abdominal hysterectomy under subarachnoid block found that dexamethasone 4 mg group had a 40% incidence of nausea and vomiting, whereas the placebo group had an incidence of 67.5%.[16].

On review of literature on the use of dexamethasone to prevent intrathecal opiate induced nausea and vomiting, we found conflicting results. Wu et al. reported that dexamethasone alone was not an effective antiemetic but a combination of dexamethasone 4 mg and droperidol 6.25 mg reduced the incidence of PONV after spinal morphine 0.2 mg for cesarean section compared with placebo [17].

Szarvas et al. found that dexamethasone 8 mg IV plus ondansetron 8 mg was as effective as ondansetron 8 mg. The administration of dexamethasone alone was associated with a frequent incidence of PONV, demonstrating a lack of efficacy when used alone in the prophylaxis of PONV in patients undergoing major orthopedic operation with spinal morphine [18]. The incidence of PONV associated with intrathecal morphine has been found to be as high as 73% [19]. This high incidence of PONV is probably associated with failure of dexamethasone in preventing nausea and vomiting episodes. Whereas incidence of nausea and vomiting following intrathecal buprenorphine has been considerably less at around 20-34% which is similar our findings where the incidence was 21.7% [4,5].

When given as a single drug or when used in combination therapy, 4 mg to 5 mg of dexamethasone has been found to have comparable clinical effects on the prevention of PONV as the 8-mg to 10-mg dose [20].

Allen TK et al. in a systematic review found relatively strong evidence that a single IV dose of dexamethasone 5 to 10 mg was an effective antiemetic for women receiving neuraxial morphine for cesarean delivery or abdominal hysterectomy [21]. Wang et al suggested that dexamethasone, 5 mg iv is the minimum effective dose in preventing nausea and vomiting associated with epidural morphine for post-Cesarean analgesia [22]. The exact mechanism by which dexamethasone exerts an antiemetic action is not fully understood. But its antiemetic action may be via the blockage of the receptors in the nucleus tractus solitarius of the central nervous system. Dexamethasone may also exert its antiemetic action through some peripheral mechanism [23].

The possible mechanisms for antiemetic effect of corticosteroids are it may affect 5-hydroxytryptamine (5HT) turnover in the in neural tissue by shunting the metabolism of tryptophan away from 5-HT pathways and it may prevent the release of 5-HT in the gut or prevent activation of 5-HT receptors in the gastrointestinal system [24].

Dexamethasone had no effect on the incidence of pruritis, the incidence of which in our study was similar to the findings of other studies [18,21,25]. Our study has a few limitations, firstly we have only studied the incidence of PONV in the first eight hours, although few studies have found dexamethasone to have a delayed antiemetic as effect we found protocol violations were common in our pilot study postoperatively after eight hours. Secondly we have not studied the patient satisfaction or potentiation of analgesic effects. Lastly, we have compared two doses of dexamethasone and comparison with another class of antiemetic would have improved the study.

We conclude that dexamethasone significantly reduces the nausea and vomiting associated with intrathecal buprenorphine. A dose of 4mg of dexamethasone is as efficacious as 8mg and is a low cost alternative to other antiemetic drugs.

References

1. Bujedo BM, Santos SG, Azpiazu AU. A review of epidural and intrathecal opioids used in the management of postoperative pain. J Opioid Manag 2012;8:177–92.
2. Capogna G, Celleno D, Tagariello V, Loffreda-Mancinelli C. Intrathecal buprenorphine for postoperative analgesia in the elderly patient. Anaesthesia 1988; 43:128–30.
3. Sen M. Intrathecal buprenorphine for postoperative analgesia in orthopaedic surgery. J Indian Med Assoc 1992;90:5–6.
4. Khan FA, Hamdani GA. Comparison of intrathecal fentanyl and buprenorphine in urological surgery. J Pak Med Assoc 2006;56:277–81.
5. Ipe S, Korula S, Varma S, George GM, Abraham SP, Koshy LR. A comparative study of intrathecal and epidural buprenorphine using combined spinal-epidural technique for caesarean section. Indian J Anaesth 2010;54:205-9.
6. Singh AP, Kaur R, Gupta R, Kumari A. Intrathecal buprenorphine versus fentanyl as adjuvant to 0.75% ropivacaine in lower limb surgeries. J Anaesthesiol Clin Pharmacol 2016;32:229–33.
7. Rabiee SM, Alijanpour E, Jabbari A, Rostami S. Benefits of using intrathecal buprenorphine. Casp J Intern Med 2014;5:143–7.
8. Toner AJ, Ganeshanathan V, Chan MT, Ho KM, Corcoran TB. Safety of Perioperative Glucocorticoids in Elective Noncardiac SurgeryA Systematic Review and Meta-analysis. Anesthesiology 2017;126:234-48.
9. Apfel CC, Korttila K, Abdalla M, Kerger H, Turan A, Vedder I, et al. A factorial trial of six interventions for the prevention of postoperative nausea and vomiting. N Engl J Med 2004;350:2441–51.
10. Gan TJ, Meyer TA, Apfel CC, Chung F, Davis PJ, Habib AS, et al. Society for Ambulatory Anesthesia guidelines for the management of postoperative nausea and vomiting. Anesth Analg 2007;105:1615–28.
11. Bilgin TE, Birbicer H, Ozer Z, Doruk N, Tok E, Oral U. A comparative study of the antiemetic efficacy of dexamethasone, ondansetron, and metoclopramide in patients undergoing gynecological surgery. Med Sci Monit. 2010;16:CR336-41.
12. Ormel G, Romundstad L, Lambert-Jensen P, Stubhaug A. Dexamethasone has additive effect when combined with ondansetron and droperidol for treatment of established PONV. Acta Anaesthesiol Scand. 2011;55:1196–205.
13. Elhakim M, Nafie M, Mahmoud K, Atef A. Dexamethasone 8 mg in combination with ondansetron 4 mg appears to be the optimal dose for the prevention of nausea and vomiting after laparoscopic cholecystectomy. Can J Anaesth 2002;49:922–6.
14. Research TIG for A. Dexamethasone Alone or in Combination with Ondansetron for the Prevention of Delayed Nausea and Vomiting Induced by Chemotherapy. N Engl J Med 2000;342:1554–9.
15. Gan TJ, Diemunsch P, Habib AS, Kovac A, Kranke P, Meyer TA, et al. Consensus guidelines for the management of postoperative nausea and vomiting. Anesth Analg 2014;118:85–113.
16. Khatiwada S, Bhattarai B, Biswas BK, Pokharel K, Acharya R, Singh SN, et al. Postoperative Nausea and Vomiting in Patients Undergoing Total Abdominal Hysterectomy Under Subarachnoid Block: A Randomized Study of Dexamethasone Prophylaxis. Kathmandu Univ Med J 2013;10:41-45.
17. Wu JI, Lo Y, Chia YY, Liu K, Fong WP, Yang LC, et al. Prevention of postoperative nausea and vomiting after intrathecal morphine for Cesarean section: a randomized comparison of dexamethasone, droperidol, and a combination. Int J Obstet Anesth 2007;16:122–7.
18. Szarvas S, Chellapuri RS, Harmon DC, Owens J, Murphy D, Shorten GD. A comparison of dexamethasone, ondansetron, and dexamethasone plus ondansetron as prophylactic antiemetic and antipruritic therapy in patients receiving intrathecal morphine for major orthopedic surgery. Anesth Analg 2003;97:259–263.
19. Caranza R, Jeyapalan I, Buggy DJ. Central neuraxial opioid analgesia after caesarean section: comparison of epidural diamorphine and intrathecal morphine. Int J Obstet Anesth 1999;8:90–3.
20. De Oliveira GS, Castro-Alves LJS, Ahmad S, Kendall MC, McCarthy RJ. Dexamethasone to prevent postoperative nausea and vomiting: an updated meta-analysis of randomized controlled trials. Anesth Analg 2013;116:58–74.
21. Allen TK, Jones CA, Habib AS. Dexamethasone for the prophylaxis of postoperative nausea and vomiting associated with neuraxial morphine administration: a systematic review and meta-analysis. Anesth Analg 2012;114:813–22.
22. Wang JJ, Ho ST, Wong CS, Tzeng JI, Liu HS, Ger LP. Dexamethasone prophylaxis of nausea and vomiting after epidural morphine for post-Cesarean analgesia. Can J Anaesth 2001;48:185–90.
23. Wang J-J, Ho S-T, Uen Y-H, Lin M-T, Chen K-T, Huang J-C, et al. Small-Dose Dexamethasone Reduces Nausea and Vomiting After Laparoscopic Cholecystectomy: A Comparison of Tropisetron with Saline. Anesth Analg 2002;95:229-32.
24. Si X-Y, Wu L-P, Li X-D, Li B, Zhou Y-M. Dexamethasone combined with other antiemetics for prophylaxis after laparoscopic cholecystectomy. Asian J Surg 2015;38:21–7.
25. Banihashem N, Hasannasab B, Alereza H. Does dexamethasone prevent subarachnoid meperidin-induced nausea, vomiting and pruritus after cesarean delivery? Saudi J Anaesth 2013;7:138-41.

Original Research Article

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Comparison of Ultrasound Guided Transversus Abdominis Plane Block and Caudal Epidural Block for Pain Relief in Children Undergoing Unilateral Inguinal Herniotomy

Ramalingam Ayshvarya[1], Rajasekaran Selvakumar[2], Ranganathan Ganessan[3], Murugiah Suresh[4]

[1]Resident [2]Professor & H.O.D [3]Assistant Professor [4]Associate Professor, Department of Anaesthesia, K.A.P. Viswanatham Government Medical College and Mahatma Gandhi Memorial Government Hospital, Tiruchirappalli, Tamil Nadu 620001, India.

Abstract

Context: Transversusabdominis plane block (TAP) has emerged as a simple, safe technique for post-operative analgesia in lower abdominal surgeries for adults. Its superiority over the most preferred caudal block in paediatric surgeries is unclear. *Aims:* To evaluate the efficacy of the Ultrasound (USG) guided -TAP block in comparison with the Caudal Block, for pain relief in paediatricinguinal herniotomies. *Settings and Design:* After obtaining institutional ethical committee approval, a Randomised Control Trial was conducted in 60 children,undergoing elective unilateral inguinal herniotomy in our tertiary care hospital. *Methods and Material:* Childrenof age 1-7years, weighing 5-20kg of ASA I/II were randomly allocated into two groups after obtaining parental consent.Group T received USG-guided TAP block (0.5ml/kg of 0.25% bupivacaine) and Group C received Caudal block (1ml/kg of 0.25% bupivacaine). The intra-operative hemodynamics and analgesic requirement were recorded. Pain in the post-operative period was assessed using FLACC pain score. Time to first rescue analgesia, cumulative opioid consumption, along with the incidence of side effects were noted in the first 12hrs of the post-operative period. Statistical analysis was performed using SPSSv16. *Results:* The duration of postoperative analgesia in Group T (8.6hrs±1.84), was significantly more than that of Group C, (4.57hrs±1.406). The pain scores and the mean opioid consumption were significantly less with Group T. Time to urine voiding was prolonged in Group C. *Conclusions:* ThoughCaudal block provided better intra-operative analgesia, the duration of post-operative analgesia was longer with USG-guided TAP block for pediatric inguinal herniotomy.

Keywords: USG Guided; Transversusabdominis; Paediatric; Pain; Haemodynamics; Post-Operative Analgesia; Opioid Consumption.

Introduction

Perioperative pain in paediatric population is undertreated in a substantial percentage, due to myths that children do not feel pain. The developmental and cognitive differences in children also pose difficulty in assessment of their pain [1].

In reality, children tend to have more physical and emotional reactions to pain than adults, requiringoptimal pain relief to prevent acute and long term adverse effects [2]. Transversus Abdominis Plane (TAP) block,is effective in reducing post-operative pain scores and morphine consumption in adults [3,4]. This study was conducted to compare the efficacy of the USG-guided TAP block with the widely used Caudal block [5,6] for post-operative pain relief in pediatric population undergoing inguinal herniotomy.

Materials and Methods

After obtaining the Institutional Ethical Committee approval, a Randomised Control Trial was conducted in 60 children, undergoing elective

Corresponding Author: Ramalingam Ayshvarya, Resident, Department of Anaesthesia, K.A.P. Viswanatham Government Medical College and Mahatma Gandhi Memorial Government Hospital, Tiruchirappalli, Tamil Nadu 620001, India.
E-mail: aysh88@gmail.com

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unilateral Inguinal Herniotomy in our tertiary care hospital during the period December 2015 – January 2017. Children belonging to age group 1-7 yrs, weighing 5-20kg, of ASA status I – II to undergo unilateral Inguinal Herniotomy, were included in the study after obtaining informed consent from the parents / guardian of the patients. They were randomly allocated into two groups, Group T and Group C, with 30 patients in each, using computer generated random numbers. Children in Group T receiving USG-guided TAP Block with 0.5ml / kg of 0.25% bupivacaine and Group C receiving Caudal Epidural Block with 1ml / kg of 0.25% bupivacaine.

Children undergoing bilateral Inguinal Herniotomy, belonging to ASA status III, IV, of age < 1yrs or >7yrs, weighing <5 kg or >20kg with known allergy to the drugs used in the study or any local infection at the site of the block administration or with any contraindications for caudal anaesthesia such as major sacral malformations, meningitis, raised intracranial hypertension and parent refusal are excluded from the study.

Children were fasted for 8hrs for milkand solids, and 2hrs for clear liquids [7]. Children in both the groups were sedated with oral midazolam syrup, 0.5mg / kg 30 minutes before the surgery and were shifted to the operating room [7]. Baseline vital signs were recorded following application of standard monitoring (ECG, HR, NIBP, SpO2). An intravenous access was secured using a 22 gauge IV cannula and children were premedicated with glycopyrrolate 8mcg / kg given intravenously 5 min before induction. Jackson Rees modification of Ayre's T-piece was used for General anaesthesia. Fentanyl 1mcg / kg was given intravenously during preoxygenation with 100% oxygen for 3mins with an appropriate sized face mask. GAwas induced with propofol 2mg / kg and muscle paralysis was achieved using succinylcholine 1.5mg / kg. An Ambu LMA of appropriate size was inserted and the child was allowed to breathe spontaneously. Anaesthesia was maintained with 50% N_2O: 50% O_2 and 2% Sevoflurane. MAC was not monitored in our study. A MAC of 2% was used based on the results of studies which have shown that MAC of sevoflurane with nitrous oxide in children of age1-3yrs and 5-12yrs was around 2.0±0.2% [8].

In children belonging to Group T, USG-guided TAP block was given. After insertion of the LMA, with the child in the supine position, a high frequency (6-13Hz) linear probe, connected to Sonoray Ultrasound machine was used to scan the anterior abdominal wall, under strict aseptic precautions. The probe was first placed transversely at the level of the umbilicus and adjustments were made to obtain good images of the Rectus abdominis muscle. The probe was then slid laterally, towards the posterolateral part of the abdominal wall to lie between the iliac crest and subcostal margin, across the midaxillary line. It was then adjusted to obtain a clear view of the abdominal wall muscles, from superficial to deep, namely External Oblique, Internal Oblique and Transversusabdominis muscle and the peritoneal cavity deeper to it (Picture 1).

A 5cm 23 gauge block needle with side port, was introduced anteriorly under aseptic precautions, in plane to the ultrasound probe, until the tip of the needle lay in the plane between the Internal Oblique & Transversus Abdominis muscles [9,10]. One ml of 0.9% saline was injected in the plane, to confirm the correct placement of the needle. Following negative aspiration for blood, 0.5ml / kg of 0.25% bupivacaine was injected in the Transversus Abdominis Plane, which was seen as a dark hypoechoic shadow between the two muscles, pushing the internal oblique anteriorly and Transversus abdominis muscle deeper. USG- guided TAP block was given by a senior anaesthesiologist with minimum experience of 20 cases with ultrasound guided TAP block.

Children belonging to Group C, were placed in left lateral position with knees drawn up to chest. After skin preparation with betadine solution, the sacral hiatus was identified by palpating the sacral cornua with the index finger of the non-dominant hand.

A 23gauge needle was inserted at 45-60 degrees to the skin over the sacral hiatus. After piercing thesacrococcygeal membrane which was felt as a distinct pop, the needle angle was dropped to 20 to 40 degrees from the skin and advanced about 2-4mm into the caudal space [11]. The position of the needle in the caudal space was confirmed by the "whoosh test" by injecting saline. After careful negative aspiration for blood or CSF, 1ml / kg of 0.25% bupivacaine was injected into the caudal space. Caudal block was given by an experienced anaesthesiologist.

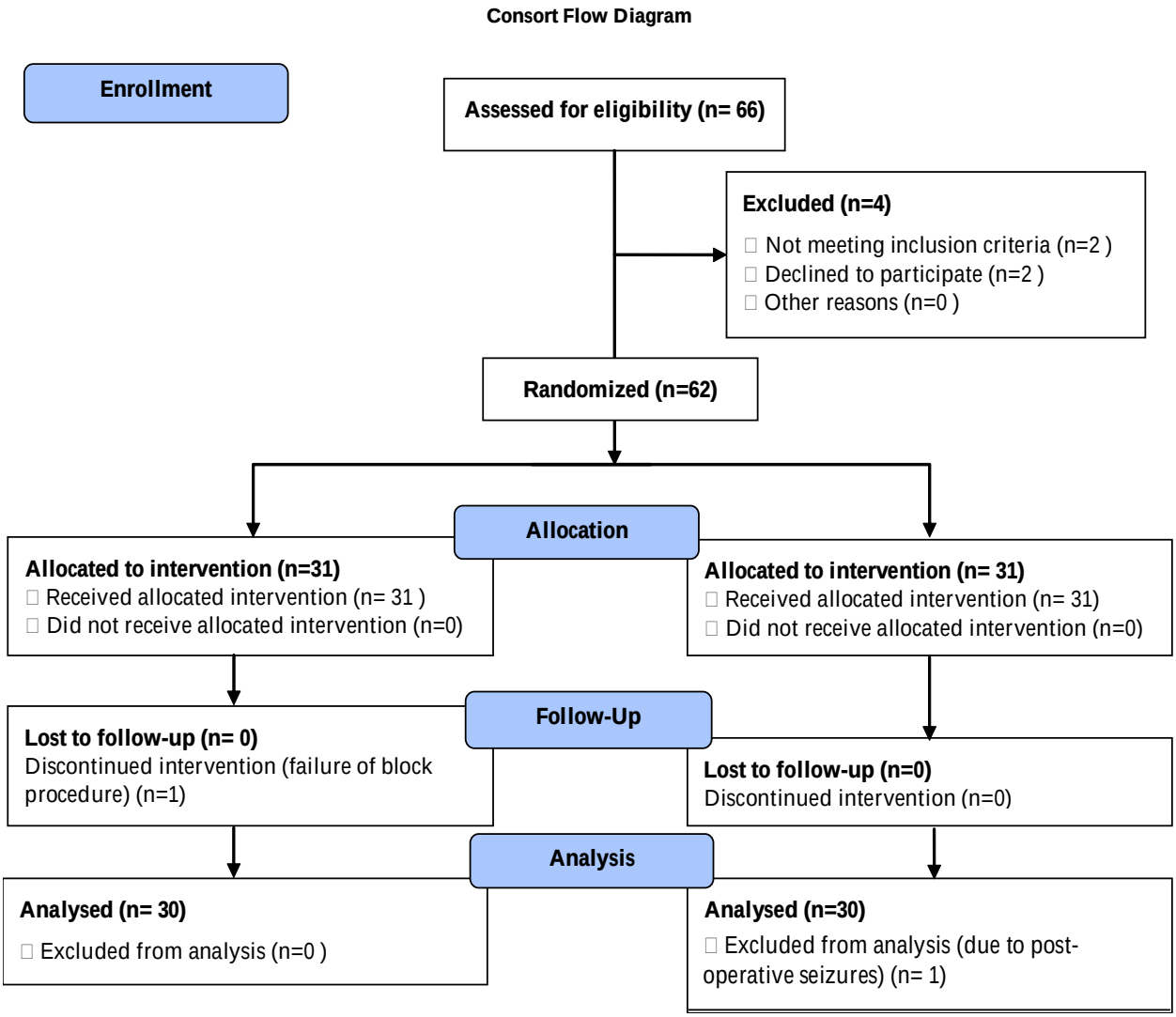
Surgical procedure was started 15mins after the administration of the block. An investigator who was unaware of the block given, was made to record HR, NIBP and SpO2, every 5mins from the beginning of the surgical procedure until the removal of the LMA. A 20% increase in heart rate or mean arterial pressure despite administration of 2% sevoflurane intraoperatively, was considered as inadequate analgesia and was treated

by supplementation with fentanyl at a dose of 1mcg/kg.

Any adverse events which occured during the block procedure, intra-operative period and after LMA removal were recorded. All children were assessed for pain using FLACC behavioural pain assessment score (Facial expression, Legs, Activity state, Crying and Consolability) [12] and their vitals were monitored during the immediate post-operative period in the recovery room, then every

Flacc Behavioural Pain Assessment Score

Criteria	Score 0	Score 1	Score 2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, uninterested	Frequent to constant quivering chin, clenched jaw
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking ,or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squirming, shifting, back and forth, tense	Arched, rigid or jerking
Cry	No cry (awake or asleep)	Moans or whimpers; occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching, hugging or being talked to, distractible	Difficult to console or comfort



hour for the first 6 hrs and every two hourly for the next 6hrs, after surgery.

Interpreting the Behavioural Score

Each category is scored on the 0–2 scale, which results in a total score of 0–10.

- Score of 0 = Relaxed and comfortable
- Score 1–3 = Mild discomfort
- Score 4–6 = Moderate pain
- Score 7–10 = Severe discomfort or pain or both

When the FLACC pain score >3, the children are given 1.5mg / kg of tramadol intravenously as rescue analgesia. Post-operative analgesia was defined as the duration of analgesia from the immediate post-op period to the time at which the first rescue analgesic was required. Children who required rescue analgesia during the immediate post-operative period were excluded from the study, implying failure of the block procedure.

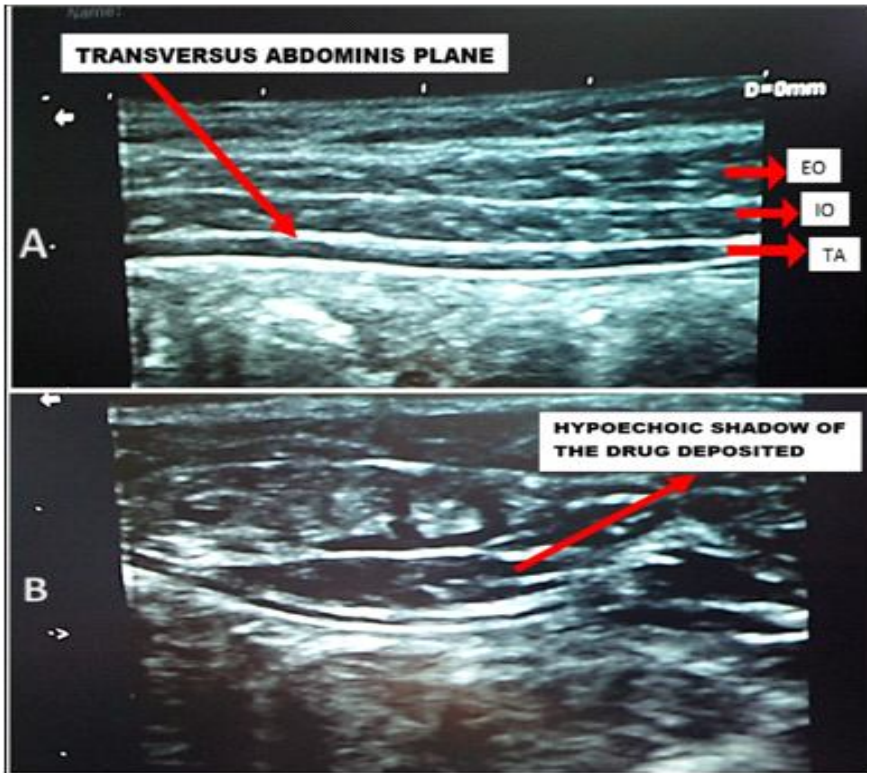
A pilot study was conducted in the study centre.Based on the results of the pilot study, a sample size of sixty patients were required, to set alpha at 0.05 and power at 80%.A sample size of 66 was decided considering, a dropout rate of 10%.

Data were entered in Microsoft excel Ver. 14.0.2010. Jones, Chicago and analysed by using SPSS Inc. Released 2007. SPSS for Windows, Version 16.0. Chicago, SPSS Incand StataCorp. 2003. Stata Statistical Software: Release 8. College Station, TX: Stata Corp LP. Baseline data comparison was done between the group T and Group C using appropriate test. Repeated measures of ANOVA was done to find out the difference in Heart rate and mean arterial pressure in various time period among both the groups.

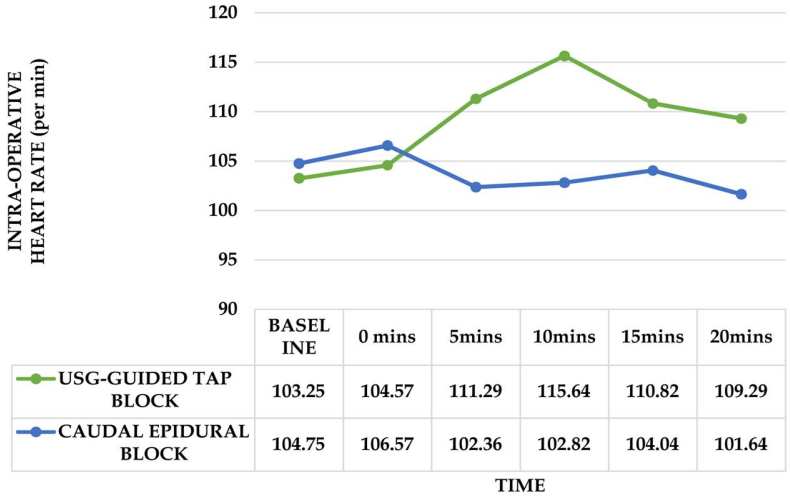
The Post-operative analgesia duration was compared between both the groups by using Student t Test. Similarly, Friedman test was done to find the difference in pain score among the group T and Group C in various time periods.

Results

Among the 62 patients who were included in the study, one patient was excluded from follow-up due to failure of block procedure. Analysis was performed in 60 patients, excluding the one patient who developed febrile seizure during the 2nd post-operative hour. As seen in Table 1, demographic variables such as Age, Sex, Weight and Height were comparable in both the groups. Heart rate (Figure1) and mean arterial pressure vary significantly from baseline during the intraoperative period in Group T with USG-guided TAP block, whereas it remains stable throughout the intra-operative period with

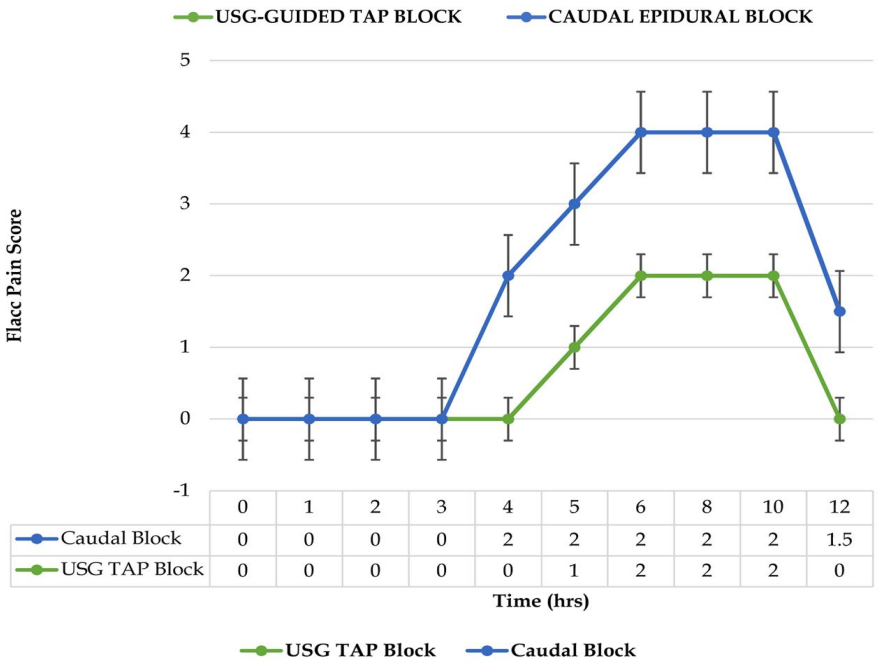


Picture: A. Ultrasound view of the three muscle layers in the abdominal wall (EO- External Oblique, IO – Internal Oblique, TA- TransversusAbdominis muscle)
B. Hypoechoic shadow seen separating the two layers of the TransversusAbdominis Plane after drug deposition



	BASELINE	0 mins	5mins	10mins	15mins	20mins
USG-GUIDED TAP BLOCK	103.25	104.57	111.29	115.64	110.82	109.29
CAUDAL EPIDURAL BLOCK	104.75	106.57	102.36	102.82	104.04	101.64

Fig. 1: Heart Rate Variability during Intra-Operative Period in Group T & Group C



	0	1	2	3	4	5	6	8	10	12
Caudal Block	0	0	0	0	2	2	2	2	2	1.5
USG TAP Block	0	0	0	0	0	1	2	2	2	0

Fig. 2: FLACC Pain Score (Median) in the post-operative period (0-12hrs) in Group T & Group C

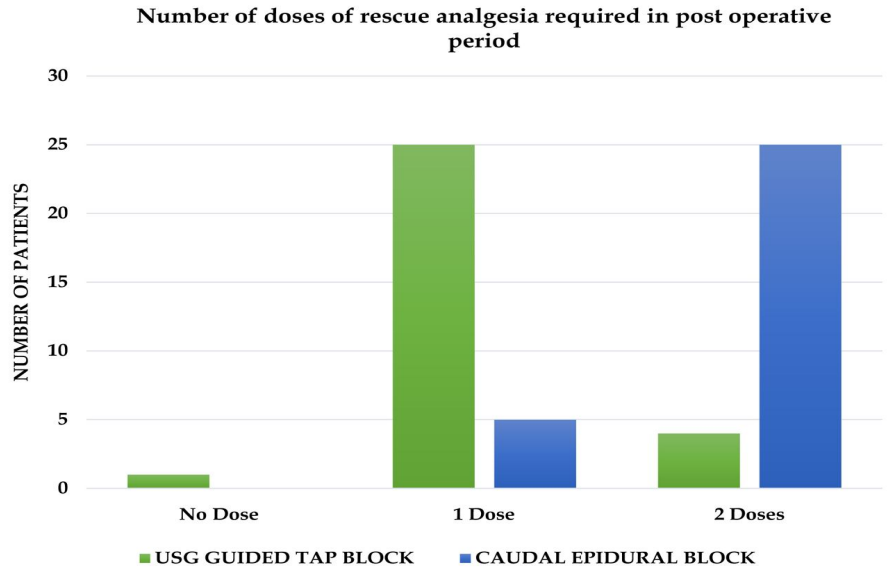


Fig. 3: Requirement of total number of doses of rescue analgesia in the first 12hrs of post-operative period in groups t & c

Table 1: Demographic variables

S. No	Characteristic	Group T	Group C	P value
1.	Age	4.40± 1.831	4.37± 1.650	0.941
2.	Sex- Male	27(90)	28(93.3)	0.640
3.	Weight	13.73± 3.667	13.40±4.090	0.741
4.	Height	110.83± 21.050	104.72± 20.365	0.257

Table 2: Duration of postoperative analgesia

S. No	Characteristic	USG guided TAP block	Caudal Epidural block	P value
1	Duration of Post op analgesia (hrs)	8.60± 1.840	4.57± 1.406	<0.0001

Caudal block in Group C. Around 53.3% (n=16) of patients belonging to Group T required intra-operative fentanyl supplementation, whereas only 3% (n=1) in Group C, required intra-operative fentanyl supplementation.

Duration of Post-operative analgesia was longer in Group T than Group C. TAP block provided postoperative analgesia for 8.60 hrs on average whereas caudal block provided a post-operative analgesia of duration 4.57 hrs on average (Table 2). The difference was found to be statistically significant. Pain scores were similar in both the groups, in the immediate, first and second hour of the post-operative period.

During the 3rd, 4th and 5th post-op hours, the pain scores were significantly high in group C, than group T as seen in Figure 2. FLACC pain scores were less in Group T with TAP block than Group C with Caudal block at all times of observation in the first 12 post-operative hours. The cumulative doses of tramadol required to rescue the patient from post-operative pain was 23.40mg±11.322 in Group T and 38.23mg±15.434 in Group C, the difference found to be statistically significant. As seen in Figure 3, only 4% of patients in Group T required 2 doses of rescue analgesia whereas 83.3% in Group C required 2 doses in the first 12hrs post-operative period for pain relief. Emergence delirium was observed equally in both the groups. 10% (n=3) of the patients in group T had vomiting, whereas 20% of the patients (n=6) in Group C had vomiting in the post-operative period. 1 patient in Group C had post-operative seizure. Time to Urine voiding was longer in Group C (7.4hrs) than in Group T (6.13hrs).

Discussion

Optimal treatment of perioperative pain is usually multimodal. Even in procedures which can be done under regional anaesthesia, a general anaesthesia or sedation is usually given for the child to cooperate for the regional technique. Adequacy of the regional block in supplementing the general anaesthesia can be assessed only indirectly using the changes in haemodynamic parameters and requirement of supplementation by analgesics like opioid [13]. Since pain is associated with stress response resulting in increase in heart rate and blood pressure, the cardiovascular responses were used as a surrogate for adequacy of analgesia.

The heart rate and mean arterial pressure remained constant throughout the procedure in Group C whereas the heart rate and MAP were varying from the baseline, significantly during the 10-15mins period after the beginning of surgical procedure in Group T. This is because Caudal block is a neuraxial blockade which offers complete blockade of sensory, motor and autonomic innervation up to the level of blockade [14]. Hence there is complete analgesia in Caudal block, whereas TAP block anaesthetizes only the nerves supplying the parietal peritoneum, skin and muscles of anterior abdominal wall [15]. Hence cord traction and visceral peritoneal handling can result in stress response, causing rise in heart rate and mean arterial pressure in Group T.

Among the initial research studies with TAP block, a study by Fredrickson [15] on TAP block for inguinal herniotomy in 8 paediatric patients, demonstrated that 5 patients of the 8 did not require any intra-operative supplementation whereas rest of the 3 patients required fentanyl supplementation, which he attributed to the pain felt during spermatic cord manipulation.

Similarly Ray et al [14] who studied Caudal block with bupivacaine and ropivacaine administered pre-operatively in paediatric patients undergoing urogenital procedures demonstrated no change in haemodynamic parameters during the intra-operative period and no supplementation was required in both the groups.

The duration of post-operative analgesia with TAP block was found to be significantly longer than Caudal block. Studies with Caudal block have demonstrated a post-op analgesia of 4-6hrs [16]. In our study, the mean duration of post-op analgesia with caudal block was 4.6hrs (274min).

The duration of post-operative pain relief was longer in TAP group 516min (8.6hrs) when compared to caudal group. Owing to the high vascularity of the caudal space, the absorption of local anaesthetic into systemic circulation is more in Caudal block, resulting in faster clearance of the local anaesthetic [17]. In contrast, Transversus Abdominis Plane is a relatively avascular fascial plane. The local anaesthetic drug volume deposited in the caudal space has to spread over a larger area to achieve the level of blockade whereas the drug volume injected in TAP spreads in a narrow fascial plane between two muscles [18].

The post-operative pain felt in a superficial surgery like inguinal hernia repair, is mainly due to pain sensations from the skin, muscles and parietal peritoneum, which is effectively blocked by the TAP block, making it effective in providing prolonged post-operative analgesia.

Dalia M [19] achieved similar results in his studyin children of age group 6months to 6years, undergoing open pyeloplasty, where he demonstrated that the patients with TAP block had a significantly longer time to first rescue analgesia, 602min in contrast to 280min in caudal block.

Similar pain scores are observed between the two groups in the first 2hrs after surgery. Its inferred that both caudal and TAP block are equally effective in providing pain relief in the immediate post-operative period. FLACC scores are lower in TAP block group when compared to caudal block group, at all-time points of observation upto 12 post-operative hours. Cumulative doses of tramadol as rescue analgesic were significantly more in Caudal block, with a mean tramadol consumption of 38.23mg compared to 23.40mg in TAP block group. Since the time to first rescue analgesic was longer in TAP block, children in Group T required lesser number of doses. Carney et al [20] who studied 40 children undergoing open appendicectomy, observed that TAP block significantly reduced VAS pain scores at rest and on movement at all times of observation and mean morphine requirementsin the first 48hrs postoperatively.

Sevoflurane which was used in the general anaesthesia is responsible for the emergence delirium [21] observed 10% of patients in both the groups. Volatile anaesthetics and opioids (fentanyl) used in General anaesthesia can cause PONV. Incidence of PONV was higher in Caudal group than in TAP block group, probably because of the increased requirements of tramadol [22] in Caudal group. No complications or adverse events related to TAP block was noted in our study. There are rare instances such as Liver trauma with regional anaesthesia block needle while performing landmark guided TAP block, reported by Farooq M and Carey M [23]. As the block was administered under ultrasound guidance, such complications could be avoided, in our study.

The time to first urine voiding, in caudal group (7.4hrs+1.6) was significantly longer than TAP block group (6.13hrs±1.5) but there were no cases of urinary retention which required intervention in both the groups. In studies which compared caudal to non-caudal procedures, many of them showed that caudal block was associated with longer time to urine voiding in the post-operative period. In a study by Markham et al, the incidence of urinary retention was 12/26 in caudal group and 5/26 in ilioinguinal-iliohypogastric nerve block group [24].

Conclusion

Caudal block provided better intra-operative analgesia than USG guided TAP block for inguinal hernia repair. Ultrasound-guided TAP block provided prolonged post-operative pain relief than single shot Caudal block and reduced the mean opioid consumption in the first 12 post-operative hours after inguinal herniotomy in children of age 1-7years.

Key Messages

TAP block performed under ultrasound guidance in children was found to be simple, safe and effective technique, in providing longer duration of post-operative analgesia without much sideffects.

References

1. Miller, R. Miller's Anesthesia. 8th ed. Philadelphia: Elsevier Health Sciences, 2014.p.2704.
2. Kender A, Bryskin R, Motoyama & Davis. Regional Anesthesia. In: Smith 'sanesthesia for infants and children. 7th edition. Philaderlphia: Mosby. 2011.p.452-507.
3. McDonnell JG, O'Donnell B, Curley G, Heffernan A, Power C, Laffey JG. The analgesic efficacy of

transversusabdominis plane block after abdominal surgery: a prospective randomized controlled trial. AnesthAnalg. 2007 Jan;104(1):193-7.

4. Rafi AN. Abdominal field block: a new approach via the lumbar triangle. Anaesthesia. 2001 Oct;56(10): 1024-6.
5. Sanders JC. Paediatric regional anaesthesia, a survey of practice in the United Kingdom. Br J Anaesth. 2002 Nov;89(5):707-10.
6. Lloyd-Thomas AR. Pain management in paediatric patients. Br J Anaesth 1990;64:85–104.
7. Lloyd-Thomas AR. Pain management in paediatric patients. Br J Anaesth 1990; 64:85–104.
8. Miller, R. Miller's Anesthesia. 8th ed. Philadelphia: Elsevier Health Sciences, 2014.p.2774.
9. Lerman J, Sikich N, Kleinman S, Yentis S. The pharmacology of sevoflurane in infants and children. Anesthesiology. 1994 Apr;80(4):814-24.
10. Sahin L, Sahin M, Gul R, Saricicek V, Isikay N. Ultrasound-guided transversusabdominis plane block in children: a randomised comparison with wound infiltration. Eur J Anaesthesiol. 2013 Jul;30(7):409-14.
11. Galante D, Caruselli M, Dones F, et al. Ultrasound transversusabdominis plane (TAP) block in pediatric patients: Not only a regional anesthesia technique for adults. Anaesth Pain & Intensive Care 2012; 16(2): 201-4.
12. Goswami D, Hazra A, Kundu KK .A Comparative Study between Caudal Bupivacaine (0.25%) and Caudal Bupivacaine (0.25%) with Dexmedetomidine in Children Undergoing Elective Infra-Umbilical Surgeries. J AnesthClin Res 2015; 6:583.
13. Merkel SI, Voepel-Lewis T, Shayevitz JR, Malviya S. The FLACC: a behavioral scale for scoring postoperative pain in young children. PediatrNurs. 1997 May-Jun;23(3):293-7.
14. Hannallah RS, Broadman LM, Belman AB, Abramowitz MD, Epstein BS. Comparison of caudal and ilioinguinal/iliohypogastric nerve blocks for control of post-orchiopexy pain in pediatric ambulatory surgery. Anesthesiology 1987;66:832–4.
15 Ray M, Mondal SK, Biswas A. Caudal analgesia in paediatric patients: Comparison between Bupivacaine and Ropivacaine. Indian J Anaesth. 2003;47:275–8.
16. Frederickson M, Seal P, Houghton J. Early experience with the transversusabdominis plane block in children. PediatrAnesth 2008;18:891–892.
17. Ivani G, Lampugnani E, Torre M, Calevo Maria G, DeNegri P, Borrometi F, Messeri A, Calamandrei M, Lonnqvist PA, Morton NS. Comparison of ropivacaine with bupivacaine for paediatric caudal block. Br J Anaesth. 1998 Aug;81(2):247-8.
18. Peter J, Davis & Franklyn P, Cladis & Etsuro K, Motoyama. Smith's Anesthesia for Infants and Children. 8th ed. Elsevier; 2011.p.256–7.
19. Rozen WM, Tran TM, Ashton MW, Barrington MJ, Ivanusic JJ, Taylor GI. Refining the course of the thoracolumbar nerves: a new understanding of the innervation of the anterior abdominal wall. Clin Anat. 2008;21:325-33.
20. El Fawy DM, El Gendy HA. Ultrasound-guided transversusabdominis plane block versus caudal block for postoperative pain relief in infants and children undergoing surgical pyeloplasty. Ain-Shams JAnaesthesiol. 2014;7:177-81.
21. Carney J, McDonnell JG, Ochana A, Bhinder R, Laffey JG. The transversusabdominis plane block provides effective postoperative analgesia in patients undergoing total abdominal hysterectomy. Anesth Analg. 2008;107:2056–60.
22 Sarner JB, Levine M, Davis PJ, et al. Clinical characteristics of sevoflurane in children: a comparison with halothane. Anesthesiology 1995;82:38-46.
23. Pendeville PE, Von Montigny S, Dort JP, Veyckemans F. Double-blind randomized study of tramadol vs. paracetamol in analgesia after day-case tonsillectomy in children. Eur J Anaesthesiol. 2000 Sep;17(9): 576-82.
24. Farooq M, Carey M . A case of liver trauma with a blunt regional anesthesia needle while performing transversusabdominis plane block. Reg Anesth Pain Med. 2008 May-Jun;33(3):274-5.
25. Markham SJ, Tomlinson J, Hain WR. Ilioinguinal nerve block in children. Acomparison with caudal block for intra and postoperative analgesia. Anaesthesia. 1986 Nov;41(11):1098-103.

Original Research Article

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A Comparative Study of Clonidine & Dexmedetomidine as an Adjuvant with Bupivacaine in Epidural Anaesthesia

Singh Vishwadeep[1], Karki Geeta[2]

[1]Assistant Professor [2]Associate Professor, Department of Anaesthesiology, Sri Ram Murti Smarak Institute of Medical Sciences, Bareilly, Uttar Pradesh 243001, India.

Abstract

Background: The introduction of adjuvants, have decreased the dose requirement of local anaesthetics, increased their onset of action, prolonged their action and improved the analgesia . *Aim:* To compare Clonidine and Dexmedetomidine as an adjuvant with Bupivacaine in epidural anaesthesia *Material and Methods*: 90 patients of either sex, between 18 to 65 years of age and belonging to ASA Grade I & II physical status were divided into 3 groups with 30 patients each. *Group 1:* 20ml 0.5% plain bupivacaine + 0.5ml saline (preservative free), *Group 2:* 20ml 0.5% plain bupivacaine + 2µg/kg clonidine, *Group 3:* 20ml 0.5%plain bupivacaine + 1 µg/kg dexmedetomidine. Statistical analysis was done using the statistical package(SPSS 15.0 evaluation version). Continuous co-varieties were compared using analysis of variance (ANOVA). The qualitative data comparison were studied using the Chi-squares test. *Result:* Time of sensory onset to T-10 in group 1 was 10.02±2.6 min, in group 2 was 9.82±3.10 min, and in group 3 was 7.10±2.10 min.The time of motor block onset to bromage 3 in group 1 was 20.36±34 min, in group 2 was 17.80±4.08 and in group 3 was 14.50±5.18 minutes. The time of motor block regression to bromage 0 in group 1 was 152 ± 12.2 minutes, in group 2 was 226.42±26.17 and in group 3 was 248.70±28.40 minutes. The incidence of side-effects was statistically non significant. *Conclusion:* Clonidine and dexmedetomidine are good alternatives to opioids as adjuvant to bupivacaine in epidural anaesthesia.

Keywords: Epidural; Dexmedetomidine; Clonidine; Bupivacaine; Adjuvant.

Introduction

Many techniques and drug regimens, with partial or greater success, have been tried from time to time by the mankind for the relief of pain [1].

But the introduction of regional anesthesia in the form of epidural anesthesia has markedly changed the method of pain relief both during surgical procedures and other pain symptoms.

Epidural anaesthesia is a central neuraxial block technique with many applications. The epidural space was first described by Corning in 1901, and Fidel Pages first used epidural anaesthesia in humans in 1921. In 1945 Tuohy introduced the needle which is still most commonly used for epidural anaesthesia. Improvements in equipment, drugs and technique have made it a popular and versatile anaesthetic technique, with applications in surgery, obstetrics and pain control. Both single injections and catheter techniques can be used. Its versatility means it can be used as an anaesthetic, as an analgesic adjuvant to general anaesthesia and for post-operative analgesia in procedures involving the lower limbs, perineum, pelvis, abdomen and thorax.

Local anaesthetics like bupivacaine for epidural anaesthesia through epidural cathether have been used with great success, but with the introduction of potent and short acting opioids like fentanyl and later other adjuvants, have decreased the dose

Corresponding Author: Geeta Karki, Associate Professor, Department of Anaesthesiology, Sri Ram Murti Smarak Institute of Medical Sciences, Bareilly, Uttar Pradesh 243001, India.
E-mail: krkgits@gmail.com

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requirement of local anaesthetics, increased their onset of action, prolonged their action and improved the analgesia with decreasing the side effects of local anaesthetics.

In this regard, the newer α-2 adrnergic agonists like dexmedetomidine and clonidine are now being used with greater success. They have both analgesic and sedative properties when used as adjuvants in regional anaesthesia [2].

Dexmedetomidine is an α2 adrenergic agonist, provides sedation, and anxiolysis. It is more selective α2 agonist. α2:α1 ratio is 1600:1, making it complete α2 agonist [3]. It was introduced in clinical practice in United States in 1999 and approved by FDA. The sedative and hypnotic effect is produced by action on α2 receptor in locus caeruleus. The analgesic effect is produced by action on α2receptor in locus caeruleus and within spinal cord [4]. Despite sound level of sedation with Dexmedetomidine there is limited respiratory depression providing wide safety margin. It has also been noted that α2 agonist have analgesic effect when injected via intrathecal or epidural route [5]. Dexmedetomidine is rapidly and extensively metabolized in liver and excreted in urine and feces.

Clonidine, an α2-agonist has been used with claims of many advantages. The mechanism of action of α2-agonist involves vasoconstriction and antinociception from α2 stimulation [6] of receptors in dorsal horn cells of spinal cord. Some side effects reported in literature are hypotension, bradycardia and sedation which are dose dependent.

The aim of the present study was to compare Clonidine and Dexmedetomidine as an adjuvant with Bupivacaine in epidural anaesthesia,with respect to

- Onset and duration of sensory and motor block,
- Duration of analgesia,
- Haemodyanamic changes,
- Adverse effect of drugs and
- Sedation

On the basis of the above parameters, overall assessment of efficacy of adding clonidine/ dexmedetomidine as adjuvant to Bupivacaine in epidural anaesthesia was done.

Material & Methods

After obtaining ethical committee approval and informed written consent from patient , the study was carried out on 90 patients of either sex , between 18 to 65 years of age and belonging to ASA Grade I & II physical status.

Exclusion Criteria

Patients with the history of uncontrolled labile hypertension, heart block, dysarrythmia, on cardiac medication (adrenergic receptor antagonist, calcium channel blocker or ACE inhibitor), addiction to narcotic, patient posted for LSCS and with any contraindication to epidural anaesthesia were not included in the study

- All the patients were thoroughly examined and investigated before the surgery. After pre-medication patient was randomly allocated into one of the three groups, each group consisting of 30 patients.*Group 1 (Control):* 20ml 0.5% plain bupivacaine + 0.5ml saline (preservative free) *Group 2 (Clonidine):* 20ml 0.5% plain bupivacaine + 2µg/ kg clonidine *Group 3 (Dexmedetomidine):* 20ml 0.5%plain bupivacaine+1µg/ kg dexmedetomidine.
- Equal volume of drug was injected in each group and all patients were preloaded with 15ml/kg of Ringer Lactate .In the operation theatre pulse oximetry (Spo2), non- invasive blood / pressure (NIBP) and ECG were monitored and in sitting posture epidural cathether was placed into L2-L3 or L3-L4 epidural space under strict aseptic conditions, using Tuohy's needle with LOR technique.
- All the patients were observed for the - Onset, duration and quality of anaesthesia. Sensory block was assessed bilaterally by short hypodermic needle in mid clavicular line.Motor block was assessed by modified bromage scale. Sedation and pain was assessed by modified ramsay scale.Hemodynamic changes viz. Pulse rate & rhythm, B.P., ECG were recorded at regular intervals in peroperative & in post operative period.Any other untoward incidence such as nausea, vomiting, shivering, pruritis, respiratory depression and sedation was assessed.The changes in above parameters were clinically and statistically compared with the control group. Statistical analysis was done using the statistical package (SPSS 15.0 evaluation version). Data were expressed as either mean and standard deviation or numbers and percentages. Continuous co-varieties were compared using analysis of variance (ANOVA). The qualitative data comparison were studied using the Chi-squares test. The P value reported at the 95% confidence interval. $P<0.05$ was considered statistically significant .

Observations

Table 1: Distribution of patients according to their age

Mean age in years	Bupivacaine (Gp1)	Clonidine Gp (2)	Demedetomidine (Gp3)
<18	-	-	-
18-27	-	-	-
28-38	11	12	10
39-48	16	17	18
49-58	03	1	02
59-65	-	-	-
Total	30	30	30
Mean ± SD	41.36 ± 6.462	40.36 ±5.436	40.36 ±7.210

P value

Grp	1 and 2	1 and 3	2 and 3
P value	>0.05	>0.05	>0.05

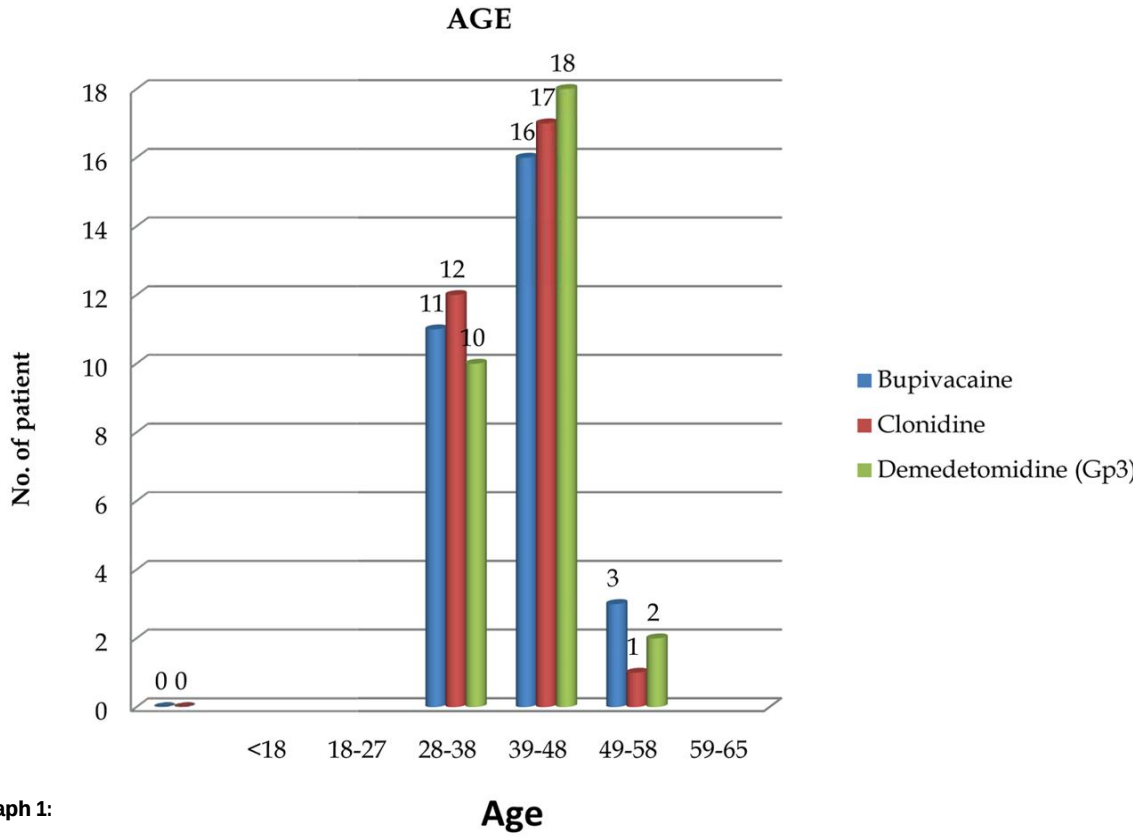
Result

The Mean Standard(MSD) Deviation of age in different Grps 1,2,3. The age distribution remain comparable and statistically insignificant in all age groups having P value> 0.05.

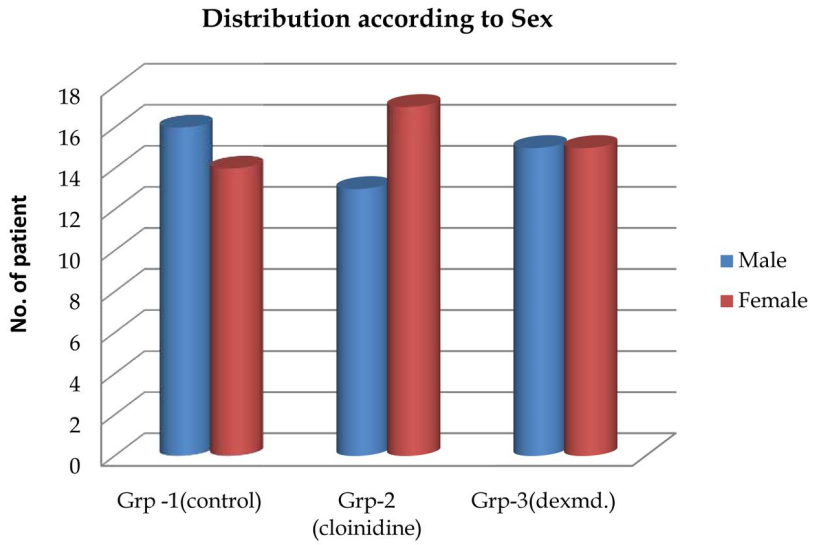
Table 2: Distribution of patient according to their sex

Group	Male	Female	Total	P value
Grp -1(control)	16	14	30	0.948>0.05
Grp-2 (cloinidine)	13	17	30	
Grp-3(dexmd.)	15	15	30	

Result: The sex distribution remains comparable in all the groups and statistically insignificant in all the groups having P value >0.05



Graph 1:

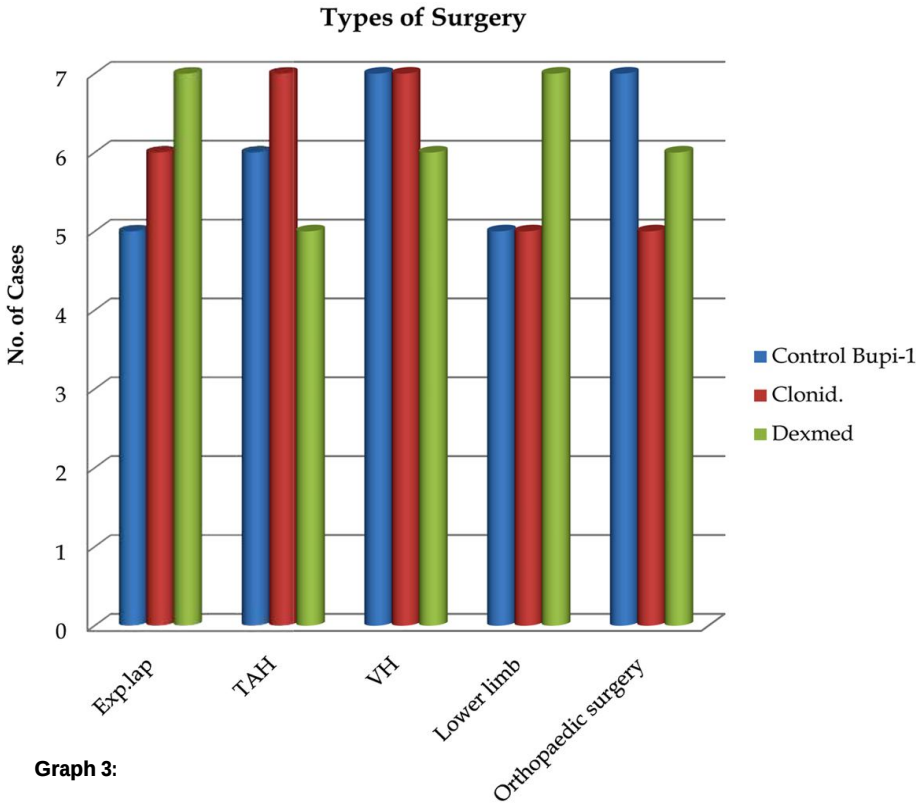


Graph 2:

Table 3: Distribution according to their type of surgery

Surgery	Control Bupi-1	Clonid. Grp 2	Dexmed Grp 3	Total	P –Value
Exp.lap	5	6	7	18	>0.05
TAH	6	7	5	18	
VH	7	7	6	19	
Lower limb	5	5	7	17	
Orthopaedic surgery	7	5	6	18	
Total	30	30	30	90	

Result: **T**here was no significant differences between the groups according to the type of surgery and distribution remain comparable and statistically insignificant in all groups having **P value >0.05**



Graph 3:

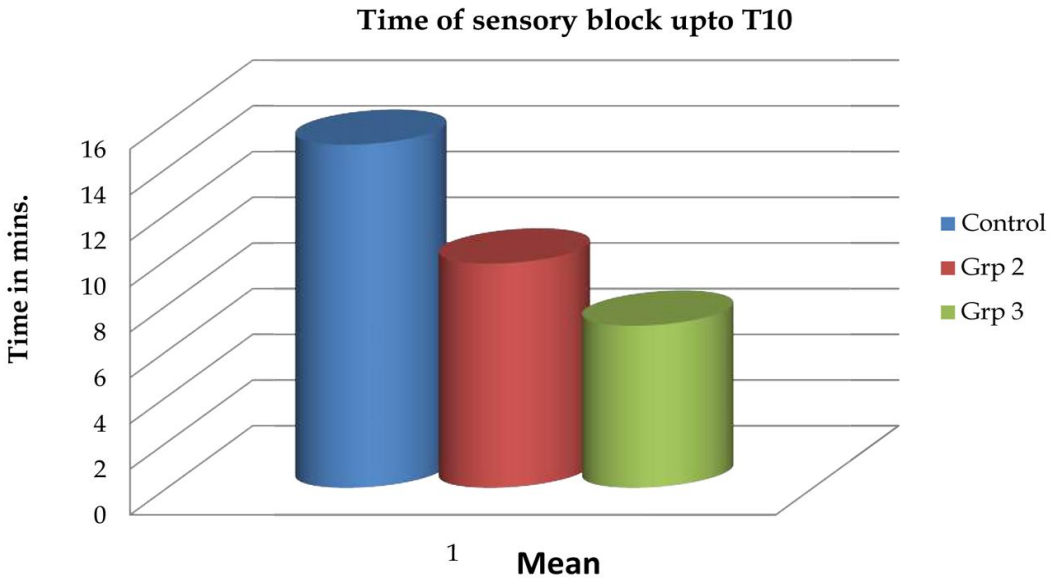
Table 4: Time of Sensory onset / block up to T-10 (in minutes)

Groups	Control (Bupiv.)	Grp 2 Clonidine	Grp 3 (Dexmed)	P value
Mean ±SD No. of cases	15.02 ± 2.6 30	9.82±3.10 30	7.10±2.10 30	<0.05

P value

Group	1 and 2	1and 3	2 and 3
P –value	<0.05	<0.05	<0.05

Result: It is evident from the table that the time of sensory onset was shortest in group 3 (dexmedetomidine) as compared to control and group2 (clonidine) The difference in time of sensory onset is statistically significant. (p<0.05)



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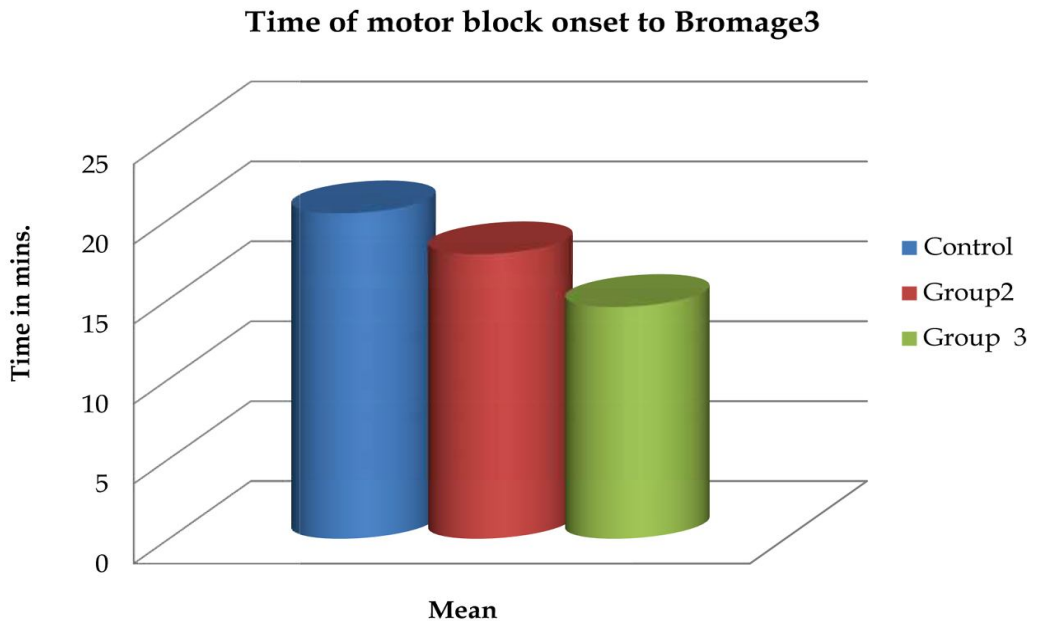


Graph 5:

Table 5: Time of motor onset to Bromage 3 (in minutes)

Groups	Control Bupiv.	Group2 Clonidine	Group 3 dexmed	P value
Mean ±SD	20.36±3.4	17.80±4.08	14.50±5.18	<0.05
No. of cases	30	30	30	

P value

Group	1 and 2	1 and 3	2 and 3
P value	<0.05	<0.05	<0.05

Result: It is evident from the table, motor block onset to Bromage 3 was shortest in Group III(dexmed) as compared to control and group2. The difference in time of motor block onset is statistically significant(P<0.05).

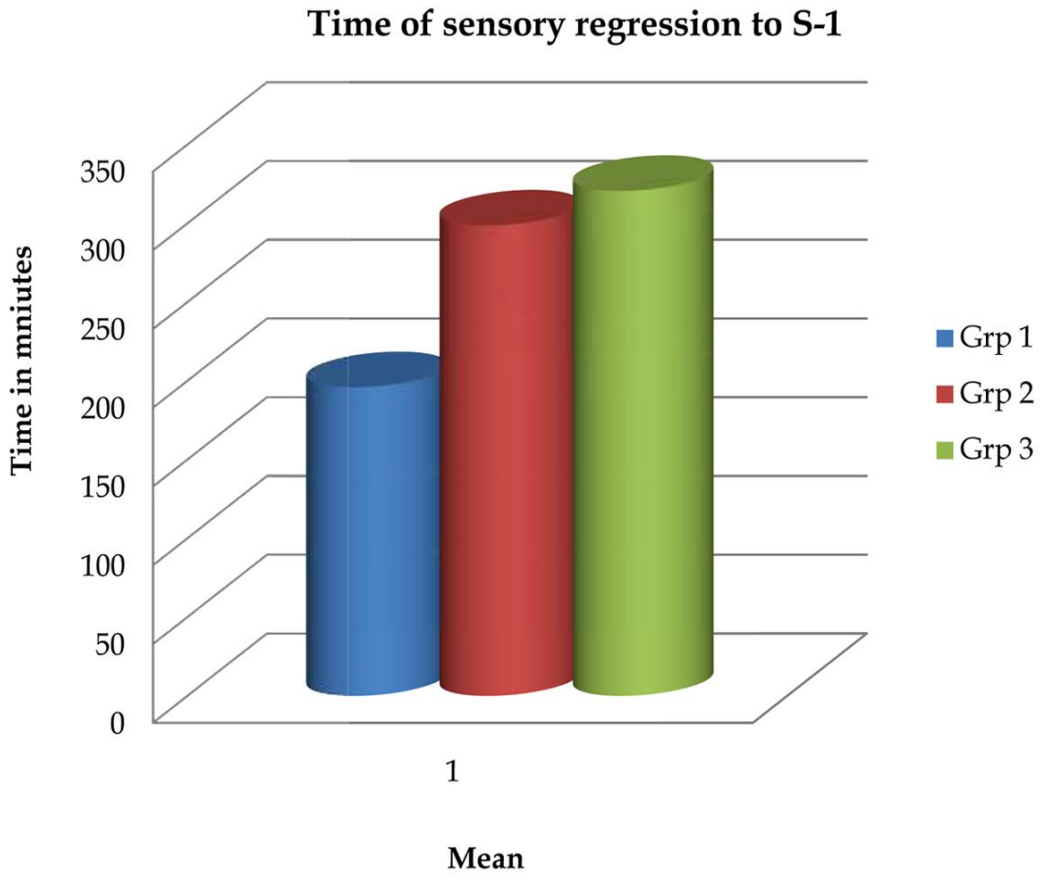
Table 6: Time of sensory regression to S-1(in minutes)

Groups	Grp 1 Bupiv.	Grp 2 Clonidine	Grp 3 Dexmed	P value
Mean ± SD	196±22	298.70±36.54	320.62±38.32	<0.05
No of cases	30	30	30	

P value

Group	1 and 2	1 and 3	2 and 3
P Value	<0.05	<0.05	<0.05

Result: it is evident from the table that time of sensory regression to S1 was longest in Group 3 (dexmedetomidine) as compared to control and group 2. The difference in time of sensory regression to S1 is statistically significant (P<0.05).



Graph 6:

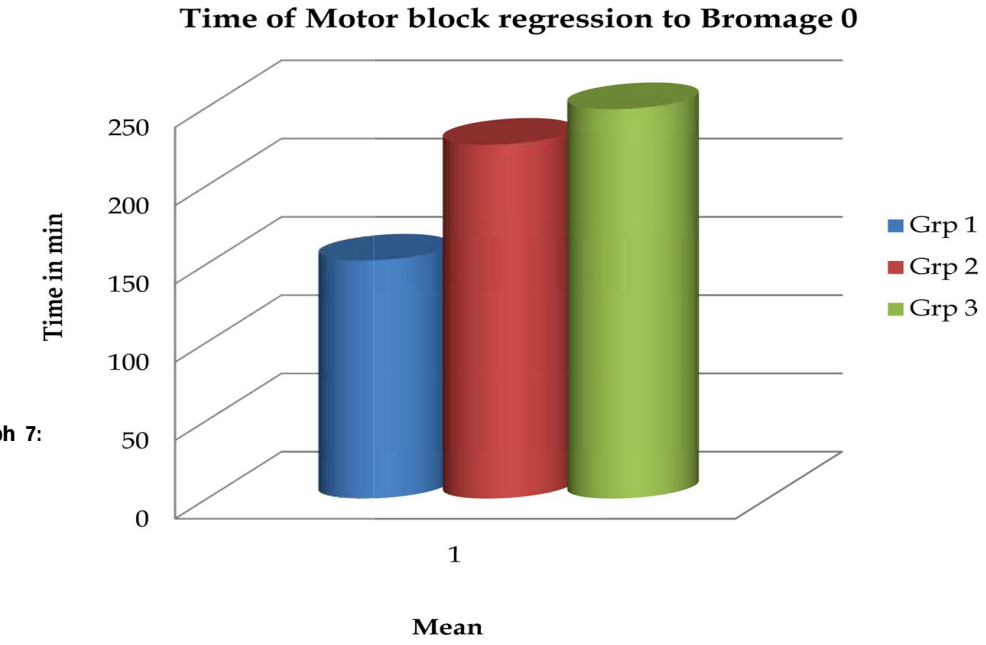
Table 7: Time of Motor block regression to Bromage 0 (in minutes)

Groups	Grp 1 Bupi.	Grp 2 Clonidine	Grp 3 Dexmed	P value
Mean ± SD No.of cases 30	152±12.2 30	226.42±26.17 30	248.70±28.40 30	<0.05

P value

Group	1 and 2	1 and 3	2 and 3
P value	<0.05	<0.05	<0.05

Result: It is evident from the table that the time of motor block regression to Bromage 0 was longest in Group3 (dexmedetomidine) as compared to control and group2 (clonidine). The difference in time of motor block is statistically significant P<0.05.



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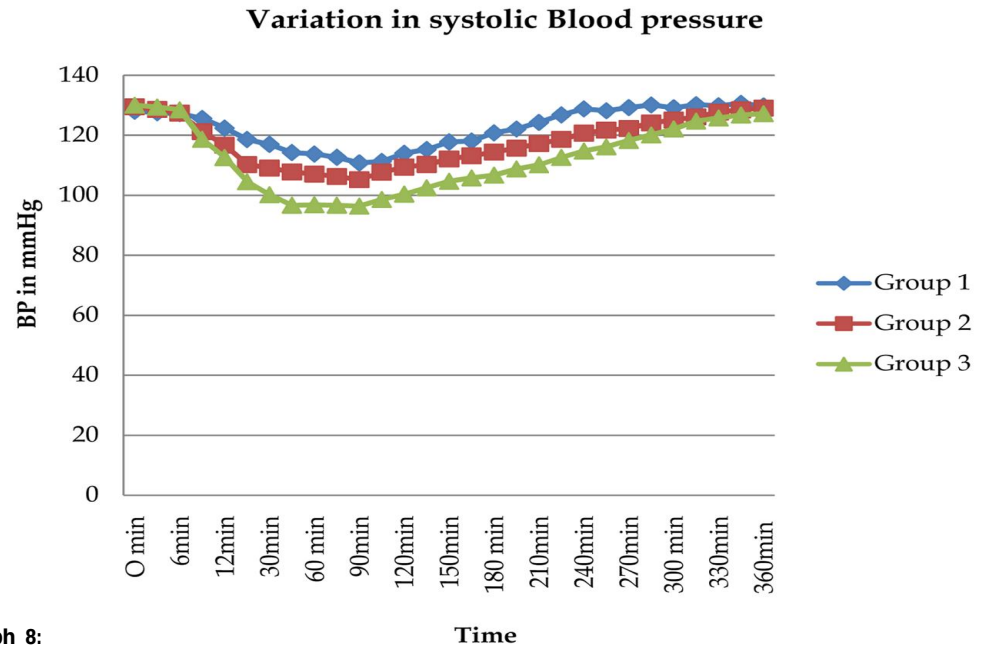
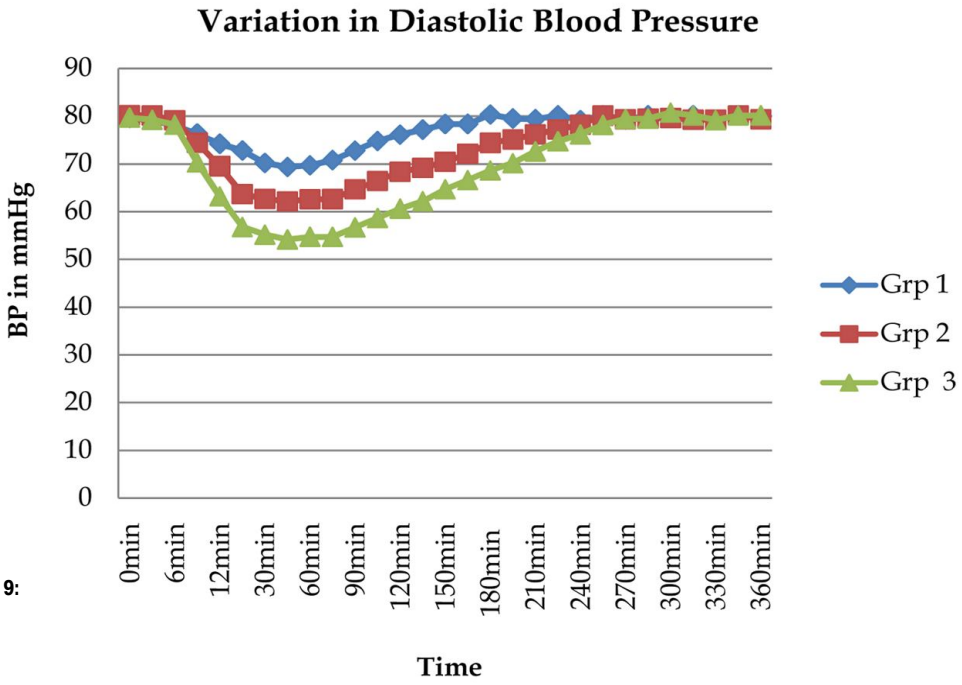


Graph 8:

Graph 9:



Graph 10:

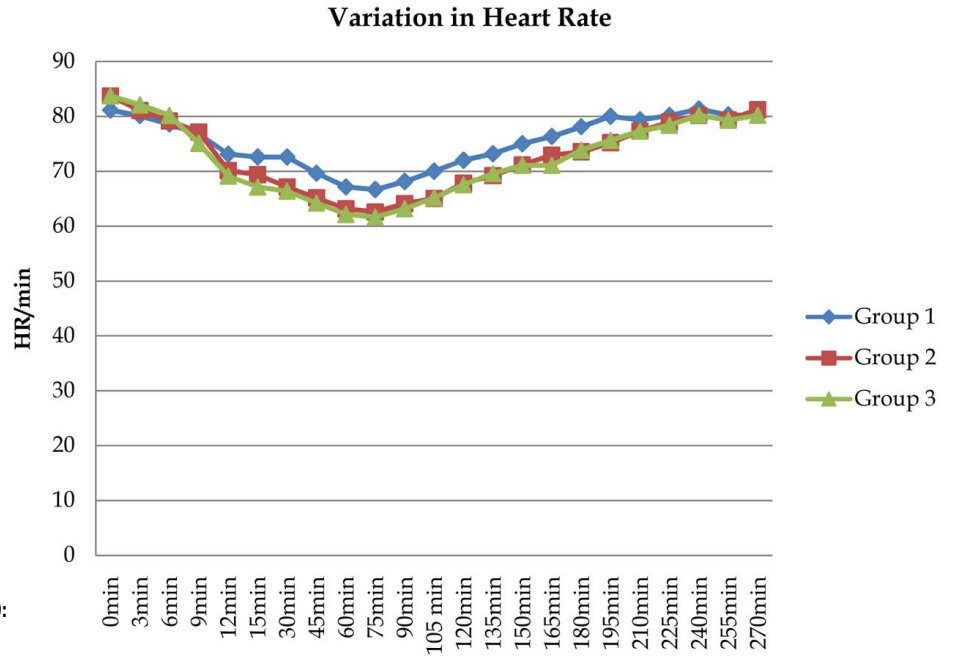


Table 8: Distribution of patients according to Score RSS

Sedation score	Group I Control	Group 2 Clonidine	Group 3 Dexmed	P value
S1	10	10	5	
S2	20	15	14	<0.05
S3	-	5	11	
S4	-	-	-	
P value	1 and 2 <0.05	1 and 3 <0.05	2 and 3 <0.05	

Graph 11:

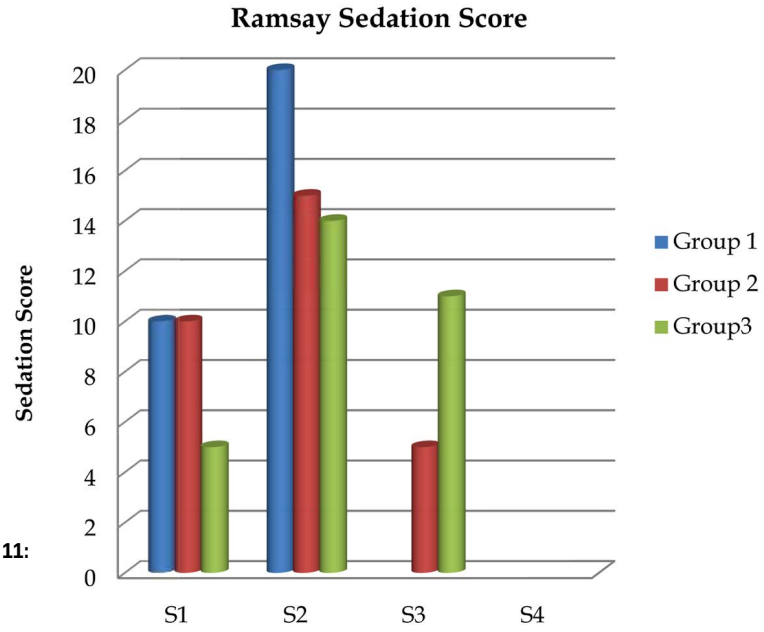


Table 9: Duration of Analgesia (in minutes)

Groups	Group 1 Control	Group 2 Clonidine	Group 3 Dexmed
Mean± SD	180±5	302.70±20.76	338±30.15
P value	**1 and 2 <0.05**	**1 and 3 <0.05**	**2 and 3 <0.05**

Result: It is evident from the table that maximum duration of analgesia(338±30.15min) was in Group 3 (Dexmedetomidine) followed by Group 2 (clonidine) (302.70±20.76min) and then in Group 1(Bup) (180±50min). The difference in analgesia duration was statistically significant. (P<0.05)

Graph 12:

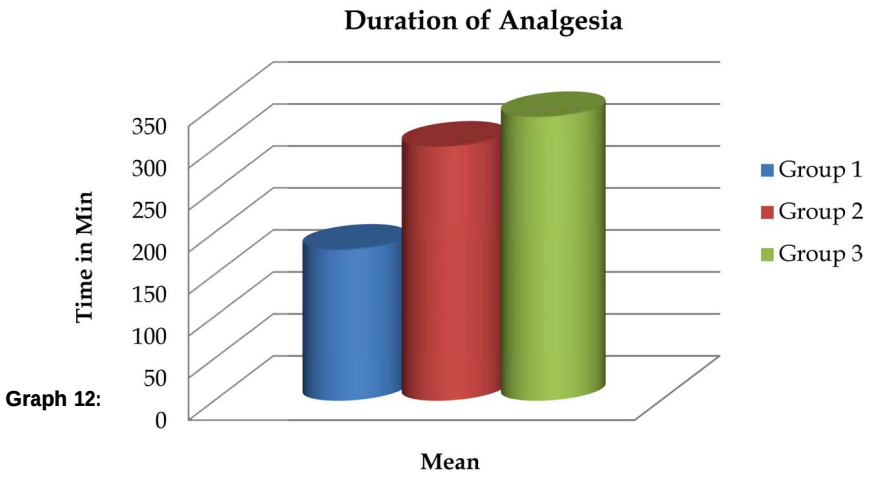
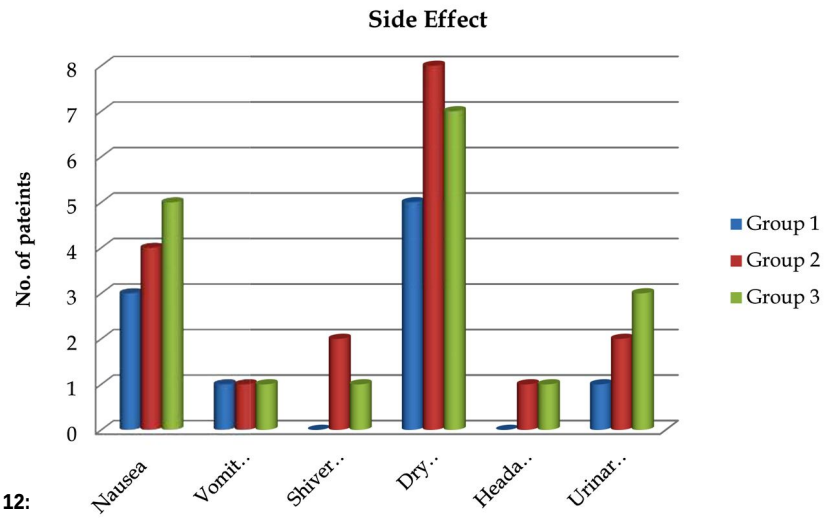


Table 10: Side effects

Side effects	Group 1	Group 2	Group 3	P value>0.05
Nausea	3	4	5	
Vomiting	1	1	1	
Shivering	0	2	1	
Dry mouth	5	8	7	
Headache	0	1	1	
Urinary retention	1	2	3	



Graph 12:

Result

In present study the age (Mean±SD) in group 1 was 41.36±6.46 years, in group 2I was 40.36±5.43 years and in group 3 was 40.36±7.21years. The age is comparable in all age groups as evident from Table 1.

Distribution according to sex was also comparable among the three groups. This is shown in Table 2. There was no significant difference between the groups according to the type of surgery and distribution remain comparable and statistically insignificant in all groups having (P value >0.05).

The time of sensory onset to T-10 in group 1 was 10.02±2.6min, in group 2 was 9.82±3.10 min, and in group 3 was 7.10±2.10min. The onset of sensory block was shortest in group 3 as compared to control and group 2. The difference in time of sensory onset is statistically significant (P<0.05).

The time of motor block onset to bromage 3 in group 1 was 20.36±34 minutes, in group 2 17.80± 4.08 and in group 3 was 14.50±5.18 minutes. It is evident from Table 5, motor block onset to Bromage 3 was shortest in group 3 (dexmedetomidine) as compared to control and group 2. The difference in time of motor block onset is statistically significant (P<0.05).

The time of sensory regression to S1 was longest in group 3 (dexmedetomidine) as compared to control and group 2. The difference in time of sensory regression to S1 is statistically significant (P<0.05) as evident from Table 6.

The time of motor block regression to bromage 0 in group 1 was 152±12.2 minutes , in group 2 was 226.42±26.17 and in group 3 was 248.70±28.40 minutes. The time of motor block regression was longest in group 3 followed by group 2 as compared to group 1. The difference in time of motor block regression is statistically significant (P<0.05).

The maximum duration of analgesia (338±30.15min) was in group 3 (dexmeditomidine) which was followed by group 2 (clonidne) 302.70±20.76 min and minimum in group 1 (Bupivacaine) 180±50 min. The difference was statistically significant (P<0.05).

The incidence of side-effects like vomiting, headache, shivering urinary retention and dizziness were comparable in all the groups and statistically non significant. The incidence of dry mouth (8 patients in group 2, 7 patients in group 3 and 5 patients in group 1) was the most common side effect but was statistically non-significant (P >0.05).

Discussion

The present study entitled "A comparative study of clonidine and dexmedetomidine as an adjuvant to bupivacaine in epidural anaesthesia" was designed to compare the efficacy of epidural dexmed 1mcg/kg and clonidine 1.5mcg/kg as an adjuvant to 0.5% bupivacaine in epidural anaesthesia with respect to onset and duration of sensory and motor block, duration of analgesia, heamodynamic changes, adverse effect of drugs and sedation.

The study was carried out on 90 patients of ASA Grade I and II of both the sexes between 18 to 65 years of age, scheduled for lower abdomen and lower limb surgeries.

Base Line Comparison of Groups

The study included the patients of age group between 18 to 65 years of age. In present study the age (Mean± SD) in group 1 was 41.36±6.46 years, in group 2 40.36±5.43 years and in group 3 was 40.36 ± 7.21years. The age is comparable in all age groups. This is shown in Table 1. Distribution according to sex was also comparable among the three groups. This is shown in Table 2.

Time of sensory onset up to T-10 (in Minutes)

In our study time of sensory onset to T-10 in group 1 was 10.02 2.6min, in group 2 was 9.82± 3.10 min, and in group 3 was 7.10±2.10min. The onset of sensory block was shortest in group 3 as compared to control and group 2. Thus clonidine and dexmedetomidine as an adjuvant to bupivacaine in epidural anaesthesia hasten the onset of sensory block.

Shobhana Gupta et al [7] in 2010 studied the effect of clonidine as an adjuvant with bupivacaine in epidural anaesthesia.They used 1mcg/kg of clonidine with bupivacaine 1.5mg/kg. Their time of sensory onset was 493.8±1.66seconds.This is comparable with our time of onset.

K Syal et al [8] in 2011 used bupivacaine 0.125% along with clonidine 60mcg. The time of sensory onset was 8.64±1.77 minutes. This time is comparable with our time of onset. They concluded that Clonidine is a useful adjuvant to bupivacaine for epidural labour analgesia and can be considered as alternative to opiods.

Chand T et al [9] in 2012 used bupivacaine 0.125% and clonidine 50mcg for post operative lumbar epidural analgesia. The time of sensory onset was 8.64±1.542 minutes. This time is comparable with our study.

Sukhminder Jit Singh Bajwa et al [10] in 2010 used 20 ml of ropivacaine and 75mcg of clonidine. The time of sensory onset was 8.64±2.56 mins, this time is comparable with that of our study.

SamyElsayed et al [11] in 2013 used 1 mcg of dexmedetomidine with bupivacaine, the time of sensory onset was 7.2±1.8mins. This time is comparable with time of onset in our study .They compared Intra operative conditions and quality of postoperative analgesia after adding dexmedetomidine to epidural bupivacaine and fentanyl in elective caesarean section using combined spinal-epidural anaesthesia.

Manal M et al [12] in 2014 used 20ml 0.5% levobupivacaine and 1.5mcg/kg dexmedetomidine in epidural anaesthesia. The time of sensory onset was 12.60±5.90 minutes.They concluded that Dexmedetomidine is a good alternative to morphine as an adjuvant to levobupivacaine in epidural anaesthesia in mojar abdominal surgeries.

Sukhminder Jit Singh Bajwa et al [13] in 2011, used 17ml of 0.75% ropivacaine and 1.5mcg/kg of dexmedetomidine. The time of onset of sensory block to T-10 was 8.52±2.36 minutes. This time is comparable with our study.

BajwaSJ et al [14] in 2011 used ropivacaine + dexmedetomidine and ropivacaine + fentanyl with 50 patients in each group. Inj Ropivacaine ,15 ml 0.75% was administered epidurally in both the groups with addition of 1ug/kg of dexmedetomidine and 1 ug/kg of fentanyl in second group. The onset of sensory analgesia to T-10 in ropivacaine and dexmedetomidine was 7.12±2.44 minutes.This time is comparable with our study.

S Shaikh et al [15] used 15ml of bupivacaine 0.5%, the time of onset was15.76± 2.95 minutes. This time is comparable with our study.

Park et al [16] used 20ml of 0.5% bupivacaine and observed that the time of onset upto T-6 was 17.6± 7.7minutes. This time of sensory onset is comparable with our time.

Time of Motor Block Onset to Bromage 3(IN MINUTES)

In our study time of motor block onset to bromage 3 in group 1 was 20.36±34minutes, in group 2 was 17.80±4.08 and in group 3 was 14.50±5.18 minutes. The onset was earliest in group 3l as compared to group 1 and group 2. That is clonidine and dexmeditomidine as adjuvant shorten the time of motor block onset.

Shobhana Gupta et al [7] in 2010 studied the effect of clonidine as an adjuvant with bupivacaine in epidural anaesthesia. They used 1mcg/kg of clonidine with bupivacaine 1.5mcg/kg. Their time of motor onset was 15.60±3.09 minutes. This time is comparable with our time of onset.

K Syal et al [8] in 2011 used bupivacaine 0.125% along with clonidine 60mcg . The time of motor onset was 15.20±4.08 minutes. This time is comparable with our study.

Sukhminder Jit Singh Bajwa et al [10] in 2010 used 20ml of ropivacaine and 75mcg of clonidine. The time of onset was 17.34±4.48minutes. This time is comparable with our study.

SamyElsayed Hanoura et al [11] used 1mcg/kg of dexmeditomidine with bupivacaine, the time of

motor onset was 11.50±4.18 minutes. This time is comparable with our study.

Manal M et al [12] in 2014 used 20ml of 0.5% levobupivacaine and 1.5mcg/kg dexmedetomidine in epidural anaesthesia. The time of motor onset was 18.16±4.48 minutes. This time of onset is comparable with our study.

Sukhminder Jit Singh Bajwa et al [13] in 2011 used 17ml of 0.75% ropivacaine and 1.5mcg/kg of dexmedetomidine. The time of motor onset was 17.24±5.16 minutes. This time is comparable with our study.

Saravia P.S.F. Sabbag et al [17] in 2008 evaluated clinical characteristics of epidural anaesthesia performed with 0.75% ropivacaine associated with dexmedetomidine .The study included two groups :Control group and Dexmedetomidine group of 20 patients each.The onset of motor blockade in Dexmedetomidine group was 15.36±3.28 minutes. This time of onset is comparable with our study.

Time of Motor Block Regression to Bromage 0 (IN MINUTES)

In our study time of motor block regression to bromage 0 in group 1 was 152±12.2 minutes , in group 2 was 226.42±26.17 and in group 3 was 248.70±28.40 minutes .The time of motor was longest in group 3 followed by group 2 as compared to group 1 .That is both the adjuvants prolonged the time of motor block regression .

Hemodynamic Changes

Baseline systolic BP, diastolic BP, heart rate were comparable. After epidural anaesthesia, there was fall in systolic, diastolic BP and HR in each group, but fall in group 2 and group 3 was more as compared to control group. But after 45 minutes they returned to baseline values. Though fall in BP was more in group 3, but not significant. There was no stastical significant difference (P>0.05) of heart rate in between different groups. There was no statistically significant difference. Similar results were also found by Sukhminder Jit Singh et al,Vikram Arora et al, Shobhna Gupta et al, K Sayal et al. Sukhminder Kaur Bajwa et al 2010, Gurpreet Singh. They all had observations similar to our study.

Sedation (Ramsay Sedation Score)

Sedation score was more in group 3(dexmeditomidine) between 60-120 minutes after epidural anaesthesia, followed by group 2 (Clonidine) between 60-120 minutes and then in Group 2(Bupivacaine).Table II shows our results that are comparable with Bajwa SJ et al [14], They found the sedation score was more in Dexmedetomidine group than in clonidine group. Rajini Gupta et al [18] in 2011, found that sedation score was more in dexmeditomidine than other group.C

Duration of Analgesia:

The maximum duration of analgesia (338±30.15min) was in group 3 (dexmeditomidine) which was followed by group 2 (clonidne) of 302.70±20.76 min and minimum by group 1 (Bupivacaine) of 180±50 min. The difference was stasitically significant ($p<0.05$)

Side Effets

The incidence of side-effects like vomiting, headache, shivering urinary retention and dizziness were comparable in all the groups and statistically non significant. The incidence of dry mouth (8 patients in group 2, 7 patients in group 3 and 5 patients in group1) was the most common side effect but was statistically non-significant ($p >0.05$).

Conclusion

Epidural anaesthesia is a popular technique because of its numerous advantages. It is a common practice to add adjuvants to local anaesthetics in epidural anaesthesia to improve the quality of anaesthesia and analgesia. It can be concluded from our study that clonidine and dexmedetomidine are good alternatives to opioids as adjuvant to bupivacaine in epidural anaesthesia.

References

1. Hohenar D ,Blumenthal, Borgeat A. Sedation and regional anaesthesia in adult patients. Br.J Anaesthesia 2008:100:8-16.
2. Kamibayashi T,Maze M, Clinical uses of alpha 2 adrenergic agonist. Anaesthesiology 2000;93:1345-9.
3. Virtenan R, Savala J.M et al Characterization of the selectivity, specificity and potency of dexmedetomidine as an alpha 2 receptot agonist. European J. pharmacol 1988;50:9-14.
4. Guo T.Z, Jeang JY, Butterman AE, Maze.M. Dexamedetomidine injection in to Locus caeruleus produces antinoception. Anaesthesiology 1996;84:873-881.

5. Asano T, Dohi S Ohtas, et al. Antinoceception by epidural and systemic alpha 2 adrenergic receptor agonist and their binding affinity in rat spinal cord and brain. Anaes Analgesia 2000;90:400-407.
6. Eisenach JC, De Kock M, Klimbscha W. Alpha 2 adrenergic agonists for regional Anaesthesia. A clinical review of Clonidine. Anaesthesiology. 1996; 85:655.
7. Shobhana Gupta, Dipak Raval, Mita Patel et al. addition of epidural clonidine enhances postoperative analgesia. A double-blind study in total knee-replacement surgeries. Anaesthesia:Essays and Researches. 2010;4:2:70-4.
8. K Syal, RK Dogra, A ohri et al. Epidural labour analgesia using Bupivacaine and clonidine. J anaesthesiol Clin Pharmacol 2011;27:(1);87-90.
9. Chand T , Kumar V, Joshi. Comparison of Bupivacaine –clonidine and Bupivacaine-fentanyl for postoperative lumbar epidural analgesia. IJRRMS. 2012 Apr-Jun;2(2).
10. Sukhwinder Jit Singh Bajwa, Sukhwinder Kaur Bajwa, Jasbir Kaur et al. Comparison of epidural ropivacaine and ropivacaine clonidine combination for elective caesarean section. SJA: 2010;4,(2):47-54.
11. Samy Elsayed Hanoura, Rabei Hassanin, Rajvir Singh. Intraoperative conditions and quality of postoperative analgesia after adding dexmedetomidine to epidural bupivacaine and fentanyl in elective caesarean section using combined spinal using combined anaesthesia. Original article. Anesth Essays Res. 2013 May-Aug; 7(2):168–172.
12. Manal M, Kamal, Sahar M et al. Comparative study of epidural morphine and epidural dexmedetomidine used as adjuvant to levobupivacaine in major abdominal surgeries. Egyptian Journal of Anaesthesia. 2014 Apr;l39(2):137-141.
13. Sukhwinder Jit singh Bajwa, Sukhwinder Kaur, Amarjit Singh et al. Dexmedetomidine and clonidine in epidural anaesthesia. A comaparative evaluation. Indian Journal of Anaesthesia. 2011;55(2):116-12.
14. Bajwa SJ, Arora V, Kaur J et al, Comparative evaluation of dexmedetomidine and fentanyl for epidural analgesia in lower limb orthopaedic surgeries. S.J of Anaesth 2011;4:365-370.
15. S Shaik. Indian journal of anaesthesia. 2014;58(3): 243-382.
16. Park HS, Chung CJ, Chin YJ. Comparison of four local epidural anaesthetic solution for elective caesarean section Korean Journal of Anaesthesiology 1992;25: 962-968.
17. Saravia P.S.F. Sabbag AT et al. Synergistic effect between dexmedetomidine and ropivacaine 0.75% in epidural anaesthesia. Rev Assoc Bras 2008;54(2);110-5.
18. Rajni Gupta, Reetu Verma, Jaishree Bogra, Monica Kohli, Rajesh Raman, Jitendra Kumar Kushwaha. A comparative study of intrathecal dexmedetomidine and fentanyl as adjuvants to Bupivacaine. J Anaesthesiol Clin Pharmacol 2011;27(3):339-43.

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Sedation with Dexmedtomidine or General Anaestesia in Combination with Regional Anaesthesia in Mastoid Surgeries: A Comparitive Study

Murdeshwar Greeshma N.[1], Kulkarni Shrinivas[2], Surana Shradha[3], Kumar Praveen B.Y.[4]

[1]Assisstant Professor [2]Associate Professor [3]Post Graduate Student, Dept. of Anesthesiology, [4]Associate Professor, Dept . of ENT, Mysore Medical College and Research Institute, Mysuru, Karnataka 570001, India.

Abstract

Backround and Aims: Mastoid surgery can be performed under general anaesthesia (GA) or sedation both combined with regional anaesthesia ((RA). There are very few studies comparing both the techniques. Dexmedetomidine is the sedative agent of choice in modern era. Our primary aim was comparison of haemodynamic variation and bleeding under GA or sedation with dexmedetomidine and secondary being, adequacy of sedation and patient comfort under dexmeditomedine sedation, post operative analgesia and duration of stay in post anaesthesia care unit. *Methods*: 60 patients posted for mastoidectomy were randomly divided into two equal groups, GA or sedation. In GA after conventional technique of induction and intubation, anaesthesia was maintained with oxygen, nitrous oxide, isoflurane and propofol infusion. In sedation group dexmedetomidine 1 μg/kg was given over ten minutes followed by infusion at rate 0.2-0.8 μg/kg/hr. RA was given in both the groups. Intraoperative parameters were noted in both the groups. Statistical software version SPSS 19 was used. *Results:* Heart rate was lower in sedation group throughout surgery. Bleeding was less in both groups. None of the patients in sedation group were converted to GA. Maximum patients had discomfort to noise and neck position. Shifting of patients was earlier with sedation than in GA. There was longer post operative analgesia with dexmedetomidine sedation. *Conclusion:* Dexmedetomidine sedation with regional anaesthesia can also be a better choice for mastoid surgery. It maintains haemodynamic stability, minimal bleeding, adequate sedation and patient comfort. It also aids early ambulation of patients and has perioperative analgesic action.

Keywords: Mastoid Surgery; Dexmedetomidine Sedation; General Anaesthesia; Regional Anaesthesia for Middle Ear Surgery.

Introduction

Mastoidectomy is a procedure of removal of infected mastoid cells from mastoid with tympanoplasty [1]. Minimum haemodynamic variation, minimum bleeding, patient comfort with respect to pain, position, anxiety and noise are the prerequisites for a safe mastoid surgery. Mastoid surgery can be performed under sedation [2] or general anaesthesia (GA), both supplemented with regional anaesthesia (RA). Under GA there is more haemodynamic variation as a result of airway handling [3]. The rise in perioperative blood pressure and heart rate is more common, which may result in increased bleeding at the site of surgery. Also use of Nitrous oxide which has 34 times more solubility in blood than Nitrogen can cause graft displacement if used continuously [1,4]. On contrary sedation without GA avoids endotracheal intubation, cessation of spontaneous respiration and hemodynamic variation associated with airway handling. There are very few studies comparing the difference of effects of GA and sedation in mastoid surgeries [5].

There are many drugs like benzodiazepines and Propofol that have been used for mastoid surgeries. Since these drugs produce respiratory depression, a drug without this side effect would be ideally suited for sedation. Hence Dexmedetomidine, which is a central presynaptic α_2-adrenoceptor

Corresponding Author: Kulkarni Shrinivas, Associate Professor, Department of Anesthesiology, Mysore Medical College and Research Institute, Mysuru, Karnataka 570001, India.
E-mail: Kulki61@yahoo.co.in

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agonist, can be an appropriate choice. Its α-2: α-1 selectivity ratio is 1620:1. Its distribution half-life is 6 minutes and elimination half-life is 2-2.5 hours. It is popular for its unique conscious sedation(patient appears to be asleep but readily aroused), analgesia without respiratory depression [6]. It decreases BP, which is beneficial in reducing intraoperative bleeding.

Hence, it was hypothesized that sedation with Dexmedetomidine had better outcomes than GA [3]. The primary objectives of the present study were to compare haemodynamic stability, bleeding, sedation with Dexmedetomidine comparedto GA, adequacy of sedation and extent of patient discomfort due to sedation. The secondary objectives were to compare, time to shift from post anaesthesia care unit (PACU) and post-operative analgesia.

Methods

The study was conducted in tertiary hospital attached to a medical College and Research Institute; (October 2016 to March 2017). After obtaining approval from the institutional ethical committee and informed written consent from the patients, 60 patients were randomly selected, posted for mastoid surgery. Random selection was done by opaque closed envelope technique and divided into two equal groups: Group-GR or Group-SR with 30 patients in each. Inclusion criteria were: adult patients of either sex, aged between 18-60 years belonging to American society of Anesthesiologists (ASA) physical status class I or II. Exclusion criteria were patients with history of chronic use of analgesic or sedative agents, diabetes mellitus, alcohol or drug abuse, language barrier or psychiatric disorder, allergy to any of the study medications, history suggestive of obstructive sleep apnea, evidence of bradycardia with heart rate less than 60 or if patients were on beta blocker therapy.

Thorough preoperative evaluation was done for all patients and they were kept nil orally overnight. On the day of surgery, intravenous line obtained with 18 gauge cannula. Monitoring done using multi parameter monitor having electrocardiogram (ECG), capnography and non- invasive blood pressure (NIBP). Baseline heart rate (HR), mean arterial pressure (MAP) and pulse oximetry saturation (SPO_2) noted. They were premedicated 10 minutes before surgery with IV Ondansetron-4mg, IV Glycopyrrolate 2mg and IV Fentanyl 2μg/kg in both the groups.****

Group-GR: Patient induced with IV propofol 2mg/kg followed by IV muscle relaxant vecuronium 0.1mg/kg. After 3 minutes of ventilation with mask using oxygen (O_2) 40%, N_2O 60% and isoflurane 1%, patient intubated with endotracheal tube size 7.5 in females and 8.5 in males and tube secured. Patient ventilated with Bains circuit with O_2 40% and N_2O 60%. Anaesthesia maintained with isoflurane at 1%. Propofol infusion started and titrated between 50-100μg/kg/min. 10ml of 0.25% bupivacaine with 10ml of 1: 200000 lignocaine with adrenaline was used for RA.5 minutes after this infiltration, surgery was started. Intraoperative HR, MAP and SPO_2 monitored every 5 minutes. N_2O stopped during and after graft placement.

Beginning of skin suturing is considered to be end of surgery. 20 minutes before the end of the surgery propofol infusion was stopped. After skin suturing isoflurane was stopped. When patient developed slight efforts, he was reversed with IV neostigmine 0.05mg/kg and glycopyrolate 0.01mg/kg. Patient was extubated after adequate efforts.

RA was given in both the groups by injection of solution into the anterior meatal wall at the osteocartilaginous junction; injections at several points behind the auricle and over the mastoid process; injection of the periosteum at the anterior surface of the mastoid process and the skin of the floor of the meatus.

Group-SR: 1 μg/kg bolus of dexmedetomidine given over 10 minutes under monitoring followed by maintenance infusion at the rate of 0.4μg/kg/hr. Rate titrated between 0.1-0.8μg/kg/hr to maintain Ramsay's sedation score (RSS) of 3. 10ml of 0.25% bupivacaine with 10ml of 1: 200000 lignocaine with adrenaline was used for RA. 5 minutes after this infiltration surgery started. Intraoperative HR, MAP, respiratory rate and SPO_2 monitored for every 5 minutes. RSS also monitored. If MAP was less than 60mmHg or HR drops below 50, it was considered as unwanted hypotension or bradycardia respectively, infusion was reduced to half rate. Ringer Lactate fluid bolus was given for hypotension followed by IV ephedrine if needed. IV Atropine 0.3mg was given for bradycardia and repeated as required. If RSS of the patient was 1, IV propofol infusion was given at the rate of 50-100μg/kg/min. If patient was dissatisfied or complained of severe pain, sedation was converted to GA. At the end of the surgery, infusion was stopped. Number of patients who received this additional sedation was noted to evaluate the adequacy of sedation with dexmedetomidine.

Patients belonging to both the groups were then kept in PACU for monitoring. Any side effects like PONV or facial nerve paresis were looked for. Surgeons were asked to grade the intraoperative bleeding as 0: no bleeding, no suction; 1: minimum bleeding, sporadic suction; 2: diffuse bleeding, repeated suction; 3: troublesome bleeding, continuous suction.

Patients of Group-SR were asked to rate their discomfort score to pain, noise, position and anxiety via questionnaire; from 0 to 4 where 0- no discomfort; 1-mild discomfort; 2-moderate discomfort; 3- severe discomfort and 4- extreme discomfort. Patients were shifted to the ward after the modified Aldrete score (MAS) >8. Duration of stay in the PACU noted. Postoperative analgesia assessed via visual analogue score (VAS). Duration to attain VAS > 4 noted and rescue analgesia with IV paracetamol was given.

Ramsay Sedation Scale is as Follows

1. Anxious, agitated or restless
2. Cooperative, oriented and tranquil
3. Responds to command
4. Asleep but has a brisk response to light glabellar tap or loud auditory stimulus
5. Asleep has a sluggish response to a light glabellar tap or loud auditory stimulus
6. Asleep no response

Post Anaesthesia Recovery Score (Modified Aldrete Score)

Parameter	Score		
	2	1	0
Activity	Moves all extremities voluntarily or on command	Moves two extremities voluntarily or on command	Unable to move extremities
Respiration	Breathes deeply and coughs freely	Dyspnoeic, shallow or limited breathing	Apnoeic
Circulation	BP ± 20 mm of preanaesthetic level	BP ± 20-50 mm of preanaesthetic level	BP ± 50 mm of preanaesthetic level
Consciousness	Fully awake	Arousable on calling	Not responding
Oxygen saturation	SpO_2 >92% on room air	Supplemental O_2required to maintain SpO_2 >90%	SpO_2 <90% with O_2supplementation
	Total Score=10		

Visual Analogue Scale: VAS (0-10cm)

0	2	4	6	8	10
No pain					**worst pain**

The study was started after the pilot study involving 16 patients with 8 patients in each group. Sampling will be purposive sampling, done using the formula $S=z^2pq/d^2$ where z is constant, p is prevalence, q is (1- p) and d is significance level. In this study, considering hospital prevalence of 4% and confidence interval of 95%; z will be 1.96 and d will be 0.05. Applying this formula, sample size (S) will be 60 patients.

Statistical analysis was done using SPSS statistical software version 19 for windows. Data were presented as mean and standard deviations (SD). Comparison was done using Independent sand paired samples t tests, Cramer's V & repeated measure ANOVA tests. P values below 0.05 were considered statistically significant.

Results

In our study, both the groups were comparable in their demographic characters, duration of surgery and mean baseline HR and MAP (Table 1)

Intraoperative HR was lesser in group SR compared to group GR throughout the surgery. However there was a statistically significant increase of HR in the first 15 min and the last 10 minutes in Group GR compared to Group SR (Figure 1).

Intraoperative MAP had maximum difference at first 15-20 minutes and last 15-20 minutes. It was significantly higher in group GR compared to group SR. Throughout the surgery the difference was not statistically significant (Figure 2).

Table 1: Demographic characters, duration of surgery and mean baseline Heart Rate (HR) and Mean Arterial Pressure(MAP)

	Group GR	Group SR	P value
Age(years)	34.46 +/- 10.5	30.63 +/- 8.53	0.126
Weight (kg)	58.23 +/- 6.04	57.9 +/- 5.86	0.829
Sex (male: female)	13:17	17:13	0.302
ASA grade (I : II)	15:15	21:9	0.114
Duration of surgery	2.61 +/- 0.32	2.64 +/- 0.32	0.736
Mean baseline HR	86.93 +/- 13.45	85.9 +/- 14.77	0.778
Mean baseline MAP	76.26 +/- 8.87	78.43 +/- 7.79	0.319

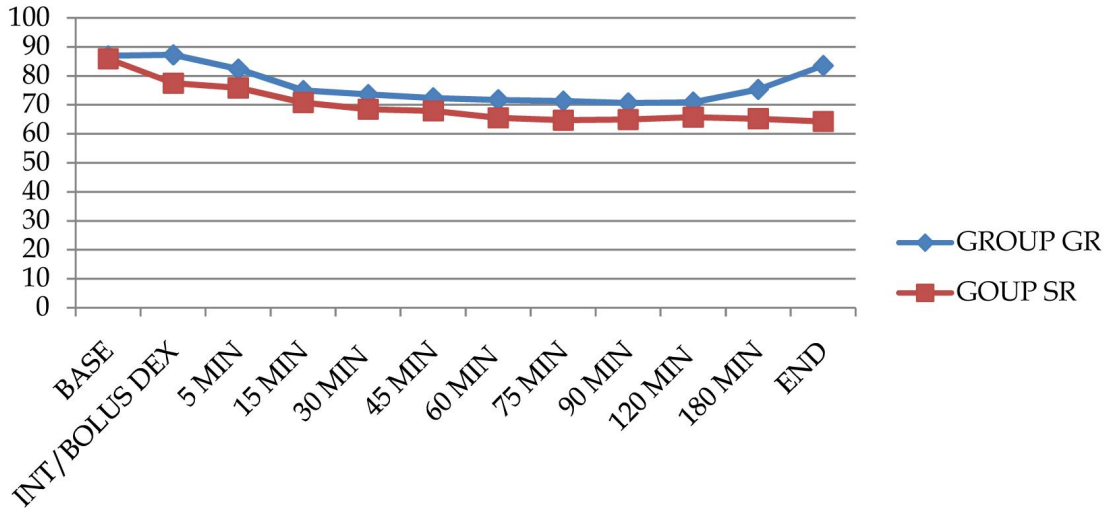

Fig. 1: Heart Rate variation at different time intervals in both the groups

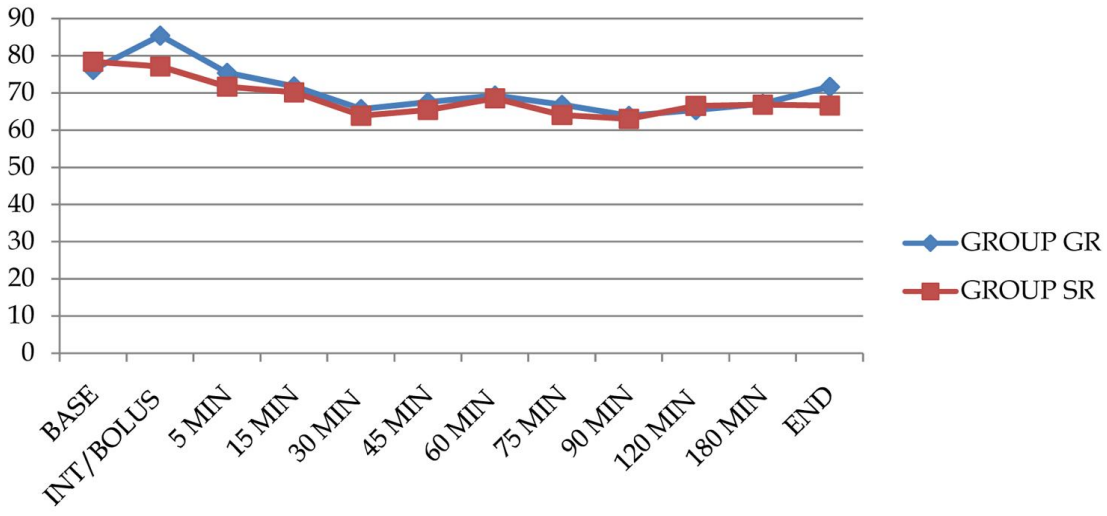

Fig. 2: Mean Arterial Pressure (MAP) changes atvarious time intervals between the Groups

Bleeding score as graded by surgeons was 1.5 +/- 0.62 in Group GR and 1.4 +/- 0.62 in Group SR. (P value-0.538). It is not statistically significant. Maximum grading of the bleeding score was 2.

Most of the patients maintained RSS of 3 in Group SR. None were converted to GA.

Patient discomfort score was assessed in Group SR. Patients show maximum discomfort to noise and neck position compared to pain and anxiety (Table 2).

Intraoperative, 3 patients in group SR had bradycardia with HR < 60/min and corrected by IV Atropine 0.6mg. None of the patients in either of

Table 2: Patient discomfort score in Group SR

Patients in Group SR	Pain	Noise	Anxiety	Neck Position
Mean discomfort score	1.2 +/- 0.4	2.2 +/- 0.66	1.6 +/- 0.71	2.1 +/- 0.79

Table 3: Perioperative Haemodynamic complications and post-operative parameters in both the Groups

	Group GR	Group SR	P value
Bradycardia	0	2	
Hypotension	1	3	
Facial paresis	1	1	
PONV	3	1	
Mean PACU shift time (min)	40.1 +/- 7.39	31.9 +/- 7.09	<0.005
Mean Post op Analgesia duration (hrs)	4.5 +/- 0.67	5.1 +/- 0.68	0.002

the Groups had PR < 50/minute. 2 patients had hypotension in Group SR. It improved after administering fluid bolus and IV ephedrine 6 mgs. Incidence of PONV was not significant in both the Groups. One case of facial paresis was noted in each group, in group GR it was noted postoperatively whereas it was detected intraoperatively in group SR. The paresis was transient and disappeared within 24 hours.

Time to shift from PACU was early in group SR (40.1±7.39 minutes) than group GR (31.9±7.09 minutes) as they attained MAS >8 early. Post-operative duration of analgesia in Group SR was longer than Group GR (Table 3).

Discussion

Studies comparing GA versus sedation for mastoid surgeries are lacking. In our study we compared sedation with Dexmedetomidine and conventional endotracheal GA, both combined with RA in mastoid surgeries to assess haemodynamic variations, perioperative bleeding, patient comfort under sedation, adequacy of sedation, any adverse effects, recovery and duration of analgesia.

Andreassen [5] compared local anaesthesia (LA) verses GA for middle ear surgery (MES), and found out that MES with LA is advantageous as it was acceptable to majority of the patients.

Dogan et al. [3] showed that LA with dexmedetomidine sedation resulted in a more stable haemodynamic state, less surgical bleeding compared to GA alone. In studies conducted by J. A. Alhashemi et al [7] and Taqhinia AH et al [8] there was a lower HR and MAP with dexmedetomidine sedation patients. Durmus et al [9] studied haemodynamic responses in tympanoplasty and septoplasty, with dexmedetomidine infusion when used intraoperatively along with GA. HR and MAP were lower intraoperatively with the infusion compared to placebo. Similarly in our study there was significant reduction in HR from the baseline throughout the surgery in dexmedetomidine sedation.

Our study has shown that MAP and HR increase was only during the first and last 15-20 minutes in GA group which coincided with laryngoscopy, intubation and extubation respectively. However there was no increase of MAP or HR in Group SR through-out. Intraoperatively in both the groups the haemodynamic changes were not statistically significant. In studies conducted by Ghali et al [10] and Reetu Verma et al [11], there was reduction of MAP from baseline with both propofol and dexmedetomidine sedation. In studies by Arain et al [12] and Ebert et al [13] using Propofol infusion for sedation, MAP was lower with propofol sedation. In the above mentioned studies we notice that MAP decreases with propofol sedation, which has got an additive effect of isoflurane in GA as in our study. Hence MAP was lower from baseline intraoperatively in group GR where anaesthesia was maintained with propofol infusion and isoflurane 1%. It was also lower in group SR and the variation in both the groups had no statistical significance. This can be explained by the powerful inhibitory effect of propofol on sympathetic outflow [13]. Dexmedetomidine also has sympathetic inhibitory effect causing fall in BP [14]. The rise in MAP in group GR during first and last 15-20 minutes is due to intubation and extubation response. Hence there was more haemodynamic stability in HR and MAP with dexmedetomidine compared to GA in our study though the variation in MAP was not much intraoperatively.

Reem Hamdy Elkabarity et al. concluded that there was near bloodless field during MES with

dexmedetomidine surgery [15]. Fazilet Sahin et al [16] observed that there was no difference in the amount of bleeding in MES when dexmedetomidine sedation was compared to alfentanyl. In Our study there was no statistical significant difference in bleeding. It might be due to the non-significant variation in MAP which was high only during the beginning and at the end of the surgery in group GR. However in both the groups the surgeons did not grade bleeding more than 2. This indicates similar extent of bleeding can be caused by GA with propofol infusion and sedation with dexmedetomidine infusion.

Hence dexmedetomidine sedation can also be preferred for controlled bleeding in mastoid surgery.

Raul et al [17] studied dexmedetomidine sedation in MES. They evaluated the degree of sedation wherein maximum had achieved RSS of 2 and 3. Adequate sedation was achieved successfully with the mean infusion rate of 0.27 μg/kg/hr. Goksu et al [18] study results showed that dexmedetomidine gives adequate sedation without any discomfort in functional endoscopic sinus surgery. Their results are consistent with the results of our study. Most of the patients had RSS of 2, 3 or 4 without any hemodynamic or respiratory untoward changes in our study. None of the patients were converted to GA.

Yungs [19] observed in his study of MES with LA that maximum discomfort was to noise and anxiety. Whereas Sormento et al [20] study patients had more discomfort to neck position when intra muscular promethazine was used. Caner G [2] observed that patients had most discomfort to noise and patients were irritable. Our study also showed increased discomfort to noise and neck position compared to anxiety and pain. This may be because of anxiolytic and analgesic property of dexmedetomidine. This entire discomfort score was assessed at the end of the surgery by questionnaire. Despite of this discomfort neither the surgeons nor the patients interrupted surgery.

Bradycardia and hypotension more associated with dexmedetomidine could be explained by its central α-2 adrenergic blockade which eventually decreases sympathetic outflow [14, 21].

In Dogan et al [3], Arian SR et al [11] and Reetu Varma et al [12] study there was better pain relief in dexmedetomidine group post operatively in MES. McCutcheon CA [22] also noted there was lesser requirement of post-operative rescue analgesics in patients undergoing carotid endarterectomy with dexmedetomidine sedation. This explains the analgesic feature of dexmedetomidine which is also observed in our study with long duration of post-operative analgesia.

Dogan et al [3] who compared dexmedetomidine sedation with GA in septoplasty also observed faster recovery in dexmedetomidine group as in our study.

Some of the limitations of our study are as follows: RSS was not assessed frequently as it would interrupt the surgery. It was done for every 15 minutes for 1st hour and then hourly. This might made us to miss if there was inadequate sedation level attended by the patient. Other limitation was the lack of facility of bispectral index for delineating the end point of sedation. In our study it was assessed via RSS where the target level was 3. There was subjective assessment of bleeding by surgeons as there was no definitive objective method of detecting the bleeding. This is another limitation of our study.

Conclusion

Mastoid surgery can be performed either under GA or sedation with RA. Sedation can be preferred over GA as there is less hemodynamic variation and equal bleeding rate in both the groups. With infusion rate of dexmedetomidine 0.1-0.8 μg/kg/hr, adequate sedation can be attained intraoperatively. Surgery can be performed by assessing hearing and facial nerve function. There will be tolerable discomfort to noise and position. The recovery of patient in sedation is earlier than with GA; less PONV and longer duration of analgesia. As there are many advantages of Dexmedetomidine sedation with RA, mastoid surgeries can be safely performed with the same.

References

1. Liang S, Irwin M.G. Review of Anesthesia for Middle Ear Surgery. Anesthesiology Clinics 2010;28(3): 519-528.
2. Gül Caner, MD, Levent Olgun, MD, Gürol Gültekin, MD, and Levent Aydar, MD, Bozyaka-Iÿzmir, Turkey Local anesthesia for middle ear surgery. Otolaryngol Head Neck Surg 2005;133:295.
3. Dogan R, Erbek S, Gonencer HH, Erbek HS, Isbilen C, Arslan G. Comparison of local anesthesia with dexmedetomedine sedation and general anesthesia during septoplasty. Eur J Anaesth 2010;27(11):960–4.

4. Davis I, Moore JRM, Lahiri SK. Nitrous Oxide and middle ear. Anesthesia 1979;34:147-151.
5. Andreassen UK, Larsen CB. Anaesthesia in ear surgery. A source economical analysis and patient assessment of general anaesthesia verses local anaesthesia in ear surgery. Ugeskr Laeger 1990;28 (152):1595-7.
6. Afonso J, Reis F. Dexmedetomidine: current role in anaesthesia and intensive care. Rev Bras Anesthesiolo 2012;62(1):118-133.
7. Alhashemi JA. Dexmedetomidine vs midazolam for monitored anaesthesia care during cataract surgery. Br J Anaesth 2006;96:722-6.
8. Taghinia AH, Shapiro FE, Slavin SA. Dexmedetomidine in aesthetic facial surgery: Improving anesthetic safety and efficacy. Plast Reconstr Surg 2008;121:269-76.
9. Durmus M, But AK, Dogan Z, Yucel A, Miman MC, Ersoy MO. Effect of dexmedetomidine on bleeding during tympanoplasty or septorhinoplasty. Eur J Anaesthesiol 2007; 24(5):447-53.
10. Ghali A, Mahfouz AK, Ihanamäki T, El Btarny AM. Dexmedetomidine versus propofol for sedation in patients undergoing vitreoretinal surgery under sub-Tenon's anesthesia. Saudi J Anaesth 2011;5: 36-41.
11. Verma R, Gupta R, Bhatia V. K., Bogra J, Agarwal S. P.. Dexmedetomidine and propofol for monitored anesthesia care in the middle ear surgery. Indian Journal of Otology. 2014 Apr;20)2):70-74.
12. Arain SR, Ebert TJ. The efficacy, side effects, and recovery characteristics of dexmedetomidine versus propofol when used for intraoperative sedation. Anesth Analg 2002;95:461-6.
13. Ebert TJ, Muzi M, Berens R, Goff D, Kampine JP. Sympathetic responses to induction of anesthesia in humans with propofol or etomidate. Anesthesiology 1992;76:725-33.
14. Hogue CW Jr, Talke P, Stein PK, Richardson C, Domitrovich PP, Sessler DI. Autonomic nervous system responses during sedative infusions of dexmedetomidine. Anesthesiology 2002;97:592-8.
15. Abdellatif A.A, Elkabarity R.M, Hamdy T.A.E Dexmedetomedine vs midazolam sedation in middle ear surgery under local anesthesia: Effect on surgical field and patient satisfaction. Egyptian J Anaesthesia 2012;28:117-123.
16. Sahin F, Deren. S, Erdogan. G, Ornek. D, DikmenInt. B. Dexmedetomidine and Alfentanil during Middle Ear Surgery. Adv. Otol. 2011;7(2):225-233.
17. Raul A, Vega S, Carolina C, Silvia S, Elba B and Victoria D. Dexmedetomidine: A New Alpha-2 agonist anesthetic agent in infusion for sedation in middle ear surgery with awake patient. Anesthesiology 2005;103:623
18. Goksu S, Arik H, Demiryurek S, Mumbuc S, Oner U, Demiryurek AT. Effects of dexmedetomidine infusion in patients undergoing functional endoscopic sinus surgery under local anaesthesia. Eur J Anaesthesiol. 2008 Jan;25(1):22-8.
19. Yung MW. Local anesthesia in middle ear surgery: survey of patients and surgeons. Clin Otolaryngol Allied Sci 1996;21(5):404–8.
20. Sarmento Km, Jr, Tomita S. Retroauricular tympanoplasty and tympanomastoidectomy under local anesthesia and sedation. Acta Otolaryngol 2009;129:726- 8.
21. Gertler.R, Brown.H.C, Donald H. Mitchell, and Erin N. Silvius. Dexmedetomidine: a novel sedative-analgesic agent. Proc (Bayl Univ Med Cent). 2001 Jan; 14(1):13–21.
22. McCutcheon CA, Orme RM, Scott DA, Davies MJ, McGlade DP. A comparison of dexmedetomidine versus conventional therapy for sedation and hemodynamic control during carotid endarterectomy performed under regional anesthesia. Anesth Analg 2006;102:668-75.

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A Comparative Study of the Effects of Premedication with Oral Clonidine versus Oral Pregabalin in Patients Undergoing Lumbar Spine Surgery

K. Gunasekaran[1], Rathna Paramaswamy[2]

[1]Associate Professor [2]Professor and Head, Department of Anaesthesia, Saveetha Medical College Hospital, Saveetha University, Chennai, Tamil Nadu 602105, India.

Abstract

Aim: The aim of this study was primarily to compare the efficacy of single pre operative dose of oral pregabalin versus oral clonidine in attenuation of pressor response to direct laryngoscopy and intubation and on the intra operative haemodynamic stability in patients undergoing elective lumbar spine surgery. The secondary outcome was to evaluate the intra operative opioid consumption in both the drug groups. *Background:* Direct laryngoscopy and intubation are painful stimuli which cause reflex sympathetic nervous system stimulation resulting in untoward haemodynamic response. This study compares the effect of single oral pre-operative dose of clonidine versus oral pregabalin in attenuation of the pressor response to direct laryngoscopy and intubation and the intra-operative haemodynamics in patients undergoing lumbar spine surgery. *Materials & Methods*: This randomized double blinded trial was conducted in our tertiary care hospital. After obtaining informed written consent, sixty adult patients belonging to ASA I and ASA II undergoing elective lumbar spine surgery under general anaesthesia were randomly divided into two groups of thirty each. Group C received 100 μg of oral clonidine and Group P received 150 mg of oral pregabalin ninety minutes prior to induction of anaesthesia. Systolic blood pressure (SBP), diastolic BP (DBP), mean arterial pressure (MAP), and heart rate (HR) were measured at three time points; baseline(3 min before induction),just before laryngoscopy, 1, 3, 5, 10 and 15 min after intubation.The intra operative haemodynamics and fentanyl consumption was recorded for all patients. Statistical analysis was done using students' t test and chi square test. *Results:* Both drugs attenuated the haemodynamic pressor response associated with laryngoscopy and endotracheal intubation. The reduction in SBP, DBP, and MAP was comparable in both groups but the tachycardia was attenuated significantly in the clonidine group (P value< 0.05). The intra operative fentanyl consumption was lesser in the clonidine group than the pregabalin group (P value=0.0069). *Conclusions:* Oral pregabalin and clonidine successfully attenuated the pressor response to direct laryngoscopy and intubation. No adverse effects were observed with the doses used in our study. The intraoperative analgesic consumption was less in both the groups.

Keywords: Clonidine; Lumbar Spine Surgery; Pregabalin; Premedication; Pressor Response.

Introduction

Laryngoscopy and tracheal intubation are noxious stimuli that evoke a transient but marked sympathetic response manifesting as increase in heart rate, blood pressure and arrhythmias. Various drugs have been used as preoperative medication to attenuate the stress response to laryngoscopy and intubation. Clonidine is primarily a $\alpha 2$ agonist used primarily for its antihypertensive effects ($\alpha 2$ to $\alpha 1$ receptor ratio of 200:1). Alpha-2 receptors are adrenoreceptors that are located primarily on presynaptic nerve terminals. Activation of these receptors inhibits adenylate cyclase activity, which in turn decreases the entry of calcium into the neuronal terminal, which limits norepinephrine release. This leads to an overall decrease in sympathetic outflow, causing peripheral vasodilatation, as well as negative chronotropic effects causing a reduction in blood pressure. This decrease in central sympathetic outflow does not

Corresponding Author: Rathna Paramaswamy, Professor, Department of Anaesthesia, Saveetha Medical College Hospital, Saveetha University, Chennai, Tamil Nadu 602105, India.
E-mail: drrathna86@yahoo.co.in

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affect baroreceptor reflexes, therefore not causing orthostatic hypotension. Stimulation of these receptors in the central nervous system has also been shown to have sedative properties. Clonidine provides sedation and anxiolysis, decreases analgesic dosage requirements, decreases MAC (minimum alveolar anaesthetic concentration), reduces catecholamine levels and lowers heart rate and blood pressure during anaesthesia and reduces postoperative oxygen consumption [1,2,3]. Gabapentinoids (gabapentin and pregabalin) were originally introduced as antiepileptics and also have analgesic, anticonvulsant, and anxiolytic effects. These drugs are well tolerated by patients and produce limited side-effects. Pregabalin is a structural analog of gammaamino butyric acid (GABA) [4,5]. Pregabalin has anxiolytic, sedative, antiallodynic, antihyperalgesic, antinociceptive and antisecretory properties [4,5]. It acts by presynaptic binding to the $\alpha 2\gamma$ subunit of voltagegated calcium channels that are widely distributed in the spinal cord and brain [4,5,6]. By altering calcium currents, pregabalin reduces or modulates the release of several excitatory neurotransmitters, including glutamate, nor epinephrine, substance P, and calcitonin generelated peptide, producing inhibitory modulation of overexcited neurons and returning them to a normal state [7]. Pregabalin is effective in neuropathic pain, post herpetic neuralgia, reflex sympathetic dystrophy, acute postoperative pain, diabetic neuropathy and reduces the intra operative and post-operative opioid requirements [7,8]. Pregabalin has been used for attenuation of pressor response in normotensive patients [9-12]. Pregabalin has a linear pharmacokinetic profile with a time to peak plasma concentration up to one hour, and oral bioavailability of 90%. It is only slightly metabolized by liver, and up to 98% of administered dose is eliminated unchanged by kidneys [8]. Eren et al evaluated the effectiveness of pregabalin in suppressing the hemodynamic response to intubation in lumbar spinal surgeries [13]. Taghipour etal evaluated the efect of oral clonidine premedication in reducing blood loss during lumbar spine surgeries [14]. No randomised controlled study has been carried out to compare oral clonidine versus oral pregabalin to attenuate the pressor response of airway instrumentation in patients undergoing elective spine surgeries under general anaesthesia. Controlled, or deliberate, hypotension has been used for many years as a means of reducing intraoperative blood loss and facilitating surgical exposure, reducing the duration of surgery and the need for blood transfusion. As an oral premedication, clonidine can reduce surgical blood loss in lumbar spine posterior fusion surgery, even at the same levels of mean arterial pressure (MAP) with the control group and its use can be studied in more complicated spine surgeries, such as scoliosis and spinal deformity surgeries.[14]

Material and Methods

After obtaining ethical committee approval and informed written consent, this prospective, randomised, double blind, controlled study was conducted on sixty patients undergoing elective lumbar spine surgeries under general anaesthesia at our tertiary care hospital over a period of nine months. The inclusion criteria were patients belonging to ASA I and II, aged between 20 to 65 years, with a BMI of 18-25, belonging to either sex who were posted for elective lumbar spine surgery under general anaesthesia. The exclusion criteria were patients with allergy to clonidine or pregabalin, cerebrovascular, neurologic, respiratory and Ischemic heart disease, renal and hepatic disease, head injuries, diabetes mellitus, BMI >25, patients on beta blockers, anti- hypertensives, anti-depressants, anti-anxiety drugs, anticonvulsants or anti-psychotics and those with anticipated difficult airway. The patients enrolled in the study were randomly divided into two groups using computer based randomization. Baseline heart rates (HR), blood pressure (BP), mean arterial pressure (MAP) were recorded before giving the study drug ninety minutes before surgery. Pre hoc power calculation suggested that a minimum of 25 patients per group would detect a 15% difference in haemodynamic response to laryngoscopy and endotracheal intubation and peri operative fentanyl requirement between groups after intubation (α=0.05, β=0.2). To take care of any dropouts, we enrolled 30 patients in each group. A total of 63 patients were enrolled in the study but one patient in group C and two patients in group P had an intubation time of more than 120 seconds and were dropped from the study (Figure 1).

Group C (n=30) – Patients in this group received 100µg of oral clonidine 90 minutes before induction of anaesthesia.

Group P (n=30) – Patients in this group received 150mg of oral pregabalin 90 minutes before induction of anaesthesia.

Study drugs containing clonidine and pregabalin were administered in a double blinded way by an anaesthesiologist not involved in the data recording. An expert anaesthesiologist in the operating room

performed laryngoscopy and endotracheal intubation and a blinded observer collected the data.

In the operating room, after establishing an intravenous line, ringer's solution was started as maintenance intra operatively. Non invasive blood pressure, electrocardiography, pulse oximetry and capnography and core temperature were monitored. The baseline heart rate (HR), systolic (SBP), diastolic (DBP) and mean arterial blood pressure (MAP) were recorded. Patients were premedicated with intravenous fentanyl 2µg/kg and midazolam 1mg. After pre oxygenation, anaesthesia was induced with IV thiopentone sodium 5 mg/kg and after loss of eyelash reflex, IV vecuronium 0.1mg/kg was given and patient's lungs were manually ventilated with 100% oxygen for three minutes. After that direct laryngoscopy was performed by using a Macintosh laryngoscope blade of appropriate size and tracheal intubation was accomplished within 15 seconds by the expert anaesthesiologist in the operating room using a suitable sized cuffed oral endotracheal tube.

After confirming bilaterally equal air entry and capnographic trace the endotracheal tube was fixed and anaesthesia was maintained with a mixture of 50:50 oxygen and nitrous oxide and isoflurane 1% with intermittent doses of 0.02mg/kg of vecuronium. The patient's lungs were mechanically ventilated with tidal volume of 8ml/kg and a respiratory rate of 12/ min to maintain end tidal CO_2 of 35 mmhg. The HR and BP (SBP, DBP and MAP) were measured at three time points: baseline (3 min before induction), just before laryngoscopy and post intubation (at 1, 3, 5, 10, 15 min after starting laryngoscopy). Towards the end of the procedure, residual neuromuscular block was reversed with 50µg/kg of neostigmine and 10 µg/kg glycopyrrolate. After extubation the patients were shifted to the post anaesthesia care unit for further monitoring.

Statistics

Statistical analysis was performed using SPSS version 16.0 (SPSS). Student's 't'-test was used to analyse the differences in the parameters between the two groups. A P value less than 0.05 was considered statistically significant.

The Following Parameters were Studied

1. Heart rate, systolic blood pressure, diastolic blood pressure, mean blood pressure were recorded at three time points- three minutes before induction, just before laryngoscopy, and post intubation (at 1,3,5,10 and 15 minutes after laryngoscopy) and the intraoperative average values.
2. Occurrence of adverse effects like hypotension, hypertension, arrhythmias, tachycardia, bradycardia, PONV (post-operative nausea vomiting), nystagmus and dryness of mouth were recorded for each case.
3. Total intraoperative dose of fentanyl in micrograms.
4. The Ramsay Sedation Scale was assessed before induction of anaesthesia and at recovery, six hours after extubation. Sedation scores was measured on a numerical score of 1–6 (Ramsay sedation scale,

   1: Patient is anxious and agitated or restless, or both,

   2: Patient is cooperative oriented, and tranquil,

   3: Patient responds to commands only,

   4: Patient exhibits brisk response to light glabellar tap or loud auditory stimulus,

   5: Patient exhibits a sluggish response to light glabellar tap or loud auditory stimulus,

   6: Patient exhibits no response).

Results

The demographic parameters such as age, sex and BMI (body mass index) were comparable in both groups. (Table 1). However there was more number of males in both groups. The baseline heart rate was 70.1±8.3 in group C and 77.6±8.3 in group P (P value< 0.05). Similarly the heart rate measured just before laryngoscopy and one minute after intubation was lower in group C compared to group P (P value< 0.05) as shown in Table 2. The heart rate measured at three minutes duration after intubation was comparable in both groups.

There afterwards the mean heart rate measured at five minutes, ten minutes and fifteen minutes after intubation was significantly low in group C compared to group P (P value<0.05). The average intra operative heart rate was significantly lower in group C compared to group P(P value=0.0001). The mean MAP at baseline, before laryngoscopy, at 1, 3, 5, 10 and 15 minutes following intubation and the average intra operative MAP was comparable in both the groups (P value>0.05). The systolic and diastolic pressures measured at these intervals were

also comparable in both groups (P value>0.05) [Table 3].

There was however a significant differences in the intra operative consumption of fentanyl between the two groups during surgery [Table 5]. The average intra operative fentanyl consumption was 105.8±16.3 mcg in group C and 119.16±20.43 mcg in group P. (P value=0.0069) Ramsay sedation scores measured before induction (baseline) and six hours after extubation were also similar between the groups [Table 4]. No major untoward effects like tachycardia, bradycardia, arrhythmias, and hypotension were seen due to the study drugs in both groups. In group P, three patients had dizziness which subsided in two hours, one patient had drowsiness and one patient had post-operative nausea and vomiting. In group C, two patients complained of dry mouth, two patients had drowsiness and one patient had post-operative nausea and vomiting [Table 6].

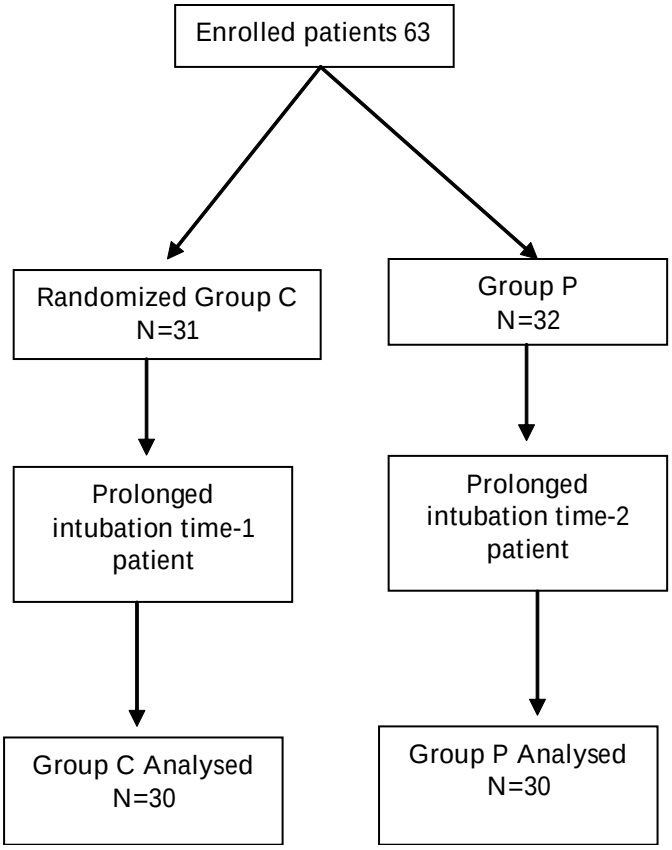

Fig. 1: Consort diagram showing flow of participants

Table 1: Demographic parameters

	Group C (n=30)	Group P (n=30)	P value
Age in years (mean ±SD)	38.8±8.71	41.4±9.92	0.285
Gender (male: female)	21:9	19:11	0.947
BMI (mean ±SD)	23.79±2.33	24.38±2.09	0.306

SD (Standard deviation), BMI(body mass index)

Table 2: Heart rate variation in the two groups

Heart rate changes	Group C	Group P	P value
Baseline HR (mean ± SD)	70.1±8.3	77.6±8.3	0.0001
Just before laryngoscopy (mean ± SD)	70.2±8.6	76.9±8.6	0.0038
1 minute after intubation (mean ± SD)	80.2±6.8	88.7±6.8	0.0001
3 minutes after intubation (mean ± SD)	83.3±10.2	85.3±6.3	0.3646
5 minutes after intubation (mean ± SD)	77.2±8.9	81.5±7.3	0.0453
10 minutes after intubation (mean ± SD)	70.2±8.82	78.0±6.9	0.0003
15 minute after intubation (mean ± SD)	66.6± 8.6	74.8±8.1	0.0003
Average intra operative HR	65.6±8.8	78.6±8	0.0001

HR (heart rate)

Table 3: Systolic blood pressure, diastolic blood pressure and mean arterial pressure variation in the two groups (in mmhg)

Variable	Group	Baseline (mean±SD)	Just before laryngoscopy (mean±SD)	1 min after intubation (mean±SD)	3 min after intubation (mean±SD)	5 min after intubation (mean±SD)	10 min after intubation (mean±SD)	15 min after intubation (mean±SD)	Mean intra operative value
SBP	Group C	132.4±4.7	121.6±16.8	138.1±18.7	124.6±22.1	119.3±22.0	115.2±21.8	112.4±21.5	118±21
	Group P	130.1±8.1	118.8±13.7	132±15.9	121.4±19.9	117.6±21.4	114.2±21.4	111.7±20.8	122±23
	P value	0.1838	0.341	0.1787	0.5579	0.7627	0.8616	0.8985	0.4846
DBP	Group C	80.7±21.1	76.2±20.4	84.9±20	80.8±19.7	79.3±19.4	77.8±19.2	76.16±18.9	72±13
	Group P	82.4±20.1	75.7±20.8	85.3±21	78.7±21.4	76±21	75.3±20.8	73.5±20.8	76±21
	P value	0.7505	0.9254	0.9400	0.6940	0.5297	0.6304	0.6061	0.3787
MAP	Group C	98±18.7	91.3±18.4	103±18	95±17.6	93±17.2	90±16.9	88±16.5	89±16.2
	Group P	98.5±20.9	90.3±20.4	100.9±19.9	92.9±19.5	89.9±19.1	88±18.8	86.2±18.4	90±18.4
	P value	0.9225	0.8427	0.6698	0.6631	0.5163	0.6664	0.6934	0.8240

SD (Standard deviation), SBP (Systolic blood pressure), DBP (diastolic blood pressure) and MAP (mean arterial pressure)

Table 4: Ramsay sedation scale

Average Ramsay score	Group C (n=30)	Group P (n=30)	P value
Before induction	2.7±0.54	2.5±0.5	0.1420
Six hours after extubation	2.16±0.37	2.16±0.38	1.0000

Table 5: Intra operative fentanyl consumption

	Group C	Group P	P Value
Average intra operative fentanyl (mcg)	105.8 ± 16.3	119.16 ± 20.43	0.0069

Table 6: Adverse events in the groups

Adverse events	Group C (Clonidine)	Group P (Pregabalin)
Bradycardia	0	0
Tachycardia	0	0
Arrhythmia's	0	0
Hypertension	0	0
Hypotension	0	0
PONV	1	1
Dizziness	0	3(subsided after 2 hrs)
Peripheral edema	0	0
Nystagmus	0	0
Dry mouth	2	0
Drowsiness	2	1

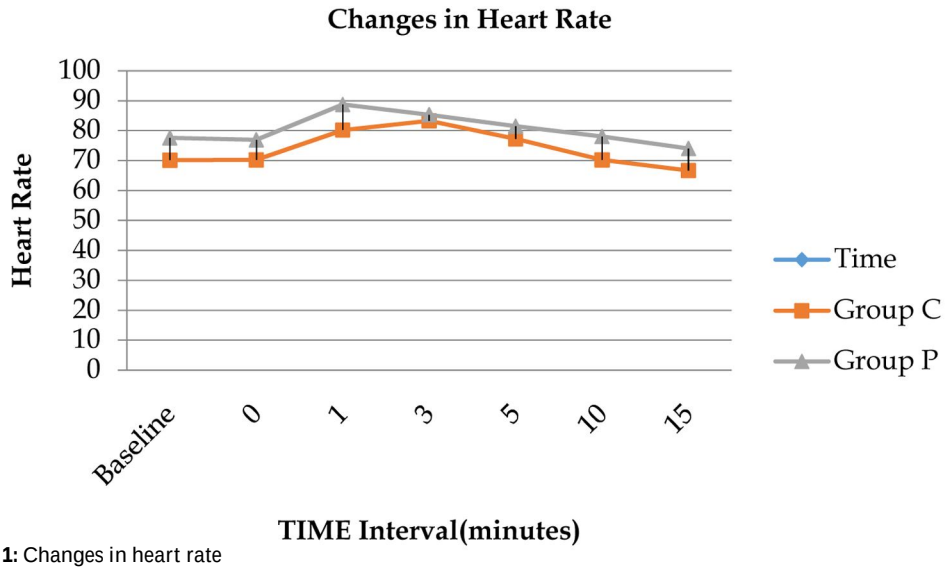

Fig. 1: Changes in heart rate

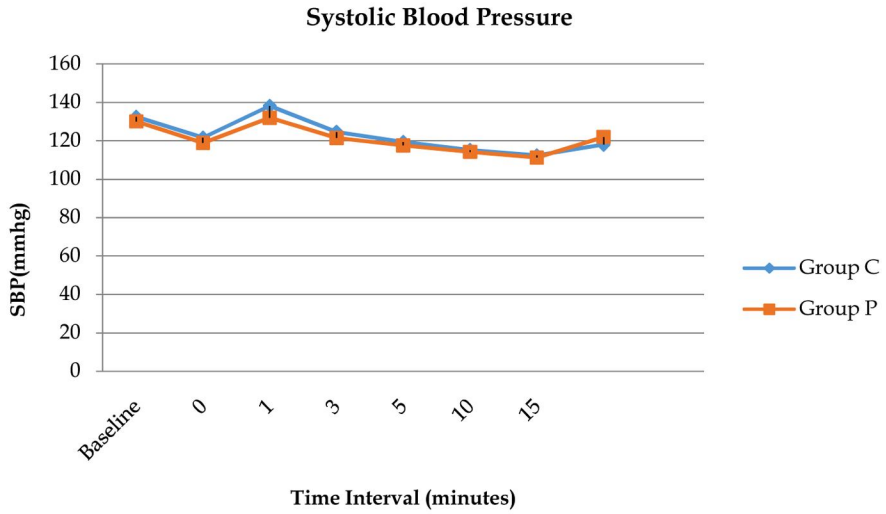

Fig. 2: Changes in systolic blood pressure

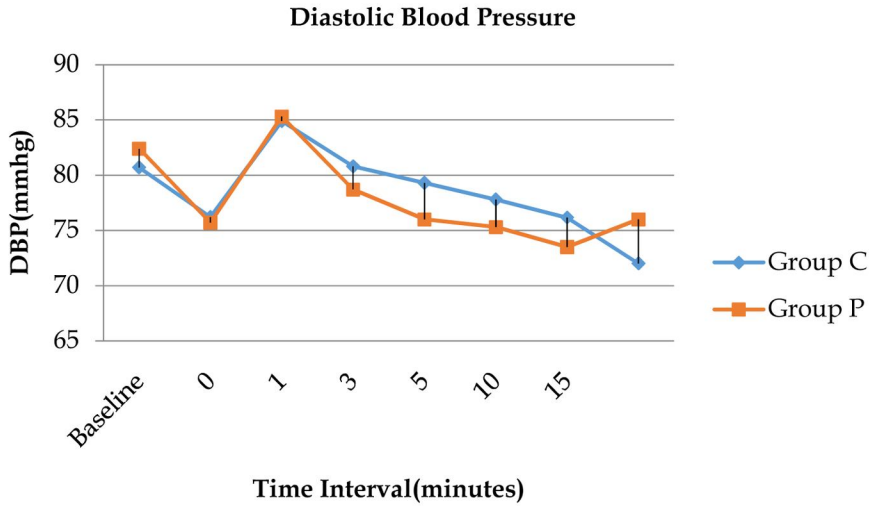

Fig. 3: Changes in diastolic blood pressure

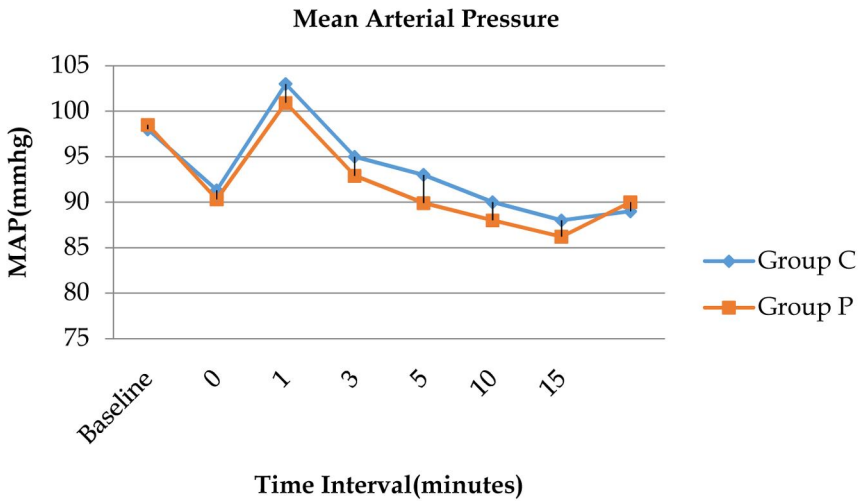

Fig. 4: Changes in mean arterial blood pressure

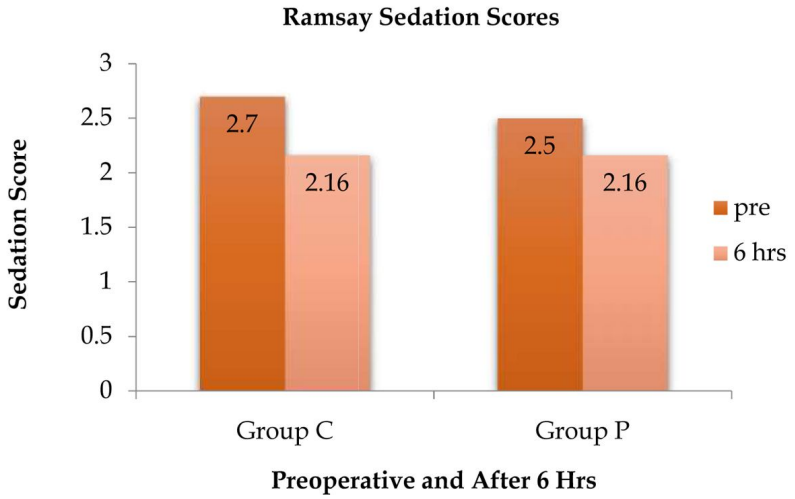

Fig. 5: Ramsay sedation scores

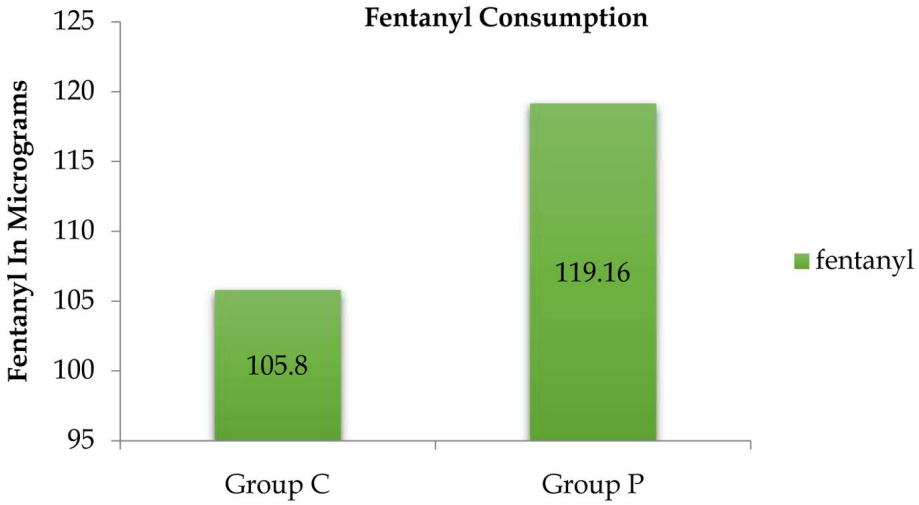

Fig. 6: Intra operative fentanyl consumption

Discussion

Pregabalin is recently used as an adjuvant for high quality acute postoperative pain control. A multimodal approach has been suggested to improve postoperative analgesia and to reduce opioid related side effects [20]. Mathiesen et al. demonstrated that single preoperative dose of pregabalin 300 mg resulted in approximately 50% reduction in 24 hour morphine requirements in patients undergoing hip surgery [21].

In another study, perioperative pregabalin is associated with better pain relief and functional outcomes three months after lumbar disc surgery [22]. Therefore, its pharmacologic, analgesic and anxiolytic properties make it a useful drug for premedication [19]. The effect of pregabalin on the haemodynamic response to laryngoscopy and tracheal intubation might be explained by its inhibitory effects on membrane voltage gated calcium channels.

White et al indicated that preoperative medication with pregabalin at doses 75 to 300 mg was not effective in attenuating acute preoperative anxiety, on the other hand pregabalin at the dose of 300 mg produced increased level of sedation before and after ambulatory surgery [11].

In this study, the dose of pregabalin which was chosen as 150 mg did not produce sedation or drowsiness. The efficacy of pregabalin in our study to suppress intubation response correlates well with the report of Eren et al [13]. The intra operative opioid consumption was less in both the groups though lesser in group C than group P. This is contrary to the study results by Jokela etal who observed that perioperative administration of pregabalin 300 mg before and after laparoscopic hysterectomy decreases oxycodone consumption, but is associated with an increased incidence of adverse effects [20].

In our study we did not observe any adverse effects or significant opioid sparing effect with pregabalin because of the lower doses used. The stable hemodynamic variables in group P in the present study were an indication of adequate analgesia and sedation with oral pregabalin. This correlates with studies done by Salman et al [12] and Sundar et al [9]. Hence both the drugs produced comparable attenuation of pressor response to laryngoscopy and intubation which correlates with the study of Gupta et al [10]. In our study oral premedication with pregabalin 150 mg one hour before surgery attenuated the haemodynamic response to laryngoscopy and endotracheal intubation.

Controlled hypotension in the peri operative period is the common strategy used to reduce blood loss in lumbar spine surgery in prone position. Apart from this, the haemodynamic stress response to laryngoscopy and endotracheal intubation are noxious stimuli which can be detrimental to patients with cardiovascular disease. Even short episodes of cardiovascular stimulation can have detrimental effects on the coronary circulation leading to high morbidity and mortality [17,18].

Clonidine is an alpha-2 adrenoceptor agonist that effects sedation and anti-nociception by stimulating central alpha-2 adrenoceptors at different sites in the central nervous system. Stimulation of medullary alpha-2 adrenoceptors decreases sympathetic tone and increases vagal activity, which blunts the hemodynamic responses to stressful stimuli. In addition, stimulation of presynaptic alpha-2 adrenoceptors decreases the release of norepinephrine at peripheral sympathetic nerve endings, which decreases sympathetic tone. Even a low dose of clonidine can attenuate the preoperative stress response and thus is recommended in cardiovascular high risk patients and small doses, like 75–150 μg attenuate the stress response before coronary artery bypass graft surgery [16].

In our study we have compared a single low dose oral clonidine versus oral pregabalin in attenuatiing the pressor response to laryngoscopy and intubation. There is good evidence from the literature that clonidine is a powerful drug that attenuates stress response of various causes [10,15-18].

Conclusion

Premedication with 150 mg of oral pregabalin or 100ìg of oral clonidine attenuated the haemodynamic pressor response associated with laryngoscopy and endotracheal intubation in patients undergoing lumbar spine surgery under general anaesthesia. There was a significant reduction in SBP, DBP, and MAP which was comparable in both groups but the tachycardia was attenuated better in the clonidine group. The Ramsay sedation scores measured pre operatively and six hours after extubation were comparable in both groups with the doses used. The intra operative fentanyl consumption was lesser in the clonidine group than pregabalin group.

Conflict of Interest

None

References

1. Singh S, Arora K. Effect of oral clonidine premedication on perioperative haemodynamic response and postoperative analgesic requirement for patients undergoing laparoscopic cholecystectomy. Indian J Anaesth 2011;55:26-30.
2. Bhalerao P, Kapse UK. Oral clonidine and gabapentin suppress pressor response: A prospective, randomized, double blind study. Anesthesia: Essays and Researches Anesth Essays Res. 2016;10(1):17
3. Carabine UA, Wright PMC, Moore J. Preanaesthetic Medication With Clonidine: A Dose-Response Study. BJA: British Journal of Anaesthesia. 1991;67(1):79–83.
4. Ben-Menachem E. Pregabalin pharmacology and its relevance to clinical practice. Epilepsia. 2004;45:13–8.
5. Rastogi Bhawan , Kumkum Gupta, Prashant Gupta, et al, Oral pregabalin premedication for attenuation of haemodynamic pressor response of airway instrumentation during general anesthesia. Indian J Anaesth 2012;56,9-54.
6. Sundar AS, Kodali R, Sulaiman S, Ravullapalli H, Karthekeyan R, Vakamudi M. The effects of preemptive pregabalin on attenuation of stress response to endotracheal intubation and opioid-sparing effect in patients undergoing off-pump coronary artery bypass grafting. Ann Card Anaesth 2012;15:18-25.
7. Fink K, Dooley DJ, Meder WP, SumanChauhan N, Duffy S, Clusmann H, et al. Inhibition of neuronal Ca(2+) influx by gabapentin and pregabalin in the human neocortex. Neuropharmacology 2002; 42:22936.
8. BenMenachem E. Pregabalin pharmacology and its relevance to clinical practice. Epilepsia 2004;45 Suppl 6:138.
9. Sundar AS, Kodali R, Sulaiman S, Ravullapalli H, Karthekeyan R ,Vakamudi M. The effects of preemptive pregabalin on attenuation of stress response to endotracheal intubation and opioidsparing effect in patients undergoing offpump coronary artery bypass grafting. Ann Card Anaesth 2012;15:1825.
10. Gupta K, Sharma D, Gupta PK Oral premedication with pregabalin or clonidine for hemodynamic stability during laryngoscopy and laparoscopic cholecystectomy: A comperative evaluation. Saudi J Anaesth 2011;5:179-184.
11. White PF, Tufanogullari B, Taylor J, Klein K.The effect of pregabalin on preoperative anxiety and sedation levels:a dose ranging study.Anesth Analg 2009;108: 1140-1145.

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Ropivacaine versus Dexmedetomidine and Ropivacaine by Epidural Anaesthesia in Lower Limb Surgeries

Sandeep Prithviraj Pandharpurkar

Associate Professor, Department of Anaesthesiology, ESIC Medical College, Gulburga, Karnataka 585106, India.

Abstract

Aim: To evaluate the effect of ropivacaine versus Dexmedetomidine and ropivacaine in epidural anaesthesia in lower abdominal surgeries. *Materials and Methods:* This study is a prospective double blinded randomized study which was carried out on 100 patients who were admitted in Department of Anaesthesia in Government Medical College Gulbarga & ESIC Medical College, Gulbarga, Karnataka. This study was conducted in the period of 2014 to 2017. Patients were randomly divided in to two groups each of 50 each, which were Group A in which ropivacaine and normal saline were administered, Group B in which ropivacaine and dexmedetomidine were administered. *Results:* There was no statistical significant variation between the two groups with respect to age, height, weight and ASA I/II grading (p>0.05). The mean onset of analgesia in group A was 11.33±1.89, in group B was 8.99±0.97, the mean time to attain maximum sensory level was 15.00±1.45 in group A and in group B, it was 12.58±2.58, the mean time for complete motor block was 20.41±1.47 in group A and in group B it was 15.22±2.89. Mean time to two segment regression was 95.85±5.48 in group A and in group B it was 161.59±9.87, mean duration of analgesia was 201.25±4.26 in group A and in group B it was 290.87±8.99 and mean time to complete recovery of motor block was 133.49±5.87 in group A and in group B it was 214.21±4.25. Sedation score of 1 was observed in 12% patients in Group A, whereas in group B, 50% patients showed a score of 1 and 50% patients showed a score of 2. The sedation was more in group B compared to group A. Side effects are significantly more in group B compared to group A. (p=0.001). *Conclusion:* The onset of action, better analgesic effect with dexmedetomidine is fastened with the addition of alpha 2 agonists, and incidence of side effects insignificantly.

Keywords: Dexmedetomidine; Epidural Local Anaesthetics; Sedation Score.

Introduction

Relieving of post-operative pain is one of the most essential components of spine surgeries. For management of post-operative pain in spine surgeries, various methods have been tried, out of which epidural techniques were becoming popular. α2 adrenergic agonists have both analgesic and sedative properties, when used as an adjuvant in regional anaesthesia. For lower abdominal and lower limb surgeries, central neuraxial blockade in the form of epidural is very popular technique [1]. This technique avoids the disadvantages of general anaesthesia such as poly pharmacy, airway manipulation, and other untoward effects like vomiting, postoperative nausea. An ideal local anaesthetic in the epidural space should provide sufficient motor block for surgical relaxation, quick onset and good sensory block for providing post-operative analgesia with central nervous system and cardiovascular toxicities [2]. Ropivacaine has to be given in larger doses to obtain the analgesic and anaesthetic effects, the addition of α2 agonists, dexmedetomidine [3] can decrease the dose requirement and permit the use of more diluted solutions for better analgesia, and this also prevents side effects associated with larger doses of

Corresponding Author: Sandeep P. Pandharpurkar, Associate Professor, Department of Anaesthesiology, ESIC Medical College, Gulburga, Karnataka 585106, India.
E-mail: drsandeep777@rediffmail.com & shobhanachu@gmail.com

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ropivacaine. Dexmedetomidine has receptor affinity of 8 times greater than clonidine which makes it a highly selective $\alpha 2$ adrenergic agonist [4]. When used in epidural route, the dose of clonidine is 1-2 times higher than Dexmedetomidine. Because of their analgesic properties and local anaesthetic effects, with the addition of alpha agonist to epidural local anaesthetics, the degree of pain relief increases [5].

Materials and Methods

This study is a prospective double blinded randomized study which was carried out on 100 patients who were admitted in Department of Anaesthesia in Government Medical College Gulbarga & ESIC Medical College, Gulbarga, Karnataka. This study was conducted in the period of 2014 to 2017. Patients were randomly divided into two groups each of 50 each, which were Group A in which ropivacaine and normal saline were administered, Group B in which ropivacaine and dexmedetomidine were administered.

Inclusion Criteria

After institutional ethical committee approval and after obtaining written consent from patients of either sex, ASA I and II of age group between 18-56 years, undergoing lower abdominal and lower limb surgeries were selected in the study.

Exclusion Criteria

Patients who were allergic to local anaesthetics, who were dependent on narcotics, who had gross spinal abnormality, localized skin sepsis, hemmorhagic diathesis, head injury, hypertension, diabetes mellitus, cardiac, pulmonary, hepatic, renal disorders, peripheral neuropathy, psychiatric diseases. On the previous day of surgery, the patients detailed history was taken, general and systemic examinations were done, the patients were explained about advantages and disadvantages of epidural technique with catheter in situ. On the day of surgery, an intravenous line was secured and patients were preloaded with 15 mL/Kg ringer's lactate, 30 minutes prior to surgery, then pulse rate, blood pressure, respiratory rate, SpO2 were recorded. Then epidural anaesthesia was given in Group A, 19 mL of 0.75% ropivacaine with 1mL normal saline and in Group B, 19 mL of 0.75% ropivacaine with 1mL of dexmedetomidine (75µg made up to 1mL with normal saline). The sensory level was checked by bilateral pin prick method and motor blockade was measured by modified bromage scale. Modified bromage scale: Grade 0: Feet and knees full flexion, Grade I: Feet full flexion and just able to flex knees, Grade II: Unable to flex knees, but some flexion of feet possible, Grade 3: Unable to move feet and knees. Sedation was assessed by four point score; Grade 0: wide awake, Grade 1: sleeping comfortably but responding to verbal commands, Grade 2: deep sleep but arousable, Grade 3: deep sleep but unarousable. Postoperative pain was assessed by visual analogue scale (VAS).

Results

Table 1 shows that there was no statistical significant variation between the two groups with respect to age, height, weight and ASA I/II grading ($p>0.05$).

Table 2 shows the mean onset of analgesia in group A was 11.33±1.89, in group B was 8.99±0.97, the mean time to attain maximum sensory level was 15.00±1.45 in group A and in group B, it was 12.58±2.58, the mean time for complete motor block was 20.41±1.47 in group A and in group B it was 15.22±2.89.

Table 3 shows mean time to two segment regression was 95.85±5.48 in group A and in group B it was 161.59±9.87, mean duration of analgesia was 201.25±4.26 in group A and in group B it was 290.87±8.99 and mean time to complete recovery of motor block was 133.49±5.87 in group A and in group B it was 214.21±4.25.

Table 1: Shows the demographic profile of patients in both the groups

Demographic parameters	Group A	Group B	P value
Age (in years)	25.36±9.87	35.12±2.01	0.702
Height (cms)	168.23±5.00	170.68±3.54	0.487
Weight (Kgs)	64.21±6.58	58.35±6.85	0.025
ASA I/II	27/3	26/5	0.564

Table 2: Shows comparison of block characteristics

Variables (mins)	Group A	Group B	P value
Onset of Analgesia T10	11.33±1.89	8.99±0.97	<0.001
Time to attain max. sensory level	15.00±1.45	12.58±2.58	<0.001
Complete motor block	20.41±1.47	15.22±2.89	<0.001

Table 3: Shows comparison of study variables in two groups

Variables (mins)	Group A	Group B	P value
Two segment regression	95.85±5.48	161.59±9.87	<0.001
Duration of Analgesia	201.25±4.26	290.87±8.99	<0.001
Complete recovery of motor block	133.49±5.87	214.21±4.25	<0.001

Table 4: Shows comparison of sedation score in two groups

Sedation Score	Group A		Group B	
	Number	Percentage (%)	Number	Percentage (%)
0	44	88	0	0
1	6	12	25	50%
2	0	0	25	50%
Total	50	100	50	100

Table 5: Shows comparison of side effects in two groups

Side Effects	Group A		Group B	
	Number	Percentage (%)	Number	Percentage (%)
Nil	50	100	31	62
Bradycardia	0	0	17	34
Dry mouth	0	0	0	0
Headache	0	0	0	0
Nausea & Vomiting	0	0	0	0
Shivering	0	0	2	4
Respiratory depression	0	0	0	0
Total	50	100	50	100

Table 4 shows sedation score of 1 was observed in 12% patients in Group A, whereas in group B, 50% patients showed a score of 1 and 50% patients showed a score of 2. The sedation was more in group B compared to group A.

Table 5 shows side effects are significantly more in group B compared to group A. (p=0.001)

Discussion

In the present study, there was no statistical significant variation between the two groups with respect to age, height, weight and ASA I/II grading (p>0.05). The mean onset of analgesia in group A was 11.33±1.89, in group B was 8.99±0.97, the mean time to attain maximum sensory level was 15.00±1.45 in group A and in group B, it was 12.58±2.58, the mean time for complete motor block was 20.41±1.47 in group A and in group B it was 15.22±2.89. Mean time to two segment regression was 95.85±5.48 in group A and in group B it was 161.59±9.87, mean duration of analgesia was 201.25±4.26 in group A and in group B it was 290.87±8.99 and mean time to complete recovery of motor block was 133.49±5.87 in group A and in group B it was 214.21±4.25. Sedation score of 1 was observed in 12% patients in Group A, whereas in group B, 50% patients showed a score of 1 and 50% patients showed a score of 2. The sedation was more in group B compared to group A. Side effects are significantly more in group B compared to group A. (p=0.001).

Manjunath Thimmappa et al [6], conducted a study to compare epidural ropivacaine 0.75% alone and Ropivacaine 0.75% with alpha 2 agonists showed that onset of blockade is faster when additives are added like clonidine and dexmedetomidine. Time for two segment regression was 30-35minutes earlier in ropivacaine and clonidine. Time for rescue analgesia was longer in clonidine and dexmedetomidine group. Ropivacaine and clonidine had mild sedation, dexmedetomidine and ropivacaine group had moderate sedation with

better analgesic profile when compared to other groups, except for incidence of bradycardia. Addition of alpha 2 agonists fastens the onset of action, better analgesia with dexmedetomidine, insignificant incidence of side effects.

Vivek Maratha et al [7], comparatively evaluated the effect of ropivacaine versus dexmedetomidine and ropivacaine in epidural anaesthesia in lower limb orthopedic surgeries. The present study included 200 patients concluded dexmedetomidine may be undesirable as it produces prolonged duration of motor block and sedation.

Sarabjit Kaur et al [8], conducted a study to compare the hemodynamic, sedative and analgesia potentiating effects of epidurally administered dexmedetomidine when combined with ropivacaine. The study was conducted in 100 patients showed Epidural Dexmedetomidine as an adjuvant to Ropivacaine is associated with prolonged sensory and motor block, hemodynamic stability, prolonged postoperative analgesia and reduced demand for rescue analgesics when compared to plain Ropivacaine.

Shrirang N Bamne et al [9]; compared efficacy and safety of clonidine and dexmedetomidine as an adjuvant to ropivacaine for epidural anesthesia in lower limb surgery. It was observed that onset of sensory blockade at T12 level was faster in group RD (6.00±2.03 min) as compared to group RC (7.33 ±2.54 min). Mean time duration of onset of motor blockade was shorter in group RD (7.17± 2.52 min) as compared to group RC (12.67± 2.86 min) and time to achieve highest sensory dermatome blockade was shorter in group RD (21.00±2.75 min) as compared to group RC (28.50±2.33 min). Also mean time duration for complete motor blockade was shorter in group RD (20.17±3.40 min) as compared to group RC (27.33±3.14 min). It was concluded that dexmedetomidine was better than clonidine as an adjuvant.

Krishan Yogesh Sawhney et al [10]; conducted a study to comparatively evaluate postoperative analgesic efficacy, motor sparing effect, postoperative haemodynamic variations and total postoperative analgesic consumption in first 24 hours on 100 adult. The haemodynamic parameters were stable in all the groups. Side effects including the motor block were negligible and comparable in all groups. Group I patients had significantly lower VAS scores, mean total epidural consumption, supplemental epidural bolus requirement and rescue analgesic requirement among all groups. He concluded in study as epidural analgesia using Ropivacaine 0.2% infusion is more effective than other study groups when used for postoperative pain relief in lower limb surgeries.

Conclusion

Dexmedetomidine group was better as regards to prolonged duration of sensory block, postoperative analgesia with reduced doses of rescue analgesic required and better patient satisfaction score. However, prolonged duration of motor block and sedation produced with Dexmedetomidine may be undesirable for short surgical procedures or ambulatory surgery. The onset of action, better analgesic effect with dexmedetomidine is fastened with the addition of alpha 2 agonists, and incidence of side effects insignificantly.

References

1. Kalajdzija M, Cero I, Prnjavorac B, Ljuca S. Influence of clonidine on the chemodynamic stability and stress response in the course of surgery on general anesthesia. Med Arh 2011;65:210-2.
2. Anand VG, Kannan M, Thavamani A, Bridgit MJ. Effects of dexmedetomidine added to caudal ropivacaine in paediatric lower abdominal surgeries. Indian J Anaesth 2011;55:340-6.
3. Salgado PF, Sabbag AT, Silva PC, Brienze SL, Dalto HP, Módolo NS, *et al*. Synergistic effect between dexmedetomidine and 0.75% ropivacaine in epidural anesthesia. Rev Assoc Med Bras 2008;54:110-5.
4. Bajwa SJ, Bajwa SK, Kaur J, Singh G, Arora V, Gupta S, *et al*. Dexmedetomidine and clonidine in epidural anesthesia: A comparative evaluation. Indian J Anaesth 2011;55:116-21.
5. Bajwa SJ, Arora V, Kaur J, Singh A, Parmar SS. Comparative evaluation of dexmedetomidine and fentanyl for epidural analgesia in lower limb orthopedic surgeries. Saudi J Anaesth 2011;5:365-70.
6. Manjunath Thimmappa, Ravi Madhusudhana, Somaaekharam Potli, Dinesh Karthick. A comparative study of epidural ropivacaine 0.75% alone with ropivacaine plus clonidine and ropivacaine plus dexmedetomidine for lower abdominal and lower limb surgeries, World journal of pharmacy and pharmaceutical sciences; 2014;3(4):1218-1230.
7. Vivek Maratha, Manu Kapil, Sandeep Kumar, Archana Dhamija, Jagjeet Manchanda. Comparative evaluation of ropivacaine versus dexmedetomidine and ropivacaine in epidural anesthesia in lower limb orthopaedic surgeries; IAIM, 2016;3(10): 36-41.

8. Sarabjith Kaur, Joginder Pal Attri, Gagandeep Kaur, Tejinder Pal Singh. Comparative evaluation of ropivacaine versus dexmedetomidine and ropivacaine in epidural anesthesia in lower limb orthopaedic surgeries, Saudi Journal of Anaesthesia, 2014 October-December;8(4):463-9.
9. Shrirang N Bamne; Shrikrishna N Bamne, Shrikant N Bamne. Comparative study of onset and total time required for sensory and motor blockade of epidural ropivacaine with clonidine and dexmedetomidine for lower limb surgeries; Int J Med Sci Public Health. 2016;5(7):1369-1373.
10. Krishan Yogesh Sawhney, Sandeep Kundra, Anju Grewal, Sunil Katyal, Gurdeep Singh, Ananjit Kaur. A randomised double blinded comparison of epidural infusion of Bupivacaine, Ropivacaine, Bupivacaine-Fentanyl, Ropivacaine-Fentanyl for post-operative pain relief in lower limb surgeries.; Journal of Clinical and Diagnostic Research. 2015Sep;9(9):UC19-UC23.

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Blood Pressure and Pulse Changes after Injection of Local Anesthesia and Adrenaline in Oral Surgical Procedures

Shabnum Majeed[1], Altaf Hussain Malik[2]

[1]Senior Resident, Dept. of Anesthesiology, Government Medical College, Srinagar, Jammu and Kashmir 190010, India. [2]Lecturer, Oral & Maxillofacial Surgery, Superspeciality Hospital and Govt Dental College, Srinagar, Jammu and Kashmir 190010, India.

Abstract

Introduction: Lignocaine with adrenaline is used in oral surgical procedures widely. Catecholamines have a significant role in increasing haemodyanmic parameters like blood pressure, blood glucose level and pulse rate. In this sudy we study the effect of lignocaine with adrenaline on blood pressure and pulse rate. *Material and Methods:* A comparative double blind study was designed on 40 healthy males and females who needed extraction of tooth. In 20 patients only lignocaine was used and in other 20 subjects lignocaine was added with adrenaline. The changes in blood pressure were recorded after injection in the both the groups. *Results:* There was increase in variables like mean systolic and diastolic blood pressure and heart rate in patients where adrenaline was used with lignocaine where as there was decrease in the same variables in the patients in whom only lignocaine was used. However, the results weren't stastically significant. *Conclusion:* There is change in heamodyanmic variables in patients in whom lignocaine with adrenaline was used, however the use of adrenaline doesn't bring any significant change in studied variables.

Keywords: Adrenaline; Blood Pressure; Pulse Rate.

Introduction

The oral surgical procedures are pleasant if carried out painlessly. Most of the times these procedures are carried out under local anesthesia [1]. The vasoconstrictor properties of adrenaline not only reduces bleeding and prolong the duration of local anesthesia but also reduces the complications of the local anesthesia. Ever since the discovery of lignocaine in 1943, it has been used extensively in dentistry and other allied medical specialities [2]. The most apprehensions about its use are its systemic side effects like vasovagal shock, hyperventilation syndrome, tachycardia, shivering, and the loss of consciousness. Since lignocaine is vasodilator, adrenaline is added to prolong its effects as local anesthetic to produce desirable anestehesia. However, the anxiety associated with the dental procedures leads to production of catecholamines and exogenous administration of adrenaline has synergistic effect and can have serious metabolic and haemodyanmic effects [3].

The present study aims to study the effect of lignocaine with adrenaline and lignocaine only in patients undergoing minor oral surgical procedures like extraction of tooth

Materials and Methods

The study was conducted on outpatient basis on 40 patients with the age group 25 to 40 years of age, 20 patients in experimental group (group A) in whom lignocaine with adrenaline was used were

Corresponding Author: Altaf Hussain Malik, Lecturer, Oral & Maxillofacial Surgery, Superspeciality Hospital and Govt Dental College, Srinagar, Jammu and Kashmir 190010, India.
E-mail: drmalikaltaf@gmail.com

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studied and in the control group (group B) 20 patients were given only lignocaine at Dental Impant and Faciomaxillary Clinic Bandipore Kashmir. The patients were allocated to the groups blindly and the operater also didn't knew which drug was used in which group of patient. The injections were covered with coloured cloth to eliminate the bais. Only healthy paients who were normotensive and had normal baseline and normal ECG were selected for the study. Proper consent was obtained for the procedure .

Sethoscope (Litman) and Diamond LED regular (mmHG) was used for blood pressure measurement before the procedure and 10 minutes after injection.

Pulse oximeter was used to measure heart rate before the procedure and 10 minutes after the injection.

A standard protocol was followed for the procedure. Patients who needed only extraction of one tooth were selected for the procedure. Only 2ml of solution containing liognocaine and 1:80000 of adrenaline was used in Group A and Group B only 2ml of lignocaine was used. Patients in whom block was repeated or with positive aspiration were excluded from the study. The results were entered into master sheet and SPSS software was used for data compilation.

Results

The study consisted of 20 patients with mean age of 33 years in group A with equal distribution of sexes. In the study group the mean systolic blood pressure increased from 124.55 to 126.43mmHg where as mean diastolic blood pressure increased from 79.70 to 81.58mm Hg where as mean pulse rate increased from 79.73to 80.57 per minute (Table 1), In the control group B (lignocaine without adrenaline) the mean age of studied subjects was 31with males and females distributed equally the mean systolic BP decreased from 123.83mmHg to 121.59 mmHg after injection,whereas the diastolic BP decreased from 80.73 to 79.79 with a slight decrease of mean heart rate from 79.73to 79.19 per minute after injection (Table 2). The mean increase in blood pressure in gropu A and decrease in blood pressure was significant, however all other variables studied changed after injection but were not stastically significant (p value >0.05) in both the groups

Table 1: Group A (lignocaine with adrenaline

	No of subjects	Pre-Injection(Mean)	Post –Injection(Mean)
Systolic BP(mmHg)	20	124.55	126.43
Diastolic BP(mmHg)	20	79.70	81.58
Pulse Rate(per minute)	20	79.73	80.57

Table 2: (Lignocaine without adrenaline)

	No of Subjects	Pre-Injection	Post –injection
Systolic BP(mmHg)	20	123.83	121.59
Diastolic BP(mmHg	20	80.73	79.79
Pulse Rate(per minute)	20	79.73	79.19

Discussion

It is presumed that local anesthesia with adrenaline will increase blood pressure and heart rate. Since dental procedures relase lot of catecholamines due to stress the effect could get compouded [4]. In our study in experimental group in which adrenaline with lignocaine was used ,there was significant increase in mean systoilic blood pressure where diastolic blood pressure and heart rate didn't change much significantly,where as in control group in which only lignocaine was used the mean blood pressure dropped from pre injection to post injection phase significantly, however there was not much change in other variables like mean diastolic blood pressure and mean pulse rate. Both the changes could be explained by the vasoconstrictor properties of adrenaline in the experimental group and vasodilator properties of lignocaine in case of control group [5]. Though some studies conclude that there is no change in haemodyanmices in both the groups [6], however other studies show there can be significant changes in blood pressure and heart rate after the injection of local anesthesia with adrenaline [6,7,8]. Kohler-Knoll concluded that local anesthesia containing catecholamines increased the blood pressure

significantly [9]. There is still a lot of controversry surrounding the use adrenaline in local anesthetics [10], with the most of the studies showing there is no change in parameters likle blood pressure and heart rate [11], and most of our results in the study almost show the same results. Though adrenaline has documented use in increasing the duration of action of local anesthesia and reducing the complications [12,13,14].

Conclusion

Adrenaline with lignocaine doesn't bring any significant changes in parameters like blood pressure and heart rate and lignocaine alone also doesn't bring any significant changes also. Adrenaline used with lignoacaine isn't associated with significant changes in caradiac parameters like blood pressure and heart rate. However , significant changes in haemodyanmics in increased doses needs to be eclucidated.

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Nill

Refernces

1. Abdeshahi SK, Hashemipour MA, Mesgarzadeh V, et al. Effect of hypnosis on induction of local anaesthesia, pain perception,control of haemorrhage and anxiety during extraction of third molars: a case-control study. J Craniomaxillofac Surg 2013;41(4):310-5. doi: 10.1016/j.jcms.2012.10.009. Epub 2012.
2. Gordh T, Gordh TE, Lindqvist K. Lidocaine: the origin of a modern local anesthetic. Anesthesiology 2010;113 (6):1433-7. doi:10.1097/ALN.0b013e3181fcef48.
3. Meral G, Tasar F, Sayin F, Saysel M, Kir S, Karabulut E. Effects of lidocaine with and without epinephrine on plasma epinephrine and lidocaine concentrations and hemodynamic values during third molar surgery. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2005 Aug;100(2):e25-e30.
4. Kalra P, Rana A, Peravali RK, et al. Comparative evaluation of local anaesthesia with adrenaline and without adrenaline on blood glucose concentration in patients undergoing tooth extractions.. J Maxillofac Oral Surg 2011;10(3):230-5. doi:10.1007/s12663-011-0239-4. Epub 2011.
5. Viana AM, Campos AC, Morlin MT, Chin VK. Plasma catecholamine concentrations and hemodynamic responses to vasoconstrictor during conventional or Gow-Gates mandibular anesthesia. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2005 Oct;100(4):415-419.
6. Akinmoladun VI, Okoje VN, Akinosun OM, Adisa AO, Uchendu OC. Evaluation of the haemodynamic and metabolic effects of local anaesthetic agent in routine dental extractionsJ Maxillofac Oral Surg 2013 Dec;12(4):424-428..
7. Cáceres MT, Ludovice AC, Brito FS, Darrieux FC, Neves RS, Scanavacca MI, Sosa EA, Hachul DT. Effect of local anesthetics with and without vasoconstrictor agent in patients with ventricular arrhythmias. Arq Bras Cardiol 2008 Sep;91(3):142-147.
8. Tily FE, Thomas S. Glycemic effect of administration of epinephrine containing local anaesthesia in patients undergoing dental extraction: a comparison between healthy and diabetic patients. Int Dent J 2007 Apr;57(2):77-83.
9. Ko¨hler-Knoll E, Kno¨ ller M, Brandt K, et al: Cardiohemodynamic and serum catecholamine response to surgical removal of impacted mandibular third molars under local anesthesia: a randomized double-blind parallel group and crossover study. J Oral Maxillofac Surg 1991;49:957–96.
10. Nakamura Y, Matsumura K, Miura K, Kurokawa H, Abe I, Takata Y. Cardiovascular and sympathetic responses to dental surgery with local anesthesia. Hypertens Res 2001 May;24(3):209-214.
11. Bortoluzzi MC, Manfro R, Nardi A. Glucose levels and hemodynamic changes in patients submitted to routine dental treatment with and without local anesthesia. Clinics (Sao Paulo) 2010;65(10):975-8.
12. Abdeshahi SK, Hashemipour MA, Mesgarzadeh V, et al. Effect of hypnosis on induction of local anaesthesia, pain perception, control of haemorrhage and anxiety during extraction of third molars: a case-control study. J Craniomaxillofac Surg 2013;41(4):310-5. doi: 10.1016/j.jcms.2012.10.009. Epub 2012.
13. Chernow B, Balestrieri F, Ferguson CD, et al. Local dental anesthesia with epinephrine: minimal effects on the sympathetic nervous system or on hemodynamic variables. Arch Intern Med 1983;143(11):2141-3.
14. Ad, Cherrington., Facks, H., Stevenson, R.W., Williams, P.E., Alberti, K.G.M.M., Steiner, K.E. Effect of epinephrine on glycogenolysis and glyconeogenesis in conscious overnight-fasting dongs. Am J Physiol 1984;247:E137–E144.

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Clonidine or Tramadol Added to Bupivacaine for Prolonging Post Operative Caudal Epidural Analgesia in Children

Kulkarni Shrinivas[1], Shreeharsha M.[2], Gurudatt C.L.[3], Shradha Surana[4]

[1]Associate Professor [4]Post Graduate Student, Department of Anesthesiology, Mysore Medical College & Research Institute, Mysore Karnataka 570001, India. [2]Registrar, People Tree Hospitals, Bengaluru, Karnataka 560022, India. [3]Professor and HOD, Department of Anesthesiology, JSS University, Mysore, Karnataka 570015, India.

Abstract

Background and Objectives: Caudal epidural analgesia is most popular and commonly performed regional blocks in paediatric anaesthesia.To prolongpost operative analgesia local anesthetics have to be combined with adjuvants. Adjuvants like narcotics, alpha-2 agonists, epinephrine, tramadol, neostigmine, and s-ketamine have been studied. Of these clonidine and tramadol are drugs with minimal side effects. Hence study performed with the primary objective being, comparing the two drugs when combined with bupivacaine regarding prolongation of the post operative analgesia *Methods:* The study was conducted among Ninety children in the age group of 2 to 8 years posted for elective sub-umbilical surgical procedures lasting less than one hour, after obtaining ethical committee clearance.They were divided into 3 groups, 30 each. Group C received 0.5ml/kg of 0.25% Bupivacaine with 0.1ml/kg of normalsaline, Group BC 0.5ml/kg of 0.25% Bupivacaine with 1μg/kg of Clonidine(0.1ml/kg) and Group BT 0.5ml/kg of 0.25% Bupivacaine with 1mg/kg of tramadol (0.1ml/kg). The various parameters studied were duration of post operative analgesia, haemodynamic changes and incidence of side-effects. *Results*: The mean duration of analgesia was 539.83±19.32 minutes inclonidine group which was significantly longer than 412.00±26.05 minutes in tramadol group. The requirement of rescue analgesic was also lesser in theclonidine group. Incidence of post-operative nausea andvomiting was slightly higher in the tramadol group. *Conclusion*: **A**ddition of clonidine in the dose of 1μg/kg andtramadol 1 mg/kg to 0.25% bupivacaine (0.5ml/kg) increased the duration of postoperativeanalgesia and clonidine provided a longer durationwith lessside-effects than tramadol.

Keywords: Caudal; Bupivacaine; Clonidine; Tramadol.

Introduction

Caudal epidural analgesia is one of the most popular and commonly performed regional blocks in paediatric anaesthesia. It is a reliable and a safe technique that can be used with general anaesthesia for intraoperative and postoperative analgesia in patients undergoing abdominal and lower limb surgeries [4].

Local anaesthetics used alone do not have prolonged post operative analgesia and hence they have to be combined with adjuvants. Various adjuvants like narcotics, alpha-2 agonists (clonidine, dexmedetomidine), epinephrine, sodium bicarbonate, tramadol, neostigmine, and s-ketamine have been studied and used to prolong and improve the efficacy of the caudal block in children [18,4]. Of these adjuvants clonidine and tramadol are the most popular drugs used nowadays, as they have minimal side effects. Studies have found that both clonidine and tramadol when combined with bupivacaine for caudal epidural have prolonged post operative analgesia [9,11]. After searching the literature we could not find any study comparing the efficacy of caudal clonidine and tramadol as adjuvants. Hence the present study was undertaken with the primary objective being, comparing the two drugs when combined with bupivacaine regarding prolongation of the post operative analgesia.

Corresponding Author: Kulkarni Shrinivas, Associate Professor, Department of Anesthesiology, Mysore Medical College & Research Institute, Mysore, Karnataka 570001.
E-mail: kulki61@yahoo.co.in

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Methodology

Ninety children in the age group of 2 to 8 years with American Society of Anaesthesiologists (ASA) class I posted for elective sub-umbilical surgical procedures, lasting for less than one hour. They were selected for the study and randomly divided using shuffled sealed opaque envelop method, into three equal groups after obtaining ethical and scientific committee clearance - Group C: 0.5ml/kg of 0.25% Bupivacaine with 0.1ml/kg of normal saline, Group BC: 0.5ml/kg of 0.25% Bupivacaine with 1micro g/kg of Clonidine (0.1ml/kg) and Group BT: 0.5ml/kg of 0.25% Bupivacaine with 1mg/kg of Tramadol (0.1ml/kg).

Pre-operative assessment was done for each patient and written informed consent taken from parents. EMLA cream was applied on the dorsum of both hands one hour prior to surgery. Oral midazolam 0.5 mg/kg was given one hour prior to surgery. An intravenous line was secured with 22G intravenous cannula. Injection (Inj) Ramosetron 6micro g/kg and Inj. Dexamethasone 0.1mg/kg were given intravenously (IV) as premedications. Vital parameters like heart rate (HR), Non-Invasive Blood Pressure (NIBP), arterial pulse saturation (SpO2) and Electrocardiography (ECG) were monitored with EDAN iM80 multiparameter monitor. Pre-oxygenation done with 100% oxygen for 3 minutes. Induction was done with Inj. Thiopentone 5mg/kg body weight. Endotracheal intubation was done using appropriate sized tube after giving Inj. Atracurium 0.5mg/kg IV. General anaesthesia was maintained using controlled ventilation with 50% O2 + 50% N2O + Sevoflurance 1%. Inj. Atracurium 0.05mg/kg IV was given when required.

Under strict asepsis, caudal block was performed using 23G, 2.5cm hypodermic needle in lateral decubitus position before surgical incision. Heart rate (HR), mean arterial pressure (MAP) and SpO2 were recorded before induction, after intubation, 10 min after caudal block i.e., at the time of surgical incision and at extubation.

The test drugs were prepared by a senior anaesthesiologist who was not involved in the study and the observer and patients were thus blinded for the study drugs. The study drugs were prepared as follows: 0.5ml of Inj. Clonidine (Cloneon, Neon laboratories) with 1ml containing 150µg diluted to 7.5ml (1ml=10µg) with normal saline and 0.1ml of this used per kg body weight for the study. Likewise, 1ml of Inj. Tramadol (Tramazac, Zydus Cadila) (50mg/ml) diluted to 5ml (1ml=10mg) with normal saline and 0.1ml of this used per kg body weight for the study. The children were reversed with Injection Neostigmine 0.05mg/kg and Injection Atropine 0.02mg/kg IV after the completion of surgery.

During surgery, adequate analgesia was defined by haemodynamic stability, as indicated by the absence of increase in MAP or HR more than 15% of the baseline (value just before the surgical incision) during skin incision. If HR or MAP increased by more than 15%, analgesia was considered inadequate(failed caudal) and subsequent data obtained from those children were no longer considered and hence excluded from the study. Pain score, haemodynamic parameters, respiratory rate, oxygen saturation, sedation score, motor block and side-effects were assessed in the post-operative room hourly for first six hours and every sixth hourly for 24 hours.

The analgesic effect of caudal block was evaluated using the FLACC scale (Table 1) hourly for first six hours and every sixth hourly for 24 hours. When the FLACC score 48 was greater than or equal to 4, syrup paracetamol 15mg/kg orally was given as rescue analgesic and time was noted. Assessment

Of the duration of analgesia was performed by comparing the time from caudal block to administration of the first dose of rescue analgesic. Assessment of number of doses of rescue analgesic in 24 hours in each group was also done. Sedation was assessed using 4 point sedation score and motor blockade using modified Bromage scale soon after extubation and for first six hours and every sixth hourly for 24 hours. Motor blockade was assessed using modified Bromage scale.

Table 1: Definitions *(Pain was assessed by FLACC scale [12])*

Category	Scoring		
	0	1	2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant quivering chin, clenched jaw
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squirming, shifting back and forth, tense	Arched, rigid or jerking
Cry	No cry (awake or asleep)	Moans or whimpers; occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching, hugging or being talked to; distractible	Difficult to console

Definitions

0 = No pain, 1-3 = Mild pain, 4-7 = Moderate pain, 8-10 = Severe pain

Sedation was assessed by 4 point sedation score [16]

1. Asleep, not arousable by verbal contact.
2. Asleep, arousable by verbal contact
3. Drowsy not sleeping.
4. Alert / Awake.

Assessment of motor block was done by using Modified Bromage Scale [2]

0. Patient is able to move the hip, knee and ankle.
1. Patient is unable to move the hip but able to move the knee and ankle.
2. Patient is unable to move the hip and knee but able to move the ankle.
3. Patient is unable to move the hip, knee and ankle.

Statistical Methods

Data analysis was performed using SPSS for Windows (Version 20, IBM-SPSS Inc. Armonk, New York) the primary outcome of this study was the duration of post-operative analgesia. The mean duration of post-operative analgesia was 4-6 hours with Bupivacaine based on a previous study. A power analysis of 25 patients was required to detect an increase in the duration of post-operative analgesia by 20%. 5 more patients in each group were allowed to compensate for drop-outs during the study period. The significance was determined by paired 't' test and analysis of variance (ANOVA). The results were compared at 0.05 levels of significance for the corresponding degrees of freedom, P<0.05 (Significant), P>0.05 (Not Significant). The severity if any was evaluated by using the percentages and Z-Test. Case Fatality Rate was used to calculate the severity of the side-effects.

Results

There was statistically no significant difference among the three groups regarding the demographic criteria, the duration of surgery and anaesthesia (Table 2) Regarding the per operative and postoperative haemodynamic status, there was no significant difference among the three groups (Table 3). Regarding the duration of postoperative analgesia Group C was 293 minutes, Group BC 539 minutes and Group BT was 412 minutes (Table 5). This was statistically significant with p value 0.000. Comparing the groups BC and BT the postoperative analgesia was statistically significant (p value 0.000). Nine children in Group C required 3 doses of rescue analgesics compared with 3 children in Group BT and none in Group BC respectively which is statistically significant (p value <0.05) (table 6). Majority of the children in all the 3 groups required 2 doses of rescue analgesics. None of the children in all the 3 groups had any motor weakness or any side effects like pruritis or urinary retention and all of them were alert in the postoperative period.

Demographic Data (Table 2)

shows the age, sex, weight and height distribution of patients among the three groups.

The mean age is 4.56 years in normal saline(control) group, 4.43 years in the clonidine group, and 4.53 years in tramadol group with a p value of 0.946.

There is no significant difference in sex distribution in all three groups.

The mean weight is 14.63 kg in control group, 15.06 kg in clonidine group, and 15.16 kg in tramadol group with a p value of 0.812.

Table 2: Demographic Data

Groups	Bupivacaine+Normalsaline (C)	Bupivacaine+Clonidine (BC)	Bupivacaine+Tramadol (BT)	P value
Mean ± SD Age (in years)	4.5667 ± 1.56873	4.4333 ± 1.61210	4.5333 ± 1.67607	0.946
SEX distribution	Male-86.7% Female-13.3%	Male -86.7% Female -13.3%	Male -83.3% Female - 16.7%	>0.05
Mean ± SD Weight (in kg)	14.6333 ± 3.06800	15.0667 ± 3.70399	15.1667 ± 3.39455	0.812
Mean ± SD Height (in cm)	100.7667 ± 9.89142	101.2000 ± 9.49918	101.1000 ± 9.28978	0.983
Duration of Surgery Mean (in minutes)	23.8333	26.5000	26.0000	0.135
Duration of Anaesthesia Mean (in minutes)	39.0000	41.1667	40.8333	0.184

Table 3: Haemodynamic Stability

	Groups	Preoperative	After Intubation	Post Operative	P Value
Mean Blood Pressure	C	79.72 ± 4.40	87.41 ± 4.14	79.50 ±4.43	0.262
Mean+SD (in mm Hg)	BC	78.20 ± 3.63	86.75± 3.40	78.13 ± 3.54	
	BT	78.40 ± 3.53	86.83± 4.26	77.86 ± 3.61	
Saturation	C	100.00 ± 0.00	100.00 ± 0.00	99.00 ± 0.37	0.811
Mean+SD (%)	BC	100.00 ± 0.00	100.00 ± 0.00	99.00 ± 0.37	
	BT	100.00 ± 0.00	100.00 ± 0.00	99.00 ± 0.37	
Heart Rate	C	110.80 ± 8.62	132.0 ± 7.19	109.96 ± 8.44	0.841
Mean+SD(beats/min)	BC	113.06 ± 8.30	134.53 ± 7.30	110.26 ± 7.75	
	BT	112.06 ± 7.65	131.26 ± 8.18	109.06 ± 8.39	

The mean height is 100.7 cm in control group, 101.2 cm in clonidine group, and 101.1 cm in tramadol group with a p value of 0.983

The mean duration of surgery is 28.8 min in control group, 26.5 minutes in clonidine group and 26 minutes in tramadol group with a p value of 0.135

The mean duration of anaesthesia is 39 minutes in control group, 41.1 minutes in clonidine group and 40.8 minutes in tramadol group with a p value of 0.184.

Haemodynamic Stability (Table 3)

shows the mean preoperative, post extubation and post operative blood pressure, saturation and heart rate The mean MAP in control group are 79.7, 87.4, 79.5 mmHg preoperatively, after intubation, post operatively respectively.

The mean MAP in clonidine group are 78.2, 86.7, 78.1 mmHg preoperatively, after intubation and post operatively respectively.

The mean MAP in tramadol group are 78.4, 86.8, 77.8 mmHg preoperatively, after intubation and post operatively respectively. The mean heart rate in control group are 110.8, 132.1, 109.9 beats per minute preoperatively, after intubation, post Operatively respectively.

The mean heart rate in clonidine group are 113, 134.5, 110.2 beats per minute preoperatively, after intubation, post Operatively respectively.

The mean heart rate in tramadol group are 112, 131.2, 109 beats per minute preoperatively, after intubation, post operatively respectively.

Postoperative Haemodynamic Parameters (Table 4)

The mean MAP in the control group is 79.1,79.5, 79.5, 79.5, 79.63, 80.93, 80.66, 79.43, 79.46, 79.43 mm of Hg after extubation, at 1 hr, 2hrs, 3hrs, 4hrs, 5hrs, 6hrs, 12hrs, 18hrs and24hrs postoperative respectively. The mean MAP in the tramadol group is 80.1, 78.13, 78.13, 78.13, 78.13, 80.2, 81.76, 78.1, 78.1, 78.1 mm of Hg after extubation, at 1 hr, 2hrs, 3hrs, 4hrs, 5hrs, 6hrs, 12hrs, 18hrs and 24hrs postoperative respectively. The mean MAP in the

Table 4: Postoperative Haemodynamic Parameters

Parameters	Group	Mean Arterial Pressure (Mean + SD)	P value	Heart Rate (Mean + SD)	P value	Respirstion Rate (Mean + SD)	P value
After Extubation	C	79.13 ± 3.79		121.23 ± 4.83		21.26 ± 2.74	
	BT	80.17 ± 2.95	.391	123.90 ± 9.12	.136	21.90 ± 3.03	.563
	BC	79.41 ± 3.38		125.26 ± 8.88		22.03 ± 3.06	
1 HRS	C	79.50 ±4.43		109.96 ± 8.44		19.83 ± 2.66	
	BT	78.13 ± 3.54	.224	110.26 ± 7.75	.841	21.00 ± 2.81	.134
	BC	77.86 ± 3.61		109.06 ± 8.39		21.16 ± 2.84	
2 HRS	C	79.50 ± 4.43		110.13 ± 8.54		19.66 ± 2.70	
	BT	78.13 ± 3.54	.104	110.66 ± 7.55	.823	20.53 ± 2.76	.286
	BC	77.33 ± 3.75		109.36 ± 8.19		20.73 ± 2.79	
3 HRS	C	79.50 ± 4.43		110.16 ± 8.48		19.53 ± 2.48	
	BT	78.13 ± 3.54	.097	110.63 ± 7.58	.870	20.10 ± 2.55	.505
	BC	77.30 ± 3.73		109.53 ± 8.21		20.26 ± 2.57	
4 HRS	C	79.63 ± 4.44		110.26 ± 8.56		19.63 ± 2.39	
	BT	78.13 ± 3.54	.102	110.73 ± 7.53	.894	19.96 ± 2.51	.754
	BC	77.53 ± 3.54		109.73 ± 8.34		20.10 ± 2.50	

5 HRS	C	80.93 ± 4.44		111.56 ± 8.38		19.50 ± 2.48	
	BT	80.20 ± 3.69	.286	112.13 ± 7.67	.598	19.93 ± 2.47	.653
	BC	79.33 ± 3.57		110.06 ± 8.32		20.06 ± 2.47	
6 HRS	C	80.66 ± 4.42		111.30 ± 8.53		19.60 ± 2.49	
	BT	81.76 ± 3.69	.075	112.83 ± 7.34	.409	19.90 ± 2.52	.792
	BC	79.43 ± 3.57		110.03 ± 8.29		20.03 ± 2.52	
12 HRS	C	79.43 ± 4.37		110.26 ± 8.12		19.50 ± 2.52	
	BT	78.10 ± 3.52	.294	110.93 ± 7.20	.805	19.93 ± 2.61	.654
	BC	78.03 ± 3.69		111.60 ± 8.10		20.10 ± 2.64	
24 HRS	C	79.43 ± 4.36		110.23 ± 8.49		19.53 ± 2.44	
	BT	78.10 ± 3.52	.305	111.20 ± 7.43	.813	19.83 ± 2.58	.796
	BC	78.10 ± 3.58		111.50 ± 7.89		19.96 ± 2.59	

Table 5: Duration of Post Operative Analgesia

Group	Mean (in min)	STD. Deviation	P value
C	293.6667	22.62640	.000
BC	539.8333	19.31960	
BT	412.0000	26.05035	

Table 6: Number of Doses of Supplementary Analgesics Over 24 Hours

Groups	No. of Doses	
	1	3
C	0	9
BC	1	0
BT	0	3

clonidine group is 79.4, 77.86, 77.33, 77.3, 77.53, 79.33, 79.43, 78.1, 78.1 mm of Hg after extubation, at 1 hr, 2hrs, 3hrs, 4hrs, 5hrs, 6hrs, 12hrs, 18hrs and 24hrs postoperative respectively.

The mean heart rate in the control group is 121.2, 109.96, 110.13, 110.16, 110.26, 111.56, 111.3, 110.26, 110, 110.23 beats per minute after extubation, at 1 hr, 2hrs, 3hrs, 4hrs, 5hrs, 6hrs, 12hrs, 18hrs and 24hrs postoperative respectively.

The mean heart rate in the tramadol group is 110.26, 110.66, 110.63, 110.73, 112.13, 112.83, 110.93, 110.96, 111.2 beats per minute at 1 hr, 2hrs, 3hrs, 4hrs, 5hrs, 6hrs, 12hrs, 18hrs and 24hrs postoperative respectively.

The mean heart rate in the clonidine group is 109.06, 109.36, 109.53, 109.73, 110.06, 110.03, 111.6, 111.5, 111.5 beats per minute at 1 hr, 2hrs, 3hrs, 4hrs, 5hrs, 6hrs, 12hrs, 18hrs and 24hrs postoperative respectively.

The difference in the mean heart rates in the three groups is not statistically significant.

The mean respiratory rates in control group are 21.26, 19.83, 19.66, 19.53, 19.63, 19.5, 19.6, 19.5 and 19.53 at extubation, 1 hr, 2hrs, 3hrs, 4hrs, 5hrs, 6hrs, 12hrsand 24hrs postoperative respectively.

The mean respiratory rates in clonidine group are 22, 21.16, 20.73, 20.26, 20.1, 20.06, 20.03, 20.1and 19.96 at extubation, 1 hr, 2hrs, 3hrs, 4hrs, 5hrs, 6hrs, 12hrsand 24hrs postoperative respectively.

The mean respiratory rates in tramadol group are 21.9, 21, 20.53, 20.1, 19.96, 19.93, 19.9, 19.93n and 19.83 at extubation, 1 hr, 2hrs, 3hrs, 4hrs, 5hrs, 6hrs, 12hrs and 24hrs postoperative respectively.

Duration of Post Operative Analgesia (Table 5)

Duration of postoperative analgesia Group C was 293 minutes, Group BC 539 minutes and Group BT was 412 minutes. This was statistically significant with p value 0.000. Comparing the groups BC and BT the postoperative analgesia was statistically significant (p value 0.000)

Number of Doses of Supplementary Analgesics Over 24 Hours (Table 6)

Nine children in Group C required 3 doses of rescue analgesics compared with 3 children in Group BT and none in Group BC respectively which is statistically significant (p value <0.05). Majority of the children in all the 3 groups required 2 doses of rescue analgesics.

Discussion

Caudal analgesia used for infra umbilical surgeries in children with only local anaesthetics will produce a shorter duration of postoperative analgesia. Hence nowadays an adjuvant is always added to local anaesthetic. The most popular local anaesthetic agent being used is bupivacaine [4]. The most common adjuvants used to prolong the postoperative analgesia are opioids and alpha2 agonists [4,17]. Since morphine produces more side effects like respiratory depression, nausea and vomiting, tramadol a weak opioid analgesic with less postoperative side effects is becoming more popular as a caudal analgesic [4,15]. Alpha 2 agonists like clonidine and dexmedetomidine have been found to prolong postoperative analgesia when used along with local anaesthetics as adjuvants. It was found that addition of dexmedetomidine as adjuvant was not superior to clonidine, though dexmedetomidine is much costlier than clonidine [8]. Hence clonidine is a more popular caudal analgesic than dexmedetomidine. Individual studies using clonidine and tramadol as adjuvants to bupivacaine for caudal analgesia have been found to produce prolonged postoperative analgesia. After searching through the literature, no study comparing these 2 drugs was found. Neuraxial placement of clonidine inhibits spinal substance P release and nociceptive neuron firing produced by the noxious stimulation. Alpha 2 afferent terminals are situated centrally and peripherally, in the superficial laminae of spinal cord and several brain stem nuclei. This suggests that analgesic effects of clonidine are more pronounced after neuraxial administration [1,13]. Tramadol is a centrally acting analgesic with multimodal action. It acts on serotonergic and noradrenergic nociceptors, while its metabolite O - desmethyl tramadol acts on the mu opioid receptors. Its analgesic potency is claimed to be about 1 / 10^{th} of morphine [6,7]. It is considered to be a relatively safe analgesic but its main concern is the increased incidence of postoperative nausea and vomitting [13,6]. The dose of clonidine used by many authors is 1µg / kg body weight along with bupivacaine 0.25% [4,12]. Clonidine [12] when used as 2µg / kg body weight dose did not enhance the analgesic efficacy but increased the incidence of side effects like respiratory depression, bradycardia and hypotension [3,10]. Tramadol when used in the dose of 1 mg / kg body weight along with bupivacaine produced prolonged postoperative analgesia [5,7]. Tramadol when used as 2 mg / kg body weight did not prolong the analgesia but increased the incidence of post operative nausea and vomiting [9,5]. In our study we found that the duration of postoperative analgesia with tramadol 1mg / kg body weight was 412 minutes, when compared with clonidine 1µg / kg body weight which was 512 minutes and this was highly statistically significant. Both the drugs produced prolongation of the analgesia compared with the group where only bupivacaine 0.25% was used. Similar findings were found with studies conducted by Shreshta SK et al [15], parmeshwari A et al [12] and Doda M et al [15]. In our study, the number of doses of rescue analgesics was also more in the control group compared to the tramadol and clonidine group. We did not find any increase in the side effects, especially PONV with tramadol, as a combination of ramosetron, which has a prolonged effect and dexamethasone was used as premedicant for all the children in our study.

Hence we conclude that both clonidine and tramadol when used as adjuvants along with bupivacaine for caudal analgesia in children are effective in producing prolonged postoperative analgesia with minimal side effects. Clonidine produces more prolonged analgesia compared to tramadol and hence can be the preferred adjuvant for caudal analgesia in children.

Table 1: Pain was assessed by FLACC scale [12]

Table 2: Demographic Data shows the age, sex, weight and height distribution of patients among the three groups.

The mean age is 4.56 years in normal saline(control) group, 4.43 years in the clonidine group, and 4.53 years in tramadol group with a p value of 0.946 There is no significant difference in sex distribution in all three groups.

The mean weight is 14.63 kg in control group, 15.06 kg in clonidine group, and 15.16 kg in tramadol group with a p value of 0.812.

The mean height is 100.7 cm in control group, 101.2 cm in clonidine group, and 101.1 cm in tramadol group with a p value of 0.983

The mean duration of surgery is 28.8 min in control group, 26.5 minutes in clonidine group and 26 minutes in tramadol group with a p value of 0.135

The mean duration of anaesthesia is 39 minutes in control group, 41.1 minutes in clonidine group and 40.8 minutes in tramadol group with a p value of 0.184.

Table 3: Haemodynamic Stability shows the mean preoperative, post extubation and post operative blood pressure, saturation and heart rate

The mean MAP in control group are 79.7, 87.4, 79.5 mmHg preoperatively, after intubation, post operatively respectively.

The mean MAP in clonidine group are 78.2, 86.7, 78.1 mmHg preoperatively, after intubation and post operatively respectively.

The mean MAP in tramadol group are 78.4, 86.8, 77.8 mmHg preoperatively, after intubation and post operatively respectively.

The mean heart rate in control group are 110.8, 132.1, 109.9 beats per minute preoperatively, after intubation, post. Operatively respectively.

The mean heart rate in clonidine group are 113, 134.5, 110.2 beats per minute preoperatively, after intubation, post Operatively respectively.

The mean heart rate in tramadol group are 112, 131.2, 109 beats per minute preoperatively, after intubation, post operatively respectively.

Table 4- Postoperative Haemodynamic Parameters: The mean MAP in the control group is 79.1,79.5, 79.5, 79.5, 79.63, 80.93, 80.66, 79.43, 79.46, 79.43 mm of Hg after extubation, at 1 hr, 2hrs, 3hrs, 4hrs, 5hrs, 6hrs, 12hrs, 18hrs and24hrs postoperative respectively.

The mean MAP in the tramadol group is 80.1, 78.13, 78.13, 78.13, 78.13, 80.2, 81.76, 78.1, 78.1, 78.1 mm of Hg after extubation, at 1 hr, 2hrs, 3hrs, 4hrs, 5hrs, 6hrs, 12hrs, 18hrs and 24hrs postoperative respectively.

The mean MAP in the clonidine group is 79.4, 77.86, 77.33, 77.3, 77.53, 79.33, 79.43, 78.1, 78.1 mm of Hg after extubation, at 1 hr, 2hrs, 3hrs, 4hrs, 5hrs, 6hrs, 12hrs, 18hrs and 24hrs postoperative respectively.

The mean heart rate in the control group is 121.2, 109.96, 110.13, 110.16, 110.26, 111.56, 111.3, 110.26, 110, 110.23 beats per minute after extubation, at 1 hr, 2hrs, 3hrs, 4hrs, 5hrs, 6hrs, 12hrs, 18hrs and 24hrs postoperative respectively.

The mean heart rate in the tramadol group is 110.26, 110.66, 110.63, 110.73, 112.13, 112.83, 110.93, 110.96, 111.2 beats per minute at 1 hr, 2hrs, 3hrs, 4hrs, 5hrs, 6hrs, 12hrs, 18hrs and 24hrs postoperative respectively.

The mean heart rate in the clonidine group is 109.06, 109.36, 109.53, 109.73, 110.06, 110.03, 111.6, 111.5, 111.5 beats per minute at 1 hr, 2hrs, 3hrs, 4hrs, 5hrs, 6hrs, 12hrs, 18hrs and 24hrs postoperative respectively.

The difference in the mean heart rates in the three groups is not statistically significant.

The mean respiratory rates in control group are 21.26, 19.83, 19.66, 19.53, 19.63, 19.5, 19.6, 19.5 and 19.53 at extubation, 1 hr, 2hrs, 3hrs, 4hrs, 5hrs, 6hrs, 12hrs and 24hrs postoperative respectively.

The mean respiratory rates in clonidine group are 22, 21.16, 20.73, 20.26, 20.1, 20.06, 20.03, 20.1and 19.96 at extubation, 1 hr, 2hrs, 3hrs, 4hrs, 5hrs, 6hrs, 12hrs and 24hrs postoperative respectively.

The mean respiratory rates in tramadol group are 21.9, 21, 20.53, 20.1, 19.96, 19.93, 19.9, 19.93n and 19.83 at extubation, 1 hr, 2hrs, 3hrs, 4hrs, 5hrs, 6hrs, 12hrs and 24hrs postoperative respectively.

There is no statistically significant difference in respiratory rates in the three groups ($p>0.05$).

Table 5 duration of postoperative analgesia Group C was 293 minutes, Group BC 539 minutes and Group BT was 412 minutes. This was statistically significant with p value 0.000. Comparing the groups BC and BT the postoperative analgesia was statistically significant (p value 0.000).

Table 6- Nine children in Group C required 3 doses of rescue analgesics compared with 3 children in Group BT and none in Group BC respectively which is statistically significant (p value <0.05). Majority of the children in all the 3 groups required 2 doses of rescue analgesics.

References

1. Basker S, Singh G, Jacob R. Clonidine in Paediatrics – A Review. Indian J Anaesth. 2009;53(3):270-80.
2. Cherng CH, Yang CP, Wong CS. Epidural fentanyl speeds the onset of sensory and motor blocks during epidural ropivacaine anaesthesia. Anesth Analg. 2005 Dec;101(6):1834-7.
3. Constant I, Gall O, Gouyet L, Chauvin M, Murat L. Addition of clonidine or fentanyl to local anaesthetics prolongs the duration of surgical analgesia after single shot caudal block in children. Br J Anaesth 1998;80:294-8.
4. De Beer DA, Thomas ML. Caudal additives in children solutions or problems? Br J Anaesth 2003;90:487-98
5. Doda M, Mukherjee S. Postoperative analgesia in children-Comparative study between Caudal Bupivacaine and Bupivacaine plus Tramadol. Indian J Anaesth 2009 Aug;53(4):463-6.
6. Grond S, Sablotzki A. Clinical Pharmacology of Tramadol. Clin Pharmacokinet 2004;43(13):879-923.
7. Gutstien HB, Akil H. Opioid analgesics. In: Hardman JG, Limbird LE (eds.), Goodman and Gilman's The pharmacological basis of therapeutics. 10th ed. New York: McGraw-Hill; 2000:569-96.

8. HennawayAW, Elwahab AM Addition of clonidine and dexmedetomidine for bupivacaine prolongs caudal analgesia in children) bja 2009 Aug103(2) 268-74.
9. Khalid A, Siddiqui ZS, Haider S, Aftab S. Single Dose Caudal Tramadol With Bupivacaine And Bupivacaine Alone In Paediatric Inguinoscrotal Surgeries. J Coll Physicians Surg Pak 2007 Sep;17(9):519-22.
10. Koul A, Pant D, Sood J. Caudal Clonidine in Day-Care Paediatric Surgery. Indian J Anaesth 2009;53(4):450-4.
11. Lee JJ, Rubin AP. Comparison of a bupivacaine-clonidine mixture with plain bupivacaine for caudal analgesia in children. Br J Anaesth 1994;72:258-62.
12. Parameswari A, Dhev Anand M, Vakamudi M. Efficacy of clonidine as an adjuvant to bupivacaine for caudal analgesia in children undergoing sub-umbilical surgery. Indian J Anaesth 2010 Sep;54(5): 458-63.
13. Ross AK, Bryskin RB. Regional anesthesia. In: Davis P, Cladis P, Motoyama E (eds.), Smith's anesthesia for infants and children. 8th ed. Philadelphia, PA: Mosby Publication; 2011.p.469-70.
14. Senel AC, Akyol A, Dohman D, Solak M. Caudal bupivacaine tramadol combination for postoperative analgesia in paediatric herniorrhaphy. Acta Anaesthesiol Scand 2001;45:786-9.
15. Shrestha SK, Bhattarai B. Caudal Bupivacaine vs Bupivacaine plus Tramadol in Post-operative Analgesia in Children. J Nepal Health Res Counc 2010 Oct;8(2):99-102.
16. Shukla U, Prabhakar T, Malhotra K. Postoperative analgesia in children when using clonidine or fentanyl with ropivacaine given caudally. J Anaesthesiol Clin Pharmacol 2011 Apr;27(2):205-10.
17. Silvani P, Camporesi A, Agostino MR, Salvo I. Caudal anaesthesia in paediatrics:an update. Minerva Anestesiol 2006;72(6):453-9.
18. Verghese TS, Hanallah S R. Acute pain management in children. Journal of Pain Research 2010;3:105-123.

Original Research Article

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Intra-Operative Efficacy of General Anaesthesia vs General Anaesthesia with Paediatric Epidural Anaesthesia: A Clinical Comparative Study

Uma B.R.[1], Priyadarshini M. Bentur[2]

[1]Professor [2]Associate Professor, Department of Anaesthesiology, JJM Medical College, Davangere, Karnataka 577004, India.

Abstract

Background: Paediatric epidural anaesthesia (PEA) is very safe and effective and in combination withGeneral anaesthesia (GA) offers the advantages of reduced GA drugs, stable haemodynamics and excellent analgesia extended into the post-operative period. *Aims*: To evaluate the efficacy of GA+PEA in comparison to GA with regard to (i) Haemodynamic parameters (ii) dose requirement of Neuromuscular Blocking Agents (NMB) (iii) Quality of surgical relaxation. *Material and Methods*: 80 children of ASA statusI & II (2 to 12 yrs), scheduled for elective surgeries were randomly assigned to GA or GA+PEA groups. Both the groups received routine GA. In GA+PEA, an epidural catheter was inserted and Bupivacaine 0.25% was administered intra-operatively. Haemodynamic parameters, doses of NMB and quality of surgical relaxation (graded by surgeon) were recorded. *Statistical Analysis*: Chi-square test, student-t test and repeated measures ANOVA test were used to analyse categorical, demographic and haemodynamic parameters respectively. A p-value<0.05 was considered significant. *Results*: Rise in heart rate(HR) and mean arterial pressure (MAP) from base-line was significantly lower in GA+PEA with p value of 0.017 and <0.001 respectively. Doses of NMB agents required in GA+PEA were significantly lower with p value <0.001. The grading of quality of surgical relaxation was same in both the groups. *Conclusion*: GA+PEA is more favourable for patients with regard to stable haemodynamics, reduced requirement of NMB agents with equally good surgical relaxation when compared to GA alone.

Keywords: Paediatric Epidural Anaesthesia; General Anaesthesia; Intraoperative; Haemodynamic Parameters; Muscle Relaxant Doses; Surgical Muscle Relaxation.

Introduction

Paediatric central neuraxial blocks have a history dating back to a century. It was Rouston and Stringer of Canada who described lumbar epidural anaesthesia for inguinal hernia repair in infant and children [1].

Precise placement of epidural needles and catheters for single – shot and continuous epidural anaesthesia ensures that the dermatomes involved in the surgical procedure are selectively blocked with the resultant lower doses of local anaesthetics [2,3]. Paediatric Epidural anaesthesia and analgesia provides minimal haemodynamic alterations, excellent relief from surgical pain, subsequent improvement in autonomic, hormonal, metabolic, immunological / inflammatory and neurobehavioural consequences [4].

Paediatric Epidural Anaesthesia (PEA) is very safe and effective especially with advances in ultrasonography and electrostimulation [5]. With individual anaesthesiologist mastering the technique of paediatric epidural anaesthesia, the advantages can be many fold. PEA when combined with General Anaesthesia (GA) offers the advantages of reduced GA drug dosage, stable haemodynamics and excellent analgesia extended into the postoperative period.

Corresponding Author: Uma B.R., Professor, Department of Anaesthesiology, JJM Medical College, Davangere, Karnataka 577004, India.
E-mail: umarajshekar9@gmail.com

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This prospective randomized comparative study compares GA and GA + PEA with regard to haemodynamic parameters, dose requirement of NMB and quality of surgical relaxation.

Methods

After obtaining institutional ethical committee clearance, verbal and written informed consent from all the parents **/** guardians, 80 consecutive children of ASA physical status I & II, 2 to 12 years of age scheduled to undergo elective surgeries were enrolled in the study. Children were randomly assigned to GA or GA + PEA group. Randomization was generated by Institutional Department of Biostatistics.

All children were pre-medicated with Inj. Midazolam 0.03 mg/kg iv and Inj. Glyco-pyrrolate 0.01 mg/kg iv in the pre-operative holding area. Children were shifted to the operation theatre and monitors like pulse-oximetry, ECG and NIBP were connected. All children were induced with Inj. Propofol 2mg/kg and Inj. Fentanyl 2 µg/kg iv. Relaxation was facilitated with Inj. Vecuronium 0.1mg/kg iv and intubated with appropriate size endotracheal tube (ETT). Anaesthesia was maintained with O_2 + N_2O + Isoflurane + Inj. Vecuronium + Intermittent Positive Pressure Ventilation (IPPV). Intra-operative monitoring included SpO_2, ECG, NIBP, Temperature, End-tidal CO_2 ($EtCO_2$) and urine output (when necessary).

In GA+PEA group, after the induction of anaesthesia, the children were placed in left lateral semi-flexed position. A 19G paediatric epidural kit was used. Under strict aseptic precautions, epidural Tuohy needle was inserted in the appropriate / selected intervertebral space. Epidural space was identified with loss of resistance to saline technique and an epidural catheter was threaded through the needle and the calculated length of the catheter was left in the epidural space. The distal end of catheter was connected to a luer-lock bacterial filter. An epidural test dose of adrenaline 0.4 µg/kg was used in conjunction with negative aspiration to rule out intra vascular placement of catheter. Increase in heart rate >10 bpm within 1 min was considered positive and if so, catheter was reinserted. The epidural catheter was thoroughly secured to the skin using a transparent dressing (without pad).

An epidural injection of 0.25% Bupivacaine (1.5 ml/segment) was injected into the epidural space after negative aspiration for blood and CSF. After positioning the child, surgery was initiated.

In both the groups, parameters like heart rate (HR), mean arterial blood pressure (MAP) were noted at various intervals–baseline (before induction), 5 min, 10 min, 20 min and 30 min duration after induction . Fluids, blood and blood products were transfused as and when necessary. In GA group, Inj. Fentanyl was repeated in a dose of 1 µg/kg iv after every 45 min. In the PEA group, the epidural top-up of 0.25% Bupivacaine 1.5 ml/segment was repeated every 2 hours after the initial dose.

Towards the end of the surgical procedure, children with good respiratory efforts were reversed with Inj. Neostigmine 0.05 mg/kg, Inj. Glycopyrrolate 0.01 mg/kg iv and extubated. Decision of elective ventilation was based on intra-operative events like massive blood loss, hypotension, hypothermia or inadequate respiratory efforts.

The number of muscle relaxant doses were noted. The grading of surgical relaxation was left to the discrimination of the surgeons. They were asked to grade the relaxation as Excellent (E), Good (G), Poor (P) based on their assessment.

Statistical Analysis

Chi-square test was used for categorical data like sex distribution and surgical relaxation. Student t-test was used for demographic parameters like age, weight, duration of surgery and muscle relaxant doses. Haemodynamic parameters like HR and MAP were evaluated using repeated measures ANOVA test. Irrespective of the statistical test used a $p<0.05$ was considered to be of significance.

Results

Eighty children were included in our study. There was no significant difference in demographic parameters like age (Table 1), sex (Table 2), weight (Table 3) and intra-operative parameters like duration of surgery (Table 4).

The HR(Table 6, Graph 1) and MAP(Table 7, Graph 2) in both groups increased from the baseline. The rise in HR and MAP from the baseline was significantly lower in GA+ PEA group at different time points with a p value of 0.017 and <0.001 respectively.

The requirement of muscle relaxant was higher in the GA group, the minimum dose being 4 and maximum dose being 7 (Table 8, Graph 3). In the GA+PEA group, it ranged from 2-5 doses. The mean

± SD was 5.525±0.715 in GA group as compared to 3.075±0.764 in the GA+PEA group. There was a highly significant difference in the maintenance doses of muscle relaxant with a p value <0.001.

In GA group, the grading of surgical relaxation was excellent in 28 children and good in 12 children. In GA+PEA group, the surgical relaxation was graded as excellent in 31 children and good in 9 children(Table 5). A p-value of 0.446 (>0.05) implies that there is no statistically significant difference in intraoperative surgical relaxation between the two groups.

Table 1: Agedistribution(in years)

Group	Min value	Max value	Mean+/-SD
GA	2.6	12	7.49+/-2.80
GA+PEA	2.8	12	6.97+/-2.86

Pvalue 0.409 (>0.05)

Table 2: Sex distribution

Group	Male	Female	Total
GA	15	25	40
GA+PEA	21	19	40
Total	36	44	80

P value 0.178 (>0.05)

Table 3: Weight distribution (inkg)

Group	Min value	Max value	Mean+/-SD
GA	14	40	26.2+/-8.05
GA+PEA	12	35	22.6+/-7.56

P value 0.061 (>0.05)

Table 4 : Duration of surgery (in minutes)

Group	Min value	Max value	Mean+/-SD
GA	90	140	119.8+/-13.6
GA+PEA	60	180	112.8+/-25.9

P value 0.135 (>0.05)

Table 5: Surgical relaxation

Group	Excellent	Satisfactory	Not Satisfactory	Total
GA	28	12	0	40
GA+PEA	31	9	0	40
Total	59	21	0	80

P value 0.446 (>0.05)

Table 6: Heart rate variation

Time Point	Mean (SD) of heart rate in GA	Mean (SD) of heart rate in GA+PEA
Base line	106.6 (18.6)	105.4 (18.2)
5 minutes	121.9 (18.3)	108.9 (17.0)
10 minutes	122.1 (17.4)	109.6 (17.2)
20 minutes	119.8 (25.3)	10.9.1 (17.5)
30 minutes	120.8 (18.7)	108.3 (17.7)

P Value 0.017

Table 7: Mean arterial pressure variation

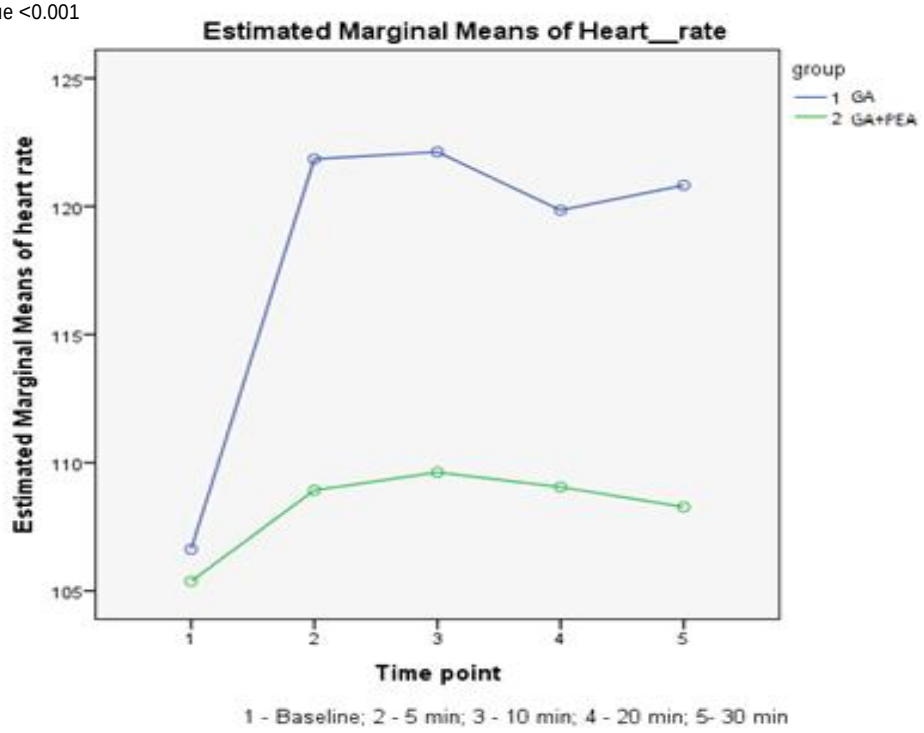
Time point	Mean (SD) of mean arterial pressure in GA	Mean (SD) of mean arterial pressure in GA+PEA
Base line	57.5 (6.4)	58.3 (5.6)
5 minutes	67.4 (7.6)	59.8 (6.2)
10 minutes	67.6 (7.9)	60.0 (6.1)
20 minutes	66.6 (7.1)	59.8 (6.0)
30 minutes	67.0 (7.0)	59.1 (6.3)

P Value <0.001

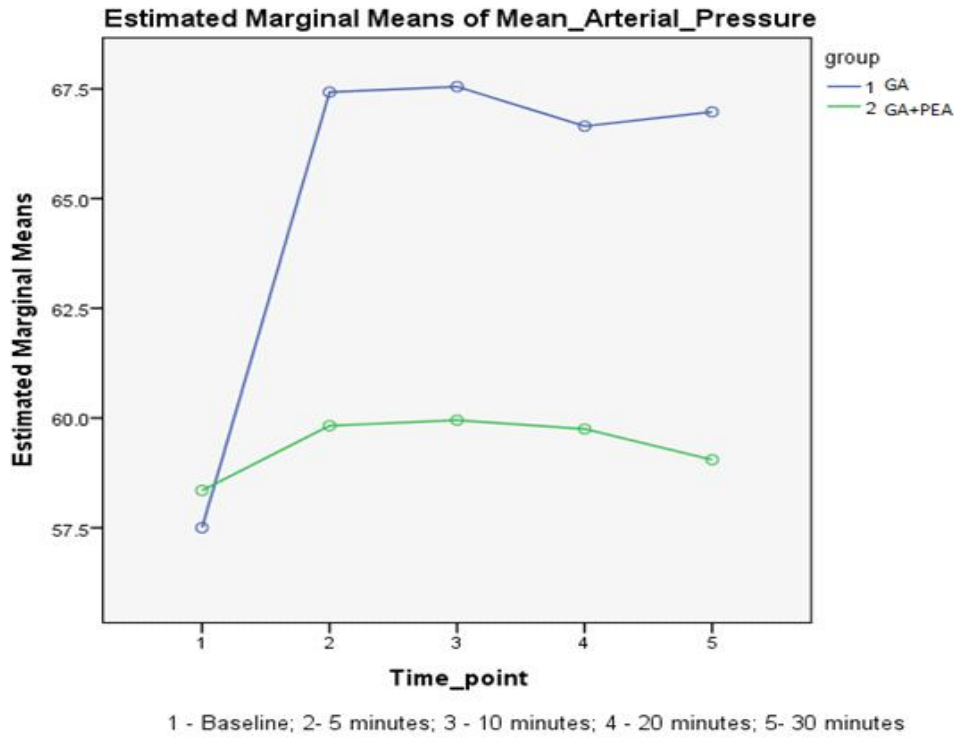
Table 8: NMBdoses

Group	Min value	Max value	Mean+/-SD
GA	4	7	5.525+/-0.715
GA+PEA	2	5	3.075+/-0.764

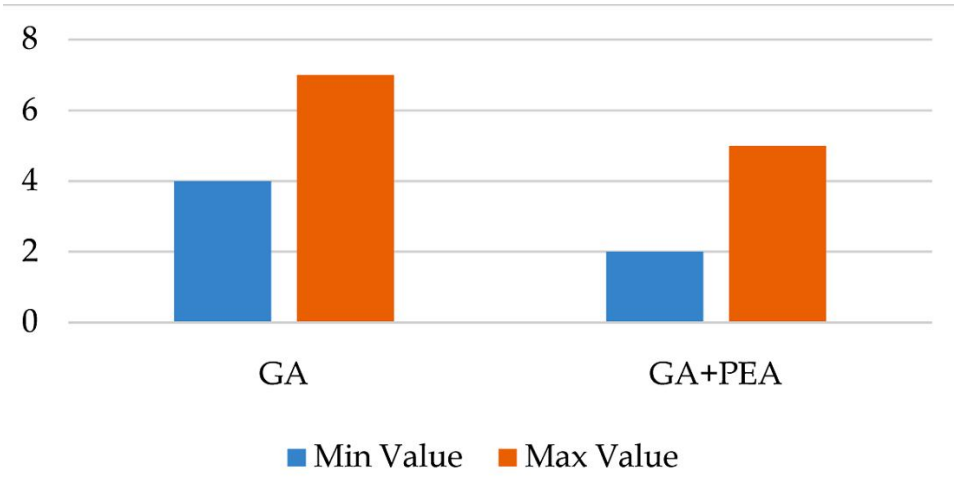
P value <0.001



Graph 2: Mean arterial pressure variation



Graph 1: Heart rate variation



Graph 3: NMB doses

Discussion

This prospective randomized study compares various intra-operative parameters in children undergoing surgery under GA alone or in combination of GA+PEA. The selection of the inter-vertebral space for performance of epidural, epidural test-dose, re-insertion of the catheter if required was done according to the standard recommended guidelines [6,7].

The type of surgeries performed in either of the groups varied from thoracotomy, abdominal, urological and lower limb orthopaedic surgeries. Both the groups had similar pre-medication and induction techniques. The drugs used were calculated on a standard dose/kg body weight chart.

The requirement of muscle relaxant was significantly lesser in GA+PEA group. The administration of NMB in children depends upon a variety of factors namely safety concerns, availability, cost effectiveness, effect on CVS and elimination pathway [8]. When all the above parameters are taken into consideration, a relatively fewer doses of NMB agents are preferable for any type and duration of surgery. This enhances the safety profile in paediatric population.

The statistically significant variation in HR and MAP in the GA+PEA group noted in our study may be attributed to use of isoflurane and propofol. A similar change was observed by A.M.Shabana, A. Shorrab [7]. This minimal haemodynamic alterations may also be due to low resting sympathetic tone and reduced blood in lower extremities in these children [9].

The grading of surgical relaxation was left to the discrimination of the operating surgeon upon completion of the surgery. The grading was done as Excellent, Good or Poor depending upon the surgeon's subjective assessment.There was no significant difference in surgical relaxation between the two groups. This implies that a reduction in the number of doses of muscle relaxant does not affect the quality of surgical relaxation in the PEA group. The epidural drug has a synergistic effect on the action of muscle relaxants. Y. Amaki et al [10] designed a device which could objectively monitor the degree of muscle relaxation. S.J. Bajwa and colleagues [11] in their study considered 4 criteria for surgeon's satisfaction namely – surgical field bleeding, immobility of the patient, degree of muscle relaxation and quality of postoperative analgesia in the ward. Surgeon's satisfaction was graded as Excellent, Good, Fair and Poor in their study. Khan and colleagues [12] evaluated surgical muscle relaxation in 84 paediatric patients by asking the surgeon to grade the degree of muscle relaxation as Good, Fair or Poor.

There are no standard scoring systems for surgical muscle relaxation which is purely a subjective assessment by the operating surgeon, variable from surgeon to surgeon and between surgeon and anaesthetist [13]. Surgical relaxation is monitored clinically by surgeons from tense muscles or by anaesthetists from patients' breathing activity. It can also be monitored using gadgets with facial / thumb muscle twitches or neuromuscular monitoring but these are expensive [12].

Conclusion

In our comparative study of GA and GA+PEA in paediatric population, we conclude that GA+PEA

is more favourable for the patient, anaesthesiologist and surgeon in terms of stable haemodynamics, reduced use of neuromuscular blocking agents and equally favourable surgical relaxation as compared to GA alone. Cost effectiveness with regard to anaesthesia technique, drug usage, etc reduces the burden on health care system in a developing country like India where many health-care schemes are implemented by the government.

Limitation

The cost effectiveness of epidural technique with regard to bed occupancy/hospital stay, ICU expenditure,etc was not evaluated.

Conflict of Interest

There are no conflict of interest with any member of anaesthesia, surgical or administrative team.

References

1. NavdeepSethi and Ravindra Chaturvedi. Paediatric Epidurals. JAnaesthesiolClinPharmacol 2013:Jan-Mar;28(1):4-5.
2. Bosenberg AT, Johr M, Wolf AR, Pro Con debate: The use of regional vs systemic analgesia for neonatal surgery.Paediatr Anaesth. 2011;21:1247-58.[Pub Med].
3. Paediatric epidural and caudal analgesia and anesthesia in children.The New York School Of Regional Anesthesia Guidelines. 2009 Mar 5.
4. Bosenberg A. Benefits of regional anesthesia in children. PediatrAnesth 2012;22:10-8.
5. Vrushali Chandrashekhar Ponde. Rec ent develop-ments in paediatric neuraxial blocks. Indian J Anaesth. 2012 Sept-oct; 56(5): 470-478.
6. Gregory's paediatric anaesthesia:5th edition.
7. A.M,Shabana, A.Shorrab; Paediatric neuraxial anaesthesia asleep or awake, what is the best for safety?.The Internet Journal Of Anaesthesiology 2009; 21(1).
8. D.M. Fisher. Neuromuscular blocking agents in pediatric anaesthesia. Br J Anaesth 1999;83:58-64.
9. Rea CC, Escalona M, Churion J, Pastrana R. First 300 cases of paediatric regional anaesthesia in Venezuela (caudal, spinal and peridural) Internet J Anaesthesiol. 2000;4:4.
10. Amaki Yoshikiyo; Kuzuta, T.; Kurata, Y.; Yabe, K., First Trial of Monitoring Muscle Relaxation in Epidural Anesthesia. Regional Anesthesia and Pain Medicine, 1996 March-April;21(2):96.
11. Sukhminder Jit Singh Bajwa, Jasleen Kaur, Amarjit Singh. A Comparative Evaluation of Epidural and General anaesthetic technique for renal surgeries: A randomised prospective study. Indian J Anaesth 2014;58:410-5.
12. Muhammad Ahmad Khan, Syed Sajjad Raza Kazmi, Shakeel Ahmad. Surgical Muscle Relaxation; To study the adequacy in paediatric patients scheduled for elective groin surgeries under general anaesthesia using sevoflurane without neuromuscular blocking agents. Professional Med J 2016;23(3):288-292.
13. Martini CH1, Boon M, Bevers RF, Aarts LP, Dahan A. Evaluation of surgical conditions during laparoscopic surgery in patients with moderate Vs deep neuromuscular block. Br J Anaesth 2014 Mar; 112(3):498-505.

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Comparison of Two doses of Melatonin for Pre-Operative Anxiolysis in Adult Patients

Yedidi Samyukta[1], Vidhya N.[2]

[1]Assistant Professor, Department of Anaesthesia, Madras Medical College, Chennai, Tamil Nadu 600003, India. [2]Assistant Professor, Department of Anaesthesia, Sree Balaji Medical College, Chennai, Tamil Nadu 600044, India.

Abstract

Aims: This study was done to determine the efficacy of melatonin as a pre-operative anxiolytic and to compare the effect of two different doses of melatonin for the same. *Settings and Design:* This is a randomised double blinded study. *Methods and Material:* 90 patientsundergoing elective surgery under general anesthesia were enrolled in the study. They were randomised to three groups using a computer generated random number table. They received the study drugs (either placebo, tab. Melatonin 3mg, or tab Melatonin 6mg) placed in identical opaque envelopes. Anxiety was assessed using the VAS anxiety scale and the Amsterdam Preoperative Anxiety and Information Scale (APAIS). Heart rate and blood pressure were measured as the physiological markers of anxiety. Sedation was assessed with the Ramsay Sedation Scale. All these values were recorded before and 60- 90 min after administration of the study drugs. Haemodynamics were also recorded 1 min after intubation. *Statistical Analysis Used:* One-way ANOVA was used for intergroup comparisons of normally distributed data. For comparison of before-after data within a group, students t- test was used. For comparing binomial data like sex and ASA status, the Chi square test was used. *Results:* Anxiety and sedation scores were found to be significantly reduced in patients receiving melatonin 3mg or 6mg, compared to those receiving placebo. Patients receiving melatonin also had lower heart rate and blood pressure after medication and also 1min after intubation. *Conclusions:* We conclude that oralmelatonin is effective for pre-operative anxiolysis in adult patients and a dose of 3mg is adequate for anxiolysis.

Keywords: Melatonin; Pre-Medication; Anxiolysis.

Introduction

Patients scheduled to undergo surgery often experience anxiety. Anxiety arises from apprehension related to the surgical procedure, anaesthesia, and other factors. Preoperative anxiolysis is beneficial as it improves patient satisfaction and reduces postoperative pain and anxiety. Benzodiazepines such as diazepam, alprazolam and midazolam have commonly been used as anti-anxiety drugs in the preoperative setting. Sedation and psychomotor impairment are some of the common side effects of benzodiazepines. Melatonin [1] (N acetyl 5 methoxytryptamine) is an endogenous hormone secreted by the pineal gland. Endogenous melatonin is well recognised for its role in regulation of the circadian rhythm. Pharmacological doses of melatonin have been shown to be effective in treatment of sleep disorders and circadian rhythm disorders. Melatonin has also been used in the treatment of migraine, prevention of cluster headache, jet lag, winter depression, chronic fatigue syndrome, nicotine withdrawal, tardive dyskinesia, adjuctive therapy in cancer, chemotherapy related thrombocytopenia etc [2]. In recent years, many randomized trials [3,4] have investigated the use of melatonin in the perioperative period. Melatonin administered pre-operatively has been found to reduce anxiety in patients undergoing surgery.

Corresponding Author: Vidhya N., Assistant Professor, Department of Anaesthesia, Sree Balaji Medical College, CLC Works Road, Chromepet, Chennai, Tamil Nadu 600044, India.
E-mail: vidhya2694@yahoo.com

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We compared two different doses of oral melatonin 3mg, and 6mg, for pre-operative anxiolysis in adult patients undergoing elective surgeries under general anesthesia.

Subjects and Methods

After obtaining institutional ethical committee approval, 90 patients undergoing elective surgery under general anesthesia were enrolled. Informed written consent was taken from all patients. They were randomly allocated to three groups: GROUP C (control group), GROUP M3 (3mg Melatonin group) and GROUP M6 (6mg Melatonin group). Randomization was done with the help of a computer generated random number table. The study drugs were kept in identical opaque envelopes, thus the patient as well as the investigator were blinded to the group allocation of the patient.

Inclusion Criteria

- ASA physical status I and II patients,
- AGE between 18-60 years,
- Patients undergoing elective surgery under general anesthesia.

Exclusion Criteria

- ASA physical status III or more,
- Patients already receiving melatonin for treatment of other conditions,
- Adults with a history of psychiatric disorders, on anti-psychotic drugs, anti-depressants, antiepileptic drugs,
- Obesity and drug allergy,
- Pregnant and lactating women,
- Patients not willing to participate in the study

Preparation and Procedure

Preoperative

The study drug was administered with a few sips of water 60- 90 min before the start of surgery. Anxiety of the patients was assessed by using the VAS anxiety scale [5] and the Amsterdam Preoperative Anxiety and Information Scale (APAIS) [6]. Heart rate and blood pressure were measured as the physiological markers of anxiety. Sedation was assessed with the Ramsay Sedation Scale [7].

All these values were recorded before and 60- 90 min after administration of the study drugs.

Intraoperative

Standard monitoring was done using 5 lead ECG, pulse oximetry and non-invasive blood pressure. Anaesthesia was induced with intravenous injection fentanyl and propofol. Muscle relaxation was achieved with injection atracurium. Airway was secured with endotracheal tube, size 8mm ID in male patients and 7 mm ID in female patients.

The heart rate, systolic and diastolic blood pressures were recorded 1 minute after intubation

Results

One-way ANOVA was used for intergroup comparisons of normally distributed data. For comparison of before- after data within a group, students t- test was used. For comparing binomial data like sex and ASA status, the Chi square test was used. Data are expressed as mean ± SD.

The three groups were comparable with respect to age, sex and ASA status.

Anxiety and sedation scores were compared before and 60-90 min after study drug administration. VAS and APAIS anxiety scores were comparable between the three groups before study drug administration.

There was a significant decrease in APAIS anxiety scores in the study groups after study drug administration (p value- 0.000). Before-after comparisons within the groups showed a decrease in scores in all three groups. The decrease in group C was not significant (p value 0.32), whereas it was significant in Groups M3 and M6 (p values- 0.000 and 0.000 respectively).

There was a significant decrease in VAS anxiety scores in the study groups after study drug administration (p value- 0.002). Before- after comparisons within the groups showed a significant reduction in all three groups (p values of 0.0315, 0.000 and 0.000 respectively for groups C, M3 and M6).

Before study drug administration, all patients were awake with a RAMSAY sedation score of 2. There was an increase in the sedation scores in the study groups after drug administration (p values of 0.001 and 0.000 respectively for groups M3 and M6).

Table 1: Demographic features

	Group C	Group M3	Group M6	p- value
Age (mean ± SD)	35.0 ± 9.4	38.2 ± 10.5	36.1 ± 11.0	0.478
Sex (M:F)	14: 16	17: 13	15: 15	0.733
ASA status (I: II)	20: 10	16: 14	19: 11	0.545

Table 2: Anxiety and sedation scores

Parameter (Mean ± SD)	Group C	Group M3	Group M6	P value intergroup
APAIS anxiety before medication	15.1 ± 4.8	15.8 ± 3.4	14.8 ± 4.1	0.632
APAIS anxiety after medication	14.0 ± 3.6	11.3 ± 3.0	10.1 ± 2.1	0.000
P value (before- after)	0.320	0.000	0.000	----
VAS anxiety score before medication	4.9 ±2.0	5.5 ± 1	5.0 ± 1	0.218
VAS anxiety score after medication	4.0 ± 1.0	3.5 ± 1.5	2.8 ± 1.2	0.002
P value (before- after)	0.0315	0.000	0.000	----
RAMSAY score before medication	2 ± 0	2 ± 0	2 ± 0	----
RAMSAY score after medication	2 ± 0	2.4 ± 0.6	2.5 ± 0.6	0.000
P value (before- after)	---	0.001	0.000	-----

Table 3: Hemodynamic parameters

Parameter (mean ± SD)	Group C	Group M3	Group M6	P value for intergroup
HR before medication	80.4 ± 7.6	78.0 ± 10.2	81.3 ± 8.4	0.329
HR after medication	78.0 ± 6.0	72.4 ± 9.0	71.1 ± 6.0	0.001
P value (before- after)	0.180	0.028	0.000	----
HR 1min after intubation	101.0 ± 10.7	96.1 ± 11.2	84.0 ± 12.4	0.000
Systolic BP before medication	122.0 ± 8.0	126.0 ± 10.1	120.4 ± 8.2	0.096
Systolic BP after medication	120.0 ± 8.4	124.0 ± 7.8	116.0 ± 7.6	0.001
P value (before- after)	0.349	0.394	0.035	----
Systolic BP 1 min after intub.	146.4 ± 10.0	135.4 ± 11.1	128.4 ± 5.3	0.000
Diastolic BP before medication	82.2 ± 6.8	84.0 ± 7.0	80.4 ± 7.2	0.144
Diastolic BP after medication	80.0 ± 4.8	80.1 ± 5.1	76.4 ± 4.8	0.005
P value (before- after)	0.153	0.017	0.014	----
Diastolic BP 1min after intub.	96.1 ± 10.2	90.0 ± 8.5	84.0 ± 7.7	0.000

Heart rate and blood pressures were compared between the three groups before and after administration of study drug. Heart rate, systolic and diastolic blood pressures were comparable between the three groups before study drug administration. After study drug administration, there was a significant difference in the heart rates between the three groups (p value- 0.001). Before- after comparisons within the groups showed no significant decrease in Group C and a significant decrease in heart rate in Groups M3 and M6 (p- values of 0.028 and 0.000 respectively). Heart rates compared one minute after intubation also showed significantly lower heart rates in the study groups (p- value 0.000).

After study drug administration, systolic BP was significantly lower in Group M6 (p value- 0.001). Before- after comparisons within the groups showed no significant change in Groups C and M3, and a significant decrease in Group M6 (p value- 0.035). There was also a significant reduction in the systolic blood pressure in the study groups 1 min after intubation (p value- 0.000). After study drug administration, diastolic BP was significantly lower in Group M6 (p value- 0.005). Before- after comparisons within the groups showed no significant change in Group C, and a significant decrease in Groups M3 and M6 (p values- 0.017 and 0.014 respectively). There was also a significant reduction in the diastolic blood pressure in the study groups 1 min after intubation (p value-0.000).

Discussion

T Patel [8] et al did a comparative study between oral melatonin and oral midazolam on preoperative anxiety, cognitive, and psychomotor functions. Oral melatonin 0.4 mg/kg was found to provide adequate anxiolysis comparable to that of oral midazolam. Also, unlike midazolam, melatonin did not impair the general cognitive and psychomotor functions. These results are consistent with our study. However, a higher dose of melatonin has been used in this study (0.4 mg/kg).

D Ionescu [9] et al studied the effect of melatonin as premedication for laparoscopic cholecystectomy

in a double- blind, placebo-controlled study. Oral melatonin 3mg administered the night before and on the morning of surgery was compared with oral midazolam (3.75mg) and placebo. Melatonin and midazolam both provided anxiolysis but melatonin was found to produce better perioperative anxiolysis, and a better recovery profile as assessed by sedation and memory. In our study, melatonin in the dose of 3 or 6mg has been shown to produce adequate pre-operative anxiolysis.

M Acil [10] et al studied the perioperative effects of melatonin and midazolam premedication on sedation, orientation, anxiety scores and psychomotor performance. In this study, melatonin was given sublingually in the dose of 5mg. Melatonin premedication was associated with preoperative anxiolysis and sedation without postoperative impairment of psychomotor performance. The results are consistent with our study.

M Naguib [11] et al compared melatonin and midazolam for pre-medication in a double- blind, placebo controlled study. Patients were given sublingual midazolam 15 mg, melatonin 5 mg or placebo, approximately 100 min before a standard anaesthetic. Patients receiving the study drugs had a significant decrease in anxiety levels and increase in levels of sedation preoperatively. Pre-operatively, midazolam was found to produce more sedation and psychomotor impairment.

The same authors (M Naguib [12] et al) studied the comparative dose-response effects of melatonin and midazolam for premedication of adult patients in a double-blinded, placebo-controlled study. Doses of 0.05, 0.1, or 0.2 mg/kg sublingual midazolam or melatonin or placebo were given to 84 women, approximately 100 min before a standard anesthetic. Patients who received the study drugs had a significant decrease in anxiety levels and increase in levels of sedation preoperatively. Midazolam was found to produce significant psychomotor impairment. Patients receiving higher dose of midazolam had higher post-operative sedation levels. The authors concluded that melatonin was a good choice for ambulatory surgery patients, and a dose of 0.05 mg/kg melatonin was an adequate dose for premedication.

These results are consistent with our study, since we have shown adequate anxiolysis with 3 mg of oral melatonin.

In our study, we compared the hemodynamic parameters of heart rate and systolic and diastolic blood pressure, as markers of anxiety. Patients receiving the study drugs had a significant decrease in heart rate and blood pressures, which was consistent with decrease in anxiety. We also compared the hemodynamic parameters 1 min after intubation. Patients receiving melatonin had lower heart rates and blood pressures 1 min after intubation, compared to controls. Two recent studies by A A Mohamed [13] et al and P Gupta [14] et al have shown melatonin to be effective in attenuation of haemodynamic response to laryngoscopy and intubation. These results are consistent with our study.

Conclusion

We conclude that oral melatonin is effective for pre-operative anxiolysis in adult patients and a dose of 3mg is adequate for anxiolysis.

Key Messages

Melatonin, an endogenous hormone, has been shown in clinical studies, to have anxiolytic effects. We compared two doses of oral melatonin, 3mg and 6mg for pre-operative anxiolysis in adult patients. We found that oral melatonin is effective for pre-operative anxiolysis in adult patients and a dose of 3mg is adequate for anxiolysis.

References

1. Lerner AB, Case JD, Heinzelman RV. Structure of melatonin. J Am Chem Soc. 1959;81:6084–5.
2. Medscape reference. Melatonin (Herbs/Suppl). [Online]. Available from: http://reference.medscape.com/drug/n-acetyl-5-methoxytryptamine-pineal-hormone-melatonin-melaton in-344545.
3. Andersen L.P.H., Werner M.U., Rosenberg J. and Gogenur I. A systematic review of peri-operative melatonin. Anaesthesia 2014;69:1163–1171.
4. Maitra S, Baidya D K, Khanna P. Melatonin in perioperative medicine: Current perspective. Saudi J Anaesth. 2013 Jul-Sep;7(3):315–321.
5. Facco E1, Stellini E, Bacci C et al. Validation of visual analogue scale for anxiety (VAS-A) in preanesthesia evaluation. Minerva Anestesiol. Dec 2013;79(12): 1389-95.
6. Moerman N, van Dam FS, Muller MJ, Oosting H. The Amsterdam Preoperative Anxiety and Information Scale (APAIS) AnesthAnalg. 1996;82:445–451.
7. Ramsay MA, Savege TM, Simpson BR, Goodwin R. Controlled sedation with alphaxalone-alphadolone. BMJ. 1974;2:656–659.

8. Tushar Patel, Madhuri S. Kurdi. A comparative study between oral melatonin and oral midazolam on preoperative anxiety, cognitive, and psychomotor functions. J AnaesthesiolClinPharmacol. 2015 Jan-Mar;31(1):37–43.
9. Ionescu D, Badescu C, Ilie A, Acalovschi I. Melatonin as premedication for laparoscopic cholecystectomy. A double- blind, placebo-controlled study: Scientific letter. SAJAA. 2008;57:8–11.
10. Acil M, Basgul E, Celiker V, Karagöz AH, Demir B, Aypar U. Perioperative effects of melatonin and midazolam premedication on sedation, orientation, anxiety scores and psychomotor performance. Eur J Anaesthesiol. 2004;21:553–7.
11. Naguib M, Samarkandi AH. Premedication with melatonin: A double-blind, placebo-controlled comparison with midazolam. Br J Anaesth. 1999;82: 875–80.
12. Naguib M, Samarkandi AH. The comparative dose-response effects of melatonin and midazolam for premedication of adult patients: A double-blinded, placebo-controlled study. AnesthAnalg. 2000;91: 473–9.
13. Ahmed A Mohamed, Hosam M Atef et al. Effects of Melatonin Premedication on the Hemodynamic Responses and Perfusion Index during Laryngoscopy and Endotracheal Intubation. Med. J. Cairo Univ. 2013 Dec;81(1):859-867.
14. Gupta P, Jethava D, Choudhary R, Jethava DD. Role of melatonin in attenuation of haemodynamic responses to laryngoscopy and intubation. Indian J Anaesth. Oct 2016;60(10):712-718.

Original Research Article

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A Comparative Study between 0.5% Bupivacaine with Clonidine Additive and 0.5% Bupivacaine Plain for Brachial Plexus Block by Supraclavicular Aprroach in Upper Limb Surgeries Using Ultrasound Guided Technique

Yadhuraj M.K.[1], Somasekharam P.[2], Vinay D.M.[3], Akhil Rao U.K.[4]

[1]Junior Resident [2]Professor and HOD [3]PG Student [4]PG Student, Dept. of Anaesthesia, MVJ Medical College and Research Hospital, Hoskote, Karnataka 562114, India.

Abstract

Backgrounds and Objectives: Supraclavicular Brachial plexus block provides safe,effective,low cost anaesthesia with excellent post operative analgesia . The current study was an attempt to compare Bupivacaine 0.5% with Bupivacaine 0.5% plus Clionidine 2mcg/kg in supraclavicular brachial plexus block with respect to Onset time and Duration of Sensory blockade, Duration of Analgesia, Side effects. *Materials and Methods:* Present study was carried out in the Department of Anaesthesiology and critical care, MVJ Medical college and RH, Bangalore from December 2014 to July 2016. Each patient was randomly allocated to one of the two groups of 50 patients each. Bupivacaine Group(A): Receives 30ml Bupivacaine 0.5% and 1ml of normal saline Clonidine Group(B): Receives 30 ml Bupivacaine 0.5% and clonidine 2mcg/kg in 1ml saline. *Parameters:* The effect was studied with respect to Onset time and Duration of Sensory and Motor blockade, Duration of Analgesia and Side-effects. *Results: Onset of Sensory block:* In our study, we observed that onset of sensory block was earlier in Clonidine group (Group B) having a mean value 7.20±1.95 minutes in comparision with Bupivacaine group (Group A) having a mean value of 17.63±3.25 minutes which is statistically significant. *Onset of Motor block:* In our study, we observed that onset of Motor block was earlier in Clonidine group (Group B) having a mean value of 9.87±2.60 minutes in comparision with Bupivacaine group (Group A) having a mean value of 20.57±2.92 minutes which is statistically significant . *Duration of Sensory block :* The Duration of sensory block was 359.00±60.53 minutes with Bupivacaine group (Group A) and 552.67±32.05 minutes with Clonidine group (Group B). The duration of sensory block was longer in Clonidine group compared with Bupivacaine group, which is statistically significant. *Duration of Motor block:* The Duration of Motor block was 390.00±55.52 minutes with Bupivacaine group (GroupA) and 597.33±27.91 minutes with Clonidine group (Group B). The duration of Motor block was longer in Clonidine group compared with Bupivaine group, which is statistically significant. Duration of Analgesia The Duration of Analgesia was minutes with 361.67±59.77 Bupivacaine group (GroupA) and 563.67±33.16 minutes with Clonidine group (Group B). The duration of Analgesia was longer in Clonidine group compared with Bupivaine group, which is statistically significant. Variations in Heart rate , Blood pressure, SpO2 ,Respiratory rate were statistically not significant in both the groups. No patient in our study developed any significant side effects. *Conclusion:* Addition of 2mcg/kg of Clonidine to Bupivacaine 0.5% has Early onset of Sensory blockade, Early onset of Motor blockade, Prolonged Duration of Sensory blockade Prolonged Duration of Motor blockade, Prolonged Duration of Analgesia when compared to Bupivacaine 0.5% at equal volumes. Both the groups maintain stable Hemodynamic profile Perioperatively and are devoid of any Side effects at the concentration and volumes used for the study.

Keywords: Bupivacaine; Brachial Plexus Block; Clonidine.

Introduction

Peripheral nerve blockade is now a well-accepted concept for comprehensive anaesthetic care. It has become important in clinical practice because of their role in post operative pain relief, shortening of patient recovery time & avoiding risks and adverse effects of General anaesthesia. Supraclavicular brachial plexus block is the preferred regional anaesthesia for upper limb surgeries. Here, the brachial plexus is presented most compactly at the proximal division or at the trunk level that provides most reliable anaesthesia

Corresponding Author: Yadhuraj M.K., Junior Resident, Dept. of Anaesthesia, MVJ Medical College and Research Hospital, Hoskote, Karnataka 562114, India.
E-mail:dryadurajgowda@gmail.com

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for upper limb surgeries by anaesthetising the middle and lower plexus over 80% of the times (median, radial and ulnar). Local anaesthetics administered as regional nerve blocks provides postoperative pain relief by blocking signal transmission to dorsal horn [1]. Certain drugs may be used as adjuncts to local anaesthetics to lower the dose of each agent , to enhance onset ,duration of action and analgesic efficacy. Several studies have demonstrated analgesic effects of "Clonidine", an alpha agonist, in local, spinal and epidural anaesthesia when combined with local anaesthetics. This observation that Clonidine has analgesic effects at spinal level has stimulated research to examine analgesic effects in the periphery [2]. It has direct local 2 action on the nerve itself and facilitation of local anaesthetic action. Also, Clonidine seems to provide analgesic benefit without major adverse effects .

The aim of this study is to evaluate whether additional anesthetic and analgesic effects could be derived from administration of Clonidine, an α2-adrenergic agonist, into brachial plexus sheath.

Materials and Methods

Source of Data

Present study entitled 'A comparative study between 0.5%bupivacaine with clonidine and 0.5% bupivacaine for supraclavicular brachial plexus block will be carried out at MVJ Medical college & research hospital,banglore from December 2014 to July 2016.

- *Study Design*: Randomized clinical trial using closed envelope method
- *Sample Size*: 30 subjects in each group
- *Sampling Method*: Simple Random Sampling
- *Statistical Analysis*: Repeated measures of ANOVA for vital events and Student's t-test

Inclusion Criteria

1. Patients aged between 18years and 60 years
2. Under physical status ASA grade1 and ASA grade 2
3. Weight between 50 kilogram -80 kilogram
4. Scheduled for elective upper limb surgeries

Exclusion Criteria

1. Other than ASA 1 and ASA2
2. Known allergy to local anaesthetic agents and alpha 2 agonist drugs,
3. Local infection at the site of block
4. Brachial plexus injury
5. History of uncontrolled Diabetes or Hypertension,

Study group: Each patient was randomly allocated to one of the two groups of 50 patients each. Bupivacaine

Group (A): Receives 30ml Bupivacaine 0.5% and 1ml of normal saline Clonidine

Group (B): Recieves 30 ml Bupivacaine 0.5%% and clonidine 2mcg / kg in 1ml saline.

Results

The present study was conducted on 100 consenting patients aged between 18- 60 years. Bupivacaine group (A) received 30ml of 0.5% Bupivacaine plus 1ml saline .Clonidine group (B) received 30ml of 0.5% Bupivacaine plus 2mcg / kg clonidine in 1ml saline for Brachial plexus block by supraclavicular approach.

Comparison of Study Groups on the Basis of Onset Time of Sensory and Motor Blockade

	Bupivacaine group	Clonidine group	P value
Sensory onset ime(SOT)	17.63±3.25	7.20±1.95	<0.001**
Motor onset time(MOT)	20.57±2.92	9.87±2.60	<0.001**

In Bupivacaine group, the mean onset time of Sensory blockade and Motor blockade was 17.63±3.25 min and 20.57±2.92 min Respectively when compared to Clonidine group having Onset time of sensory blockade and Motor blockade of 7.20±1.95 min and 9.87±2.60 min Respectively.

Comparision of Mean Onset Time between the Groups

Onset time of Sensory and Motor blockade was earlier in Clonidine group when compared with Bupivacaine group.

The p value was < 0.001 which is statistically very highly significant.

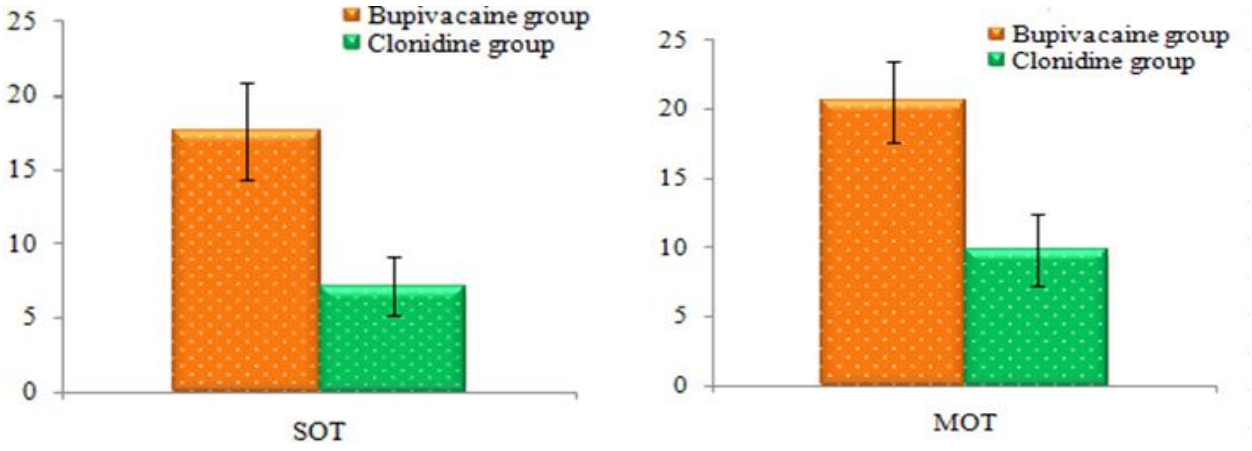

Fig. 1: Onset of sensory and motor block

Table 1: Duration of sensory and motor block

	Bupivacaine group	Clonidine group	P value
Duration of sensory (DOSB)	359.00±60.53	552.67±32.05	<0.001**
Duration of motor block(DOMB)	390.00±55.52	597.33±27.91	<0.001**

In Bupivacaine group, the Mean Duration of Sensory blockade and Motor blockade was 359.00±60.53 min and 390.00±55.52 min Respectively when compared to Clonidine group having Mean Duration of sensory blockade and Motor blockade of 552.67±32.05 min and 597.33±27.91 min Respectively.

Comparision of Mean Duration time of Sensory and Motor Blockade between the Groups

Duration of Sensory and Motor blockade was prolonged in Clonidine group when compared with Bupivacaine group. The p value was <0.001 which is statistically very highly significant.

In Bupivacaine group, the Mean Duration of Analgesia was 361.67±59.77 min when compared to Clonidine group having Mean Duration of Analgesia of 563.67±33.16 min .

Comparision of Mean Duration time of Analgesia between the groups

Duration of Analgesia was prolonged in Group B when compared with Group R . The p value was < 0.001 which is statistically very highly significant.

Table 2: Duration of analgesia

	Bupivacaine group	Clonidine group	P value
Duration of analgesia(DOA)	361.67±59.77	563.67±33.16	<0.001**

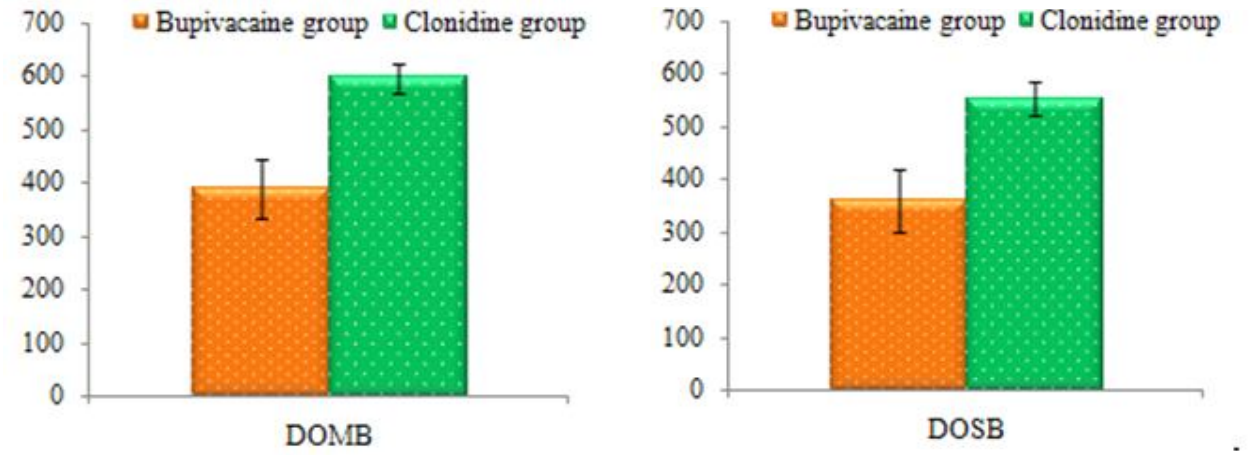

Fig. 2: Duration of sensory and motor blockade in two groups

Table 3: Comparison of side effects

Side effects	Bupivacaine group	Clonidine group
Bradycardia	Nil	Nil
Hypotension	Nil	Nil
Nausea and Vomiting	Nil	Nil

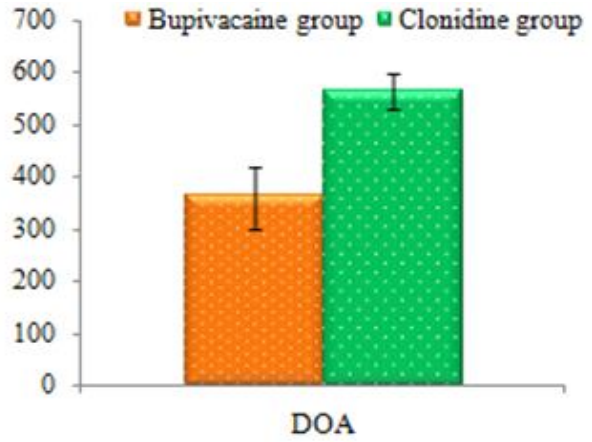

Fig. 3: Comparision of duration of analgesia in two groups

In our study we did not observed any side effects in both the groups

Discussion

A variety of receptors mediate anti-nociception on peripheral sensory axons. The peripheral administration of appropriate drugs (Adjuncts) may have analgesic benefit and reduce systemic adverse effects. In an attempt to improve perioperative analgesia, a variety of adjuncts such as opioids, verapamil, neostigmine and tramadol have been administered concomitantly with local anesthetics into the brachial plexus sheath. The aim of this study was to evaluate whether additional anesthetic and analgesic effects could be derived from administration of Alpha-2 adrenoceptor, Clonidine, into brachial plexus sheath.

Onset of Sensory Block

In our study, we observed that onset of sensory onset was earlier in study group of Clonidine having a mean value of 7.20±1.95 min in comparison with Bupivacaine group having mean value of 17.63± 3.25 min, which is statistically significant (p = < 0.001) This observation well matches with study of Susmitha chakraborthy [3], onset of sensory 6.2± 0.78 min and 8.7±1.01 min in Clonidine group and control group respectively.

Similar observation was made by Gabriella Iohom [4], where the onset time of sensory block was much faster in Clonidine group, 21.3±7.2min compared to that of placebo (24.7± 5.5 min). A Meta-analysis was conducted by Daniel M. Popping [5] on various studies using Clonidine doses ranging from 90 to 150 µg in Brachial plexus block. He found early onset of sensory block time with an onset time of Clonidine 12.8 min. In controls, average onset of time of sensory block was 15 min.

Santvana Kohli, Manpreet kaur 2013 conducted a study comparision of two different doses of clonidine added to bupivacaine [6]. They concluded in thier study higher doses of clonidine(2mcg / kg) in brachial plexus block hastens the onset of sensory blocks.Sensory onset of time was 9.9±4.1min

Onset of Motor Block

In our study, we observed that onset of motor block was earlier in study group of Clonidine having the mean value of 9.87±2.60 min and in comparison, the Bupivacaine group had a mean value of 20.57± 2.92 min which is statistically significant (p = < 0.001). 66.

This observation matches well with the study conducted by Susmitha chakraborthy, who had earlier onset of motor blockade in Clonidine group compared to control group, 10.6±1.36 min and 18.1±1.35 min respectively. However, Daniel M. Popping had contrasting result as time for onset of motor block, quantified by using the Bromage scale. In control group mean onset time of motor block was 18.3 min and Clonidine had no significant impact on onset time. Santvana Kohli, Manpreet kaur 2013 conducted a study comparision of two different doses of clonidine added to bupivacaine. They concluded in their study higher doses of clonidine(2mcg / kg) in brachial plexus block hastens the onset of motor blocks. Motor onset of time was 13.2±6.7 min.

Duration of Sensory Block

The duration of sensory blockade, in our study was 552.67±32.05 min with Clonidine group and 359.00±60.53 min for Bupivacaine group, which is statistically significant (p= < 0.001).

According to Bernard [7] et al in their study Clonidine reduced the use of supplementary intravenous anaesthetic agents for surgery and produced dosedependent prolongation of analgesia, It reached a mean 770 min (range, 190-1440 min) for the largest dose 300µg which matches well with our study. According to Murphy [8] et al, Clonidine provided an analgesic effect that lasted as long as 492 min which is twice the duration of placebo 260 min.

In Daniel M. Popping study, the duration of postoperative analgesia for control group was 461 min where as Clonidine significantly increased the duration to 584 min. Santvana Kohli, Manpreet kaur 2013 conducted a study comparision of two different doses of clonidine added to bupivacaine. They concluded in their study higher doses of clonidine(2mcg/kg) in brachial plexus block prolongs duration of analgesia.

Total duration of analgesia was 21±2.96h, which is well matched with our study. Our study observations concur well with study conducted by Eledjam [9] et al in supraclavicular block with Clonidine using the dose of 150 µg and 40 ml Bupivacaine of 0.25%. The block produced with the addition of Clonidine was longer (994.2± 34.2) compared to epinephrine as adjuvant (control group) 728.3± 35.8. Singh S, Aggarwal A (10)2010 conducted a randomized controlled double – blinded prospective study of the efficacy of clonidine(2mcg/kg) added to bupivacaine (0.25% 40 ml) as compared with bupivacaine alone used in supraclavicular brachial plexus block for upper limb surgeries. They concluded that addition of clonidine bupivacaine hastens onset of sensory and motor block and prolongs duration of sensory block ,motor block and post op analgesia.

During our study we noticed a decrease in systolic, diastolic as well as mean arterial blood pressure and pulse rate but none of the patient had hypotension(defined by decrease in blood pressure by 20%) or bradycardia and maintained the hemodynamic parameters well within the normal range, which is similar to study conducted by Eisenach JC [11] and Culebras et al.

Summary and Conclusion

- Clonidine is an alpha-2 agonist known to prolong the analgesic actions of local anaesthetics by acting on peripheral nerve.
- We studied the anaesthetic and analgesic effects of adding Clonidine into brachial plexus sheath with Bupivacaine solution in 60 patients undergoing upper extremity orthopaedic, plastic or reconstructive surgery.
- Patients were randomized into 2 groups of 30 each. All patients received brachial plexus block with 30ml of 0.5% Bupivacaine. In addition, group B received Clonidine at the dose of 2 µg/kg and group A received normal saline 1ml added to Bupivacaine solution.
- Onset of sensory blockade was faster in Clonidine group (7.20±1.95min) compared to Bupivacaine group (17.63±3.25min), which was statistically significant. Duration of sensory blockade was also longer in Clonidine group (552.67±32.05min) compared to Bupivacaine group (359.00±60.53min) and this difference was both clinically and statistically significant (p=0.001).
- Onset of motor blockade was faster in Clonidine group (9.87± 2.60min) compared to Bupivacaine group (20.57±2.92 min). The duration of motor blockade was longer in Clonidine group (597.33±27.91 min) compared to Bupivacaine group (390.00 ± 55.52 min) and this difference was both clinically and statistically significant (p=0.001). 70
- Also, the time for demand of analgesics was significantly prolonged in Clonidine group (563.67±33.16min) compared to Bupivacaine group (361.00±59.77 min) this difference was also statistically significant.

References

1. Chad M.Brumett.M.D,Brian A Williams.Additives to local anesthetics for peripheral nerve blockade. Int Anesthesiol Clin. 2011 Fall; 49(4):104-106.
2. Damien B. Murphy, Colin J.L et al.Novel analgesics Adjuvants for brachial plexus Block: A systemic Review.Analgesia and anesthesia May 2000;90(5): 1122-1128.
3. Susmita Chakraborty. Jayanta Chakraborty, Mohan Chandra Mandal, Avijit Hazra, Sabyasachi Das. Effect of Clonidine as adjuvant in Bupivacaine induced supraclavicular brachial plexus block. A randomized controlled trial. Indian J Pharmacology. 2010 Apr;42(2):74-77.
4. Gabriella Iohom, Adnane Machmachi, De´sire´-Pascal Diarra, Mohammed Khatouf, Sylvie Boileau, François Dap, Stéphanie Boini, Paul-Michel Mertes, and Herve Bouaziz, The Effects of Clonidine Added to Mepivacaine for Paronychia Surgery Under Axillary Brachial Plexus Block. Anesth Analg 2005;100: 1179–83.

5. Daniel M. Popping, Nadia Elia, Emmanuel Marret, Manuel Wenk, Martin R. Trame'. A Meta-analysis of Randomized Trials. Clonidine as an Adjuvant to Local Anesthetics for Peripheral Nerve and Plexus Blocks. Anesthesiology, 2009 Aug;11(2).
6. Santvana Kohli, Manpreet Kaur.Brachial plexus block: Comparison of two different doses of clonidine added to bupivacaine.
7. Iskandar H, Benard A, Ruel-Raymond J, Cochard G, Manaud B: The analgesic effect of interscalene block using Clonidine as an analgesic for shoulder arthroscopy. Anesth Analg 2003;96:260–2.
8. Damien B. Murphy, Colin J. L et al. Novel analgesics Adjuvants for brachial plexus Block: A systemic Review.Analgesia and anesthesia May 2000;90(5): 1122-1128.
9. Eledjam JJ, Deschodt J, Viel EJ, et al. Brachial plexus block with Bupivacaine, effects of added alpha-adrenergic agonists: comparison between Clonidine and epinephrine. Can J Anaesth 1991;38:870–5.
10. Singh S, Aggarwal A. A randomized controlled double –blinded prospective study of the efficacy of clonidine added to bupivacaine as compared with bupivacaine alone used in supraclavicular brachial plexus block for upper limb surgeries. Indian J Anaesthesia 2010;54:552-7.
11. Eisenach JC, De Kock M, Klimscha W: Alpha (2)-adrenergic agonists for regional anaesthesia. A clinical review of Clonidine (1984-1995). Anesthesiology 1996; 85:655–74.

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Effect of Preoperative Anesthesia Counseling on Patient's Recovery after Surgery under General Anesthesia

Akanksha Agarwal[1], P.K. Bhattacharya[2], G.N. Chavan[3]

[1,2]Associate Professor [3]Professor and Head, Dept. of Anesthesiology, Chirayu Medical College & Hospital, Bhopal, Madhya Pradesh 462030, India.

Abstract

Preoperative anesthesia assessment visit (PAC) can be used as a golden opportunity for counseling of the patient posted for elective surgery, its effects are time-tested on better perioperative recovery. *Aims:* To assess anxiety level and its effects in perioperative period in patients undergoing surgeries under General Anesthesia, secondly to assess postoperative recovery status with respect to cooperation, sedative and analgesic requirement, and finally to assess effect of counseling on final postoperative recovery status. *Settings and Design*: PAC clinic of Chirayu Medical College and Hopital. *Methods and Material*: Sixty ASA grade 1/2 patients, age group 18-60 years, were randomized to 2 groups: study group receiving detailed anesthesia and surgery counseling during preanesthesia check-up (PAC) one day prior and on the day of surgery. Control group undergo through conventional method of counseling one day prior to surgery. Study group will be given verbal and written advice on anaesthetic and medical risk as part of the informed consent for anesthesia. Protocol of anesthesia will be same in both the groups. Both groups were given APAIS questionnaire at time of PAC, reassessed in immediate preoperative period. VAS along with vital parameters were recorded at PAC time and again in immediate preoperative period, and then in immediately post extubation and then after every 15 mins till 2hrs in recovery room. Patient's anxiety in postoperative period was assessed with APAIS after 12 & 24 hrs. Modified Aldrete Score was used to assess overall recovery of patients. *Statistical analysis used*: Statistical analysis was done using 'unpaired t test' with p value<0.005 as significant, after calculating standard deviation (SD) and mean value of different parameters. *Results:* The level of anxiety was significantly low in study group as compared to control group in immediate preoperative as well as postoperative periods at various time intervals, as assessed by APAIS & VAS, though both scores were lower in both groups in postoperative periods as compared to PAC time. In both groups, difference in vital parameters, that is, pulse rate, blood pressue, SpO2, was insignificant, at various time durations, although the decrease in pulse rate from the time of PAC to postoperative period, was more in study group. Aldrete score of 10 (out of 10) was achieved earlier in study group (p statistically significant) than in control group. *Conclusions:* This study shows that a proper elaborative verbal and written counseling at time of preanesthesia check up can alleviate patients' anxiety or stress, resulting in decreased morbidity and better outcome.

Keywords: Preoperative Anesthesia Counselling; GA; Outcome; PAC.

Introduction

A large proportion of patients experience substantial anxiety before surgery, prevalence ranging from 11% to 80% [1]. Anxiety can be described as an unpleasant state of uneasiness or tension, which may be associated with parasympathetic and endocrinal stimulation [2].

Preoperative anxiety has been found to increase post operative morbidity, pain, hospital stay, and the need for postoperative analgesia and psychological support. It is also associated with decreased patient satisfaction with perioperative care, and reduces the quality of recovery. The aims and objectives of our study were to assess anxiety level before and after General Anesthesia, using The Amsterdam preoperative anxiety and information scale (APAIS), secondly to assess postoperative recovery status with respect to

Corresponding Author: Dr. G.N. Chavan, Professor and Head, Dept. of Anesthesiology, Chirayu Medical College & Hospital, Bhopal, Madhya Pradesh 462030, India.
E-mail: gcgcny@gmail.com

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cooperation, sedative and analgesic requirement, using Visual Analogue Scale and vital parameters, and finally to assess effect of counseling on final postoperative recovery status before shifting out the patient from recovery room, using Aldrete Score.

Subjects and Methods

This study was conducted from March to May 2015, in a tertiary care centre of Central India after clearance from Institutional Research Committee .Sixty patients of either sex, posted for and undergone various surgeries under General Anesthesia were included in the study.

Inclusion criteria were patients aged 18 to 65, patients able to give informed consent and American Society of Anesthesiologists (ASA) grade 1, 2. Exclusion criteria were patients with cognitive impairments or psychiatric disorders, inability to give informed consent, ASA 3 or above, patients posted for surgery under Regional Anesthesia or for emergency operations.

Patients were randomized to 2groups: study group (S) received detailed verbal and written anesthesia counseling including anesthetic and medical risk, during PAC one day prior and on day of surgery, in their language (Hindi or English). Control group (C) underwent conventional method of counseling one day prior to surgery. Patients were explained about the type of study and their written consent were taken. Both groups were given APAIS questionnaire at time of PAC. VAS was also recorded at time of PAC along with vital parameters (pulse rate, blood pressure, SpO_2). APAIS is a six-question scale to assess anxiety about surgery and anesthesia , with range of 6 to 30, that is , No anxiety at all (1) to extremely anxious(6) [3].

The Amsterdam preoperative anxiety and information scale (APAIS)

Not at all 1 2 3 4 5 Extremely

1. I am worried about the anesthetic

1 2 3 4 5

2. The anesthetic is on my mind continually

1 2 3 4 5

3. I would like to know as much as possible about the anesthetic

1 2 3 4 5

4. I am worried about the procedure

1 2 3 4 5

5. The procedure is on my mind continually

1 2 3 4 5

6. I would like to know as much as possible about the procedure

1 2 3 4 5

APAIS, VAS and vital parameters were recorded again in immediate preoperative period. VAS & vitals were noted immediately post extubation and then after every 15 minutes till 2hrs in recovery room. Patient's anxiety in postoperative period was assessed with APAIS after 12 & 24 hrs. Modified Aldrete Score was used to assess overall recovery of patients and time required by patients in both groups to be discharged from PACU (score of 10) was noted.

Protocol of anesthesia was same in both groups.

Premedication: I.V Inj.Glycopyrollate 0.2mg, Inj. Midazolam 1mg, Inj Fentanyl 2mcg/kg,

Induction: I.V Inj Propofol 2.5-3mg/kg ,Inj Atracurium 0.5mg/kg i.v

Maintanence: O_2+N_2O+sevoflurane+inj. Atracurium

Reversal: Inj. Glycopyrollate 0.4mg+ Inj Neostigmine 2.5mg/kg IV.

Statistical analysis was done using 'unpaired t test' with p value<0.005 as significant, after calculating standard deviation (SD) and mean value of different parameters.

Results

Sixty patients, (M/F:15/15 in control group and 8/22 in study group) of ages between 18 to 65 years with mean of 34.96 years in control group and 38.13 years in study group, were included in the study. Same protocol of General Anesthesia was followed in all cases.

In both groups, difference in vital parameters, that is, pulse rate, blood pressure, SpO2 , was insignificant, at various time durations , although the decrease in pulse rate from the time of PAC to postoperative period, was more in study group (Figure 1).

The level of anxiety was significantly low in study group as compared to control group in immediate preoperative as well as postoperative periods at various time intervals, as assessed by APAIS & VAS, though both scores were lower in both groups in postoperative periods as compared to PAC time. APAIS was high in both groups at time of PAC (23.4 v/s 22.63), but in immediate preoperative period, it decreased significantly in study group (10.93 v/s

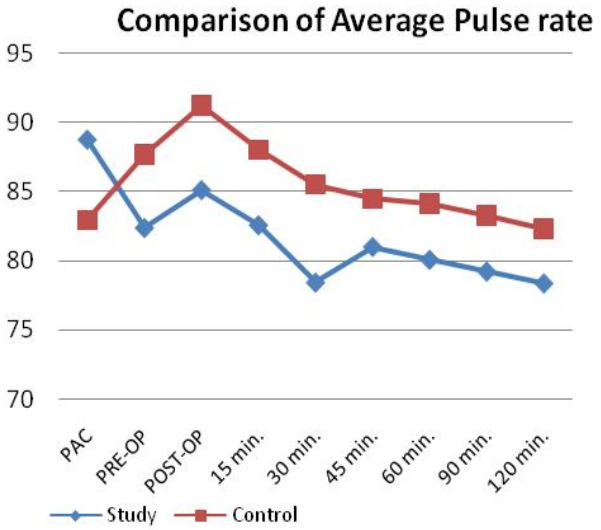

Fig. 1:

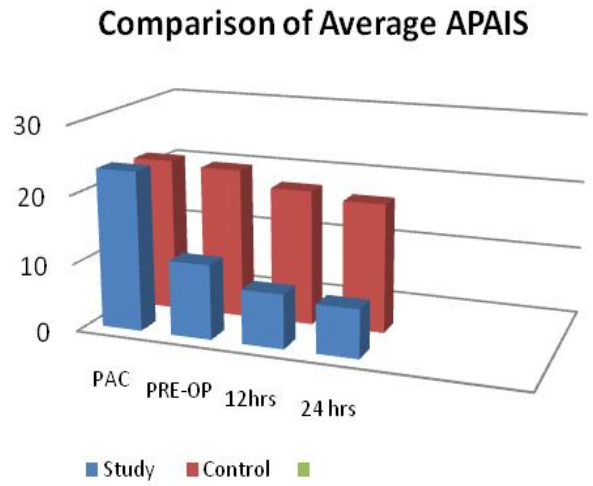

Fig. 2:

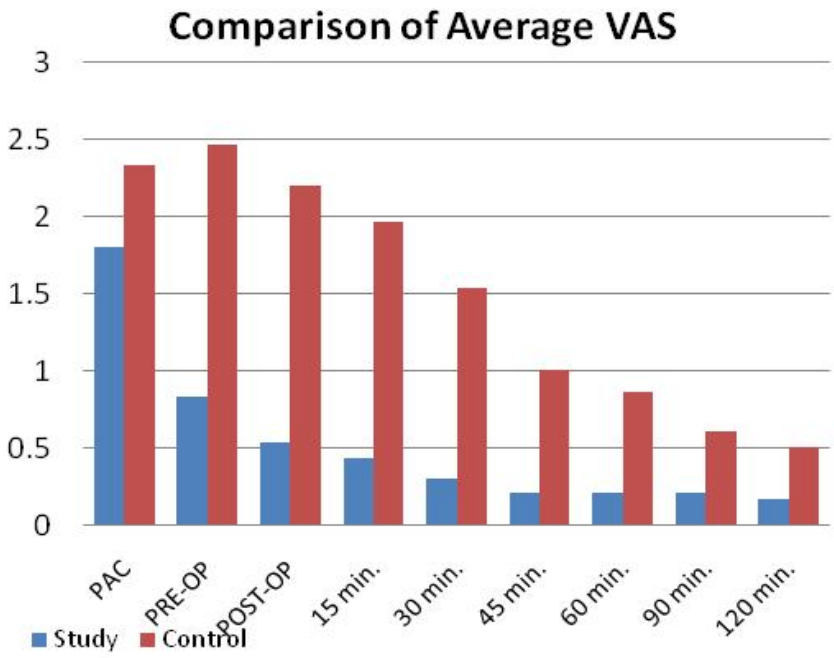

Fig. 3:

Table 1: ALDERETE SCORE

Time (mins)	Study group Pts	Control group Pts
30-60	37	4
61-90	10	14
91-120	3	12

22.03). It was also significantly low in study group after 12 and 24 hours of operation (7.93 v/s 19.86, 7.1 v/s 18.9) (Figure 2).

There was insignificant difference in VAS at time of PAC in both groups(1.8 v/s 2.33). VAS score was significantly low in study group in immediate preoperative (0.83v/s2.47), immediate postoperative (0.53 v/s 2.2), till 60 mins postoperatively. At 90 and 120 mins postoperatively, VAS was low in study group but it was not significant (Figure 3).

Aldrete score of 10 (out of 10) was achieved earlier in study group (p statistically significant) with mean of 47 +SD of 10.22 mins in study group and 93.5 + SD of 17.9 mins in control group (Table 1).

Discussion

For most of the patients, irrespective of age and sex, any surgical procedure is a stressful condition, associated with psychological effects such as anxiety and fear. In study by Akinsulone A et al [5] most common factors responsible for preoperative anxiety were fear of complications and result of the operation, the other causes being concern about family, fear for one's life and disability, postoperative pain, awareness during surgery. In our study, in control group, only the clinical status of patients and their fitness for anesthesia were assessed during PAC along with general information about anesthesia. But in study group, apart from clinical assessment, detailed verbal and written counseling of patients was also done, trying to relieve their anxiety and curiosity about anesthesia and procedure. Different scales are available to assess anxiety in patients. We have used The Amsterdam preoperative anxiety and information scale (APAIS), in addition to VAS (the Visual Analogue Scale). In study by Boker et al [3] they found APAIS as a promising new practical tool to assess preoperative patients anxiety levels, as compared to STAI (the State portion of the Speilburger State –trait anxiety inventory), in addition to VAS. We also found the APAIS to be a simple, quick and easy to understand scale.

In our study, we observed that APAIS was high in both groups at time of PAC (23.4 v/s 22.63) but in immediate preoperative period, it decreased significantly in study group (10.93 v/s 22.03). Anxiety score was significantly low in study group after 12 and 24 hours of operation (7.93 v/s 19.86, 7.1 v/s 18.9). A study by Dr Yeola et al [7], has found that preoperative patient education significantly reduces postoperative anxiety, pain and length of hospital stay, and strongly recommends preoperative patient education for better outcome.

We also measured and compared vital parameters in both groups at time of PAC, immediate preoperative and postoperative time followed by different time intervals postoperatively till 2 hours. There was decrease in pulse rate in both groups, but when compared in both groups, it was insignificant statistically, but a study by Kim W et al [4] evaluated whether level of preoperative anxiety assessed by STAI affects cardiovascular response during anesthesia induction, and evaluated the utility of preoperative anxiety scale as a predictive factor for hemodynamic changes. They concluded that the state anxiety scores of patients 45 years of age or above could be a useful tool for predicting changes in vital signs. We also recorded time required by patients to be discharged from postoperative recovery room to their wards or rooms, assessed by Aldrete score. It was achieved earlier in study group (with mean of 47 +SD of 10.22 mins in study group and 93.5 + SD of 17.9 mins in control group.). But studies supporting this outcome are negligible. Long term and bigger studies are required to confirm and established the effect of preoperative counseling on full and early recovery of patients.

Conclusion

Anxiety during perioperative period is pretty common. This study shows that a proper verbal and written elaborative counseling at time of preanesthesia check up can alleviate patients' anxiety or stress, resulting in decreased morbidity and better outcome

References

1. P Akkamahadevi, VV Subramanian : The efficacy of different methods of pre-operative counseling on perioperative anxiety in patients undergoing regional anesthesia: Indian Journal of Anesthesia 2016 Jan;60(1).
2. Javed M, Mushtaq A, Mukhtar S, Khan Z. Preoperative anxiety before elective surgery: Neurosciences 2007;12(2).
3. Boker et al. The Amsterdam preoperative anxiety and information scale provides a simple and reliable measure of preoperative anxiety: Can J Anesth 2002;49(8):792-798.
4. Kim W et al. Availability of preoperative anxiety scale as a predictive factor for hemodynamic changes

during induction of anesthesia: Korean J Anesthesiol 2010 Apr;58(4):328-333.

5. Akinsulore A et al. Assessment of preoperative and postoperative anxiety among elective major surgery patients in a tertiary hospital in Nigeria: M.E.J ANESTH 2005;23(2).
6. Homzova P et al. Measuring preoperative anxiety in patients undergoing elective surgery in Czech Republic: Cent Eur J Nurs Midw 2015;64(4):321-326.
7. Dr Yeola M et al. Effect of Pre-Operative Counselling on Post–Operative Outcome in Hernia Surgery Patients: IJSR / ISSN(Online): 2319-7064.
8. AAGBI SAFETY GUIDELINE: Pre-operative Assessment and Patient Preparation: The Role of the Anaesthetist. Jan 2010.
9. ESH Ng, CH Sia, A Pathmanathan, EHC Liu. Fears that preoperative patients have of general anesthesia: NUHS.
10. Grimaldo DA, Wiener-Kronish JP, Jurson T, Shaughnessy TE, Curtis JR, Liu LL. A randomized, controlled trial of advanced care planning discussions during preoperative evaluations.: Anesthesiology 2001; 95(1):43-50.
11. Tan CS, Mahmood U, O' Brien PD, Beatty S, Kwok AK, Lee VY, Au Eong KG. Visual experiences during vitreous surgery under regional anesthesia: a multicenter study. Am J Ophthalmol. 2005 Dec;140 (6):971-975.
12. Voon LW, Au Eong KG, Saw SM, Verma D, Laude A. Effect of preoperative counseling on patient fear from the visual experience during phacoemulsification under topical anesthesia: Multicenter randomized clinical trial.: J Cataract Refract Surg. 2005 Oct;31(10): 1966-9.

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A Comparative Study of Efficacy of Conscious Sedation using Midazolam Plus Fentanyl Versus Midazolam Plus Propofol during Regional Anaesthesia

Sangita M. Agale [Eram][1], V.V. Kulkarni[2]

[1]Assistant Professor, Department of Anaesthesia, Government Medical College, Latur, Maharashtra 413512, India. [2]Associate Professor, Department of Anaesthesia, Dr V.M. Government Medical College, Solapur, Maharashtra 413003, India.

Abstract

Introduction: Regional anesthesia Is becoming an increasing important aspect of anesthesia practice. *Aims and Objectives:* To Study efficacy of conscious sedation using Midazolam plus Fentanyl versus Midazolam plus Propofol during regional Anaesthesia. *Methodology:* We conducted a comparative study of conscious sedation using midazolam with fentanyl in group-I vs. midazolam with propofol in group-II. In the department of anesthesia at Dr.V.M. Govt. Medical college In the period between January 2005 to December 2005. 60 patients of ASA Grade I, II, & III, were randomly divided in two groups, 30 in each group, of between 15 to 60 years of either sex undergoing any surgery under regional anesthesia. The statistical analysis was done by unpaired t-test and Chi -square test calculated by SPSS software version 19. *Result :* Recovery at the end of surgery. In Group II (Midazolam+propofol) 83% of patient were calm and quiet while 40% Group I (Midazolam + Fentanyl). In group II, 7% of patients were asleep, arousable and in Group I, 33% of patients were asleep, arousable. Recovery at end of surgery is highly statistically significant, in group II. There was significantly less number of recall of events in Group II (Midazolam +propofol) Preoperative and intraoperative events, than Group I (Midazolam+Fentanyl). *Conclusion*: It can be concluded from our study that Midazolam plus Propofol was found superior to Midazolam plus Fentanyl in terms of smooth and early recovery at the end of surgery and less number of recall of events.

Keywords: Conscious Sedation; Midazolam Plus Fentanyl; Midazolam Plus Propofol.

Introduction

Regional anesthesia Is becoming an increasing important aspect of anesthesia practice. Its advantage include avoidance of certain risk with general anesthesia those of pulmonary aspiration and airway obstructions, laryngospasm. Avoidance of operation theater pollution, provision of good postoperative analgesia. Benefits in certain pre-existing pulmonary embolism postoperatively [1,2,3,4,5].

Surgery and anesthesia are events that pose considerable stress on the patient. Except a few, patients like to remain sedated during the surgical procedure. The state of wakefulness can produce anxiety and reduce patient satisfaction and cooperation.

Conscious sedation lies between wakefulness and general anesthesia wherein patients are comfortably asleep but readily arousable to verbal commands and can independently maintain their airway [6].

Various methods have been described to provide these range from intravenous or inhalation sedation to full general anesthesia. To avoid the disadvantages of the latter. Light sedation with an intravenous agent is obviously the method of choice. However to preserve the benefit of the local technique, recovery must be rapid and clearheaded with freedom form minor postoperative sequlae [7].

Corresponding Author: Sangita M.Agale (Eram), Assistant Professor, Department of Anaesthesia, Government Medical College, Latur, Maharashtra 413512, India

E-mail: dreramsangita@gmail.com

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In 1966 shane described "intravenous amnesia" technique involving small incremental doses of barbiturates, opioids, anticholinergics and ataractics. The term "conscious sedation" implies the use of intravenous anesthetics and analgesics to supplement local or regional anesthesia.

According to American dental association conscious sedation is defined as use of medication to minimally depress level of consciousness in a patient while allowing the patients to continually and independently maintain patent airway and responds appropriately to verbal commands [8].

Ability to maintain patent airway independently is an important distinguishing feature of conscious sedation from deep sedation [9].

Advantages of conscious sedation:-Adequate sedation with minimal risk, Relief of anxiety, Amnesia, Relief of pain and other noxious stimuli.

Benzodiazepines are widely used to produce sedation and amnesia in the operative room. Midazolam offers several advantages over other available benzodiazepines. It cases early recovery less postoperative sedation, less veno-irritation on injection and has excellent amnestic action.

Midazolam is used for conscious sedation for short diagnostic or endoscopic and dental procedure, adjunt to local or regional anesthesia [10]. Propofol is a sedative hypnotic drug, which is becoming popular for sedation during our patients procedures performed under local anesthesia. Its high clearance and favorable recovery profile offers advantages over other intravenous sedative and analgesic drugs. Sedation with propofol can be adjusted with manual intermittent bolus injections techniques [11,12]. *Fentanyl*: Fentanyl is a potent synthetic opiate agonist, estimated to be 25 fold to 100 fold more potent than morphine. It is highly lipid soluble and enters the central nervous system swiftly. Leading to rapid onset of action.Fentanyl provides relief of moderate to severe pain and has become the narcotic drug of choice for a wide variety of painful procedures. It has relatively short duration of action. These qualities make it ideal for the expeditious completion of painful procedures in the emergency department setting [13,14]. Patient's comfort is maintained with combination of drug [15].

In our institute Dr.V.M. Govt. Medical college we have proposed to use conscious sedation with Midazolam and Fentanyl vs. Midazolam and propofol. In this prospective randomized clinical study, was examined whether conscious sedation with propofol is better than fentanyl.

Methodology

We conducted a comparative study of conscious sedation using midazolam with fentanyl in group I vs. midazolam with propofol in group II. In the department of anesthesia at Dr.V.M. Govt. Medical college In the period between January 2005 to December 2005. 60 patients of ASA Grade I, II, & III, were randomly divided in two groups, 30 in each group, of between 15 to 60 years of either sex undergoing any surgery under regional anesthesia (spinal, epidural anesthesia or peripheral nerve blocks, Routine of emergency surgery were included into study while the patients with history of allergic reaction to the study medication, Chronic opioid or sedative drug use, Obesity (>130% for ideal body weight), Clinically significant cardiac, pulmonary, hepatic or renal dysfunction were excluded from study. The statistical analysis was done by unpaired t-test and Chi-square test calculated by SPSS software version 19.

Result

From below table recovery at the end of surgery. In Group II (Midazolam+propofol) 83% of patient

Table 1: Demographic data

Characteristics	Group I (Fentanyl)	Group II (propofol)	Remarks
Age years			
15-25	8	3	
26-35	5	8	
36-45	10	12	
46-55	6	3	
56-65	1	4	
Mean+Std.Devi.	35.67±11.74	39±11.36	
Sex			
Male	15	16	NS
Female	15	14	

The socio demographic characters of both the groups were comparable to each other

Table 2: Recovery at the end of surgery

Characteristics	Group I (n=30)		Group II (n=30)	
	No	Percentage	No	Percentage
Calm & quiet	12	40%	25	83%
Drowsy	8	27%	3	10%
Asleep, Arousable	10	33%	2	7%
Total	30	-	30	-

(X^2=12.17, P <0.05 statistically significant)

Table 3: Recall of events

Characteristcs	Group I (n=30) Midazolam+Patients				Group II (n=30) Midazolam+Propofol			
	yes	%	No.	%	Yes	%	No.	%
Preoperative event	10	33%	20	67%	3	10%	27	90%
Intraoperative Event	2	17%	25	83%	1	1%	29	99%
X^2		2.22				0.2678		

were calm and quiet while 40% Group I (Midazolam + Fentanyl). In group II, 7% of patients were asleep, arousable and in Group I, 33% of patients were asleep, arousable. Recovery and in end of surgery is highly statistically significant, in group II.

From Above table there was significantly less number of recall of events in Group II (Midazolam +propofol) Preoperative and intraoperative events, than Group I (Midazolam+Fentanyl).

Discussion

Eighty three percent of the patients from group II (Propofol+Mozolam) were awake but calm and quite and only 40% of the patients from group I were awake. 27% of patients from group I (fentanyl+ midazolam) were drowsy and 33% were asleep arousable. This indicates patients remains more sedated in fentanylmidazolam group. Thus recovery score is highly significant in –group II (Midazolam+ propofol).

There was significantly less number of recall of events in Group II (Midazolam +propofol) Preoperative and intraoperative events, than Group I (Midazolam+Fentanyl) this was similar to Tejindar sing et al [15] and N-Mackezie et al [7].

Conclusion

It can be concluded from our study that Midazolam plus Propofol was found superior to Midazolam plus Fentanyl in terms of smooth and early recovery at the end of surgery and less number of recall of events.

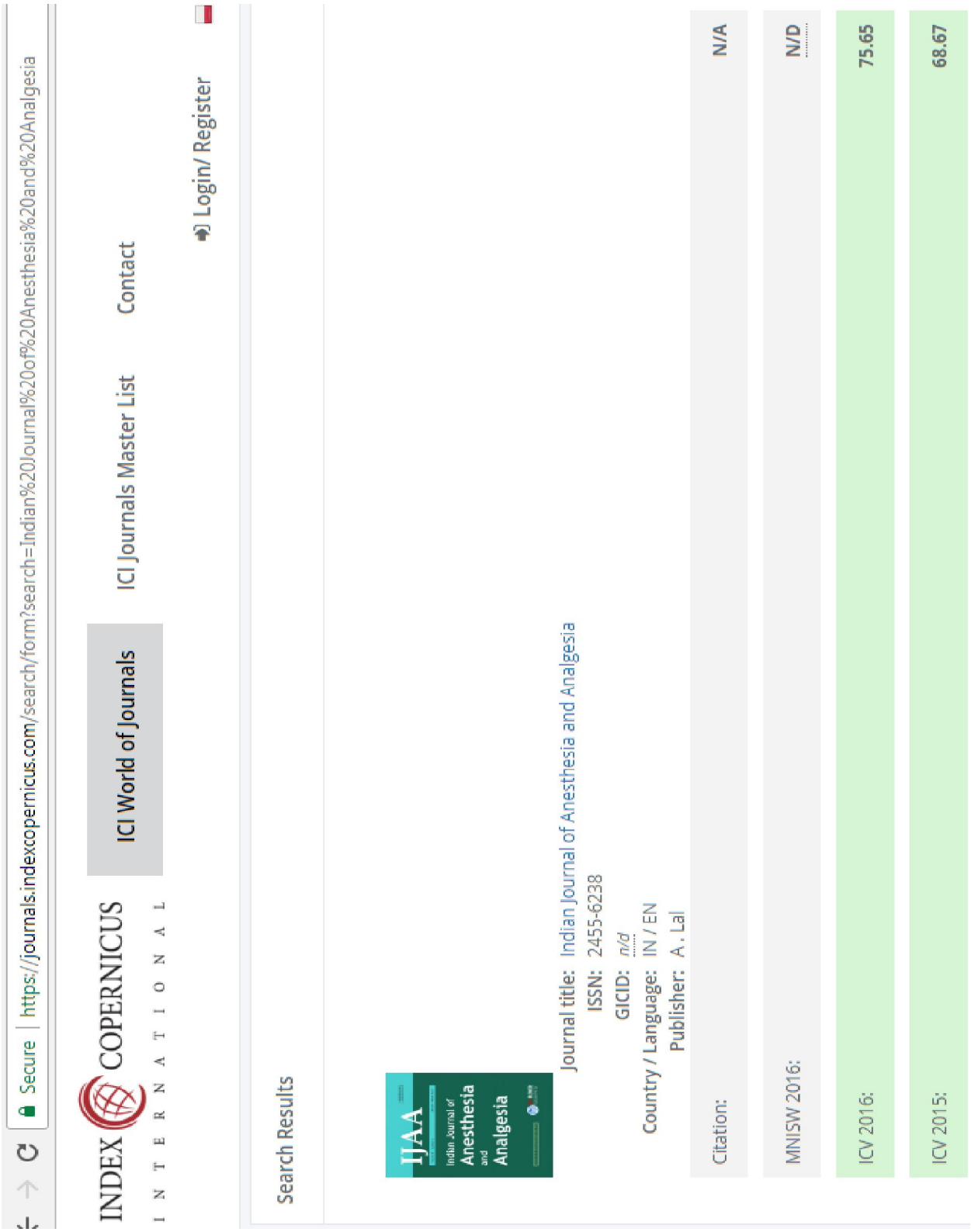
References

1. Modig J. Borg. T, Karlstrom G. Maripuu E, Sahlstedt B thromboembolism after total hip replacement: role of epidural and general anesthesia. Anesthesia and analgesia 1983;62:174-80.
2. Freund FG, Bonica JJ, ward RjAkamatsu TJ, Kennedy WF Jr. ventilator reserve and level of motor block during high spinal and epidural anesthesia anesthesiology 1967;28:834-7.
3. SJogren s. wright B. respiratory changes during continuous epidural blockade. Actaanaesthesiolo gicascandinavica 1972;16:27-49.
4. Wahba WM, Craig DB. The cardiorespiratory effects of thoracic edpidural anesthesia. Canadian anesthetists' society journal 1972;19:8-19.
5. Aitkenhead AR, Grant IS. Interaction with concurrent disease and medication. In: Henderson JJ, Nimmo WS, eds. Practical regional anaesthesia, oxford: Blackwell scientific publication, 1983. p.143-62.
6. Monica M. Mehernoor F, paul FW. The changing role of monitored anesthesia care in the ambulatory setting.Anesthanalg 1997:85:1020-36.
7. N Mackenzie and I .S. Grant propofol for intravenous sedation anaesthesia, 1987, Volume 42, pages 3-6.
8. American society of pediatrics, committee of drug ped. 1992;90:1110-1115.
10. Ref. Miller R.D. anesthesia, 4th Edition, vol.2, page 2234-2235.
11. While PF, Nequs JB, sedative infusion during local and regional anesthesia a comparison of midazolam and propofol.J. clin anesthesia 1991;3:32-9.
12. Taylor E, Ghouri AF, white PF, Midazolam in combination with propofil for sedation during local anesthesia. J. of clin Anesthesia 1992;4:213-6.

13. Seibs SM the treatment of pain the emergency department ped. Clin. North am. 1989;36:965-78.

14. Cafe CJ sedation for the pediatric patients A. review pediatric clin. North Am. 1994;41:31-58.

15. Tejindersingh, Ravishankar M, conscious sedation with propofol for surgeries under spinal anaesthesia: anaesthesilogical versus patients controlled anaesthclinpharmacol 2005;21(2):169-173.



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Clinical Study to Evaluate the Effectiveness of Epidural Dexmedetomidine for Postoperative Analgesia in Lower Limb Vascular Surgeries

Sargam Goel[1], Mohammed Omar Kamal Ansari[2], Sudhakar Koppad[3]

[1]Senior Resident, Department of Anaesthesiology, University College of Medical Sciences, Delhi 110095, India. [2]Senior Resident, Department of Anaesthesiology, ESI Post Graduate Institute of Medical Science and Research, Rajajinagar, Bengaluru, Karnataka 560010, India. [3]Consultant, Department Of Anaesthesiology and Critical Care, Bhagwan Mahaveer Jain Hospital, Vasanthnagar, Bengaluru, Karnataka 5600052, India.

Abstract

Background: The synergism between epidural local anaesthetics and opioids is well established but studies regarding combination of local anaesthetic with Dexmedetomidine as a continuous infusion for epidural analgesia are very few. This study compares the effectiveness of epidural infusion of Ropivacaine with Dexmedetomidine and Ropivacaine with Fentanyl for postoperative analgesia in lower limb vascular surgerieswith respect to the Quality of analgesia, Motor block, Sedation, Patient satisfaction, Hemodynamic effects and Adverse effects if any. *Methods:* Sixty patients scheduled for lower limb vascular surgeries between 18-70yrs of ASA 1,2,3 were prospectively randomized by computer generated method into 2 groups of 30 each. Group 1: Ropivacaine + Fentanyl . Group 2: Ropivacaine + Dexmedetomidine. Ethics committee approval was granted and patients consent was taken. Data was analyzed with the help of Chi-square test and SPSS software version 21.0. Epidural catheter was inserted at the start of surgery and used for both anaesthesia and postoperative analgesia. 0.75% Ropivacaine 3-4mg/kg was administered as a bolus dose at the start of surgery for anaesthesia. After the surgery, patient was shifted to the recovery room. 3 hours after the elapse of the bolus Ropivacaine dose, a continuous infusion of 0.1% Ropivacaine + 0.04micrograms (mcg)/kilograms (kg)/hour (hr) of Dexmedetomidine or 0.1% Ropivacaine + 0.2mcg/kg/hour Fentanyl for 48 hours at the rate of 4millilitres (ml)/hour was started through the epidural catheter. The patient was assessed at regular intervals for 48 hours. *Results:* There was no statistically significant difference between the two groups in terms of VAS at rest and on movements, Motor blockade, sedation, hemodynamics , Patient satisfaction ($p > 0.05$). There was no adverse adverse effect in any patient. *Conclusion:* Dexmedetomidine as an adjuvant to Ropivacaineprovides good postoperative analgesia, stable hemodynamics, no unwarranted motor blockade and minimal sedation without any adverse effects. This is comparable to Fentanyl.

Keywords: Epidural Analgesia; Ropivacaine; Fentanyl; Dexmedetomidine; Vascular Surgeries.

Introduction

Postoperative pain is both distressing and detrimental for the patient. Despite its importance, analgesia is often under attended in the evolution and management of acute injuries and disease processes. Vascular patients often have a higher degree of comorbidities as compared to other patients such as diabetes mellitus, hypertension, cardiac disease, renal disease, chronic obstructive pulmonary disease and coagulation abnormalities. Postoperative pain adds to these comorbidities.

Epidural analgesia is one of the most common techniques offering superior pain relief and early mobilization in these patients. For this various local anaesthetics, opioids and other adjuvants have been used in the past.

Ropivacaine is a long acting amide local anaesthetic with minimal cardiovascular and central nervous system side effects and lesser motor blockade. The addition of an opioid does provide a dose sparing effect of local anaesthetics and superior

Corresponding Author: Mohammed Omar Kamal Ansari, Senior Resident, Department of Anaesthesiology, ESI Post Graduate Institute of Medical Science and Research, Rajajinagar, Bengaluru, Karnataka 560010, India.
E-mail: dromar143@gmail.com

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analgesia but with increased incidence of adverse effects. Dexmedetomidine is another adjuvant which is a highly selective α-2 adrenoceptor agonist with minimal side effects.

The synergism between epidural local anaesthetics and opioids is well established but studies regarding combination of local anaesthetic with Dexmedetomidine as a continuous infusion for epidural analgesia are very few. So this study was undertaken to evaluate the effectiveness of epidural Dexmedetomidine in lower limb vascular surgeries by comparing an epidural infusion of 0.1% Ropivacaine and 0.04mcg / kg / hr Dexmedetomidine with 0.1% Ropivacaine and 0.2 micrograms(mcg) / kilogram(kg) / hour(hr) Fentanyl in the postoperative period.

Methods

The present study was a randomized study conducted in the Department of Anaesthesiology at our institute. 60 patientsof physical status ASA grade 1, 2 and 3 who were electively posted for lower limb vascular surgery procedure under epidural anaesthesia, during November 2013 to October 2014 were included in the study. The study was approved by the hospital ethics committee.This was a hospital based, prospective, randomized control study. A medical biostatistician was consulted for sample size determination.

Method of Randomization

Patients were randomized into two groups by the use of computer generated method.

Group 1: 0.1% Ropivacaine + 0.2 micrograms(mcg) / kilogram(kg) / hour(hr) Fentanyl

Group 2: 0.1% Ropivacaine +0.04mcg / kg / hr Dexmedetomidine.

Inclusion Criteria

Patient's informed consent, Age group of 18 – 70 years of both sexes and ASA grade I, II and III patients posted for elective lower limb vascular surgeries.

Exclusion Criteria

Patient refusal**,** Pregnant / Lactating patient**,** patients posted for emergency surgeries, Local site infection**,** Severe hypovolaemia, Bleeding / Coagulopathy or on anticoagulants, Spine deformities, Catheter dislodgement**,** Allergy to local anaesthetics or Dexmedetomidine and hepatic diseases.

Material Required

18 G Tuohy needle, 20 G catheter , 2 cc, 5 cc, and 10 cc sterile syringes, Bowl, Sponge holding forceps, Swabs, Chlorhexidine solution, Povidone iodine, Tegaderm for fixing catheter, Local anaesthetics – 2% Lignocaine, and Ropivacaine 0.75%, Adjuvants – Fentanyl, Dexmedetomidine.

Procedure

- In left lateral position, the area for block and catheter fixation was cleansed with Povidone iodine.
- Under aseptic precautions a skin wheal is raised in L2 – L3/ L3 –L4 interspace with 2ml of 2% lignocaine. A 18G Touhy needle is passed through this space for about 1cm and after removing stylet a 10ml epidural syringe firmly attached to the hub of Touhy needle. Needle is slowly advanced until it enters the epidural space, confirmed by loss of resistance to air. After confirming needle in epidural space, the epidural syringe is disconnected and absence of blood or CSF is checked.
- After an epidural test dose, 0.75% Ropivacaine 3-4mg / kg is administered as a bolus dose and the time of administration is noted. The epidural catheter is placed cephalad until 4cms in the space. The markings at the skin level are noted and the catheter is secured using transparent adhesive tegaderm.
- After the surgery, patient is shifted to the recovery room. 3 hours after the elapse of the bolus Ropivacaine dose, a continuous infusion of 0.1% Ropivacaine + 0.04 micrograms (mcg) / kilograms (kg) / hour (hr) of Dexmedetomidine or 0.1% Ropivacaine + 0.2mcg / kg / hour Fentanyl is started for 48 hours at the rate of 4 millilitres (ml) / hour through the catheter placed in epidural space.

These drugs are used as continuous epidural infusion in a 50 ml syringe, using syringe pump at 4ml per hour. An epidural bolus of 5ml was given as rescue analgesia after confirming the position of the catheter when patient 's VAS was > 4 and the patient was followed up. If pain continued to be the same, a second rescue analgesic, Inj. Paracetamol 1g by intravenous route was given. Catheter was removed if not in place and patient was excluded from the study.

The Following Parameters were Monitored

- Degree of sensory block or analgesia-(using VAS scores).
- Degree of motor blockade (using modified Bromage scale).
- Hemodynamic parameters- heart rate (HR), blood pressure (BP) and oxygen saturation (SpO_2).
- Sedation (by five point scale).
- Patient satisfaction (patient satisfaction score).
- Side effects, if any.

Quality of Analgesia [1]

Patients were assessed with a 10-cm visual analogue scale (VAS)

VAS 1: VAS at rest.

VAS 2: VAS at movements, while asking the patients to move the toes and flex the knee joint.

Visual Analog Scale

0	No Pain
1 – 3	Mild Pain
4 – 6	Moderate Pain
7 – 10	Severe Pain

0: Absolutely no pain

1: Negligible pain

2: Very very minimal pain

3: Very minimal pain

4: Minimal Pain

5: Pain requiring relief

6: Pain with little distress

7: Severe pain

8: Very severe pain

9: Very very severe pain

10: Unimaginable pain

2. Modified Bromage Scale [2]

0 →No block.

1 →Inability to raise extended leg.

2 →Inability to flex knee.

3 →Inability to flex ankle and foot.

3. Five Point Sedation Scale [3]

1 → Alert and wide awake.

2 → Arousable to verbal command.

3 → Arousable to gentle tactile stimulation.

4 → Arousable to vigorous shaking.

5 → Unarousable.

4. Satisfaction Score: Patient's satisfaction was evaluated 48 hours after surgery with a two point score

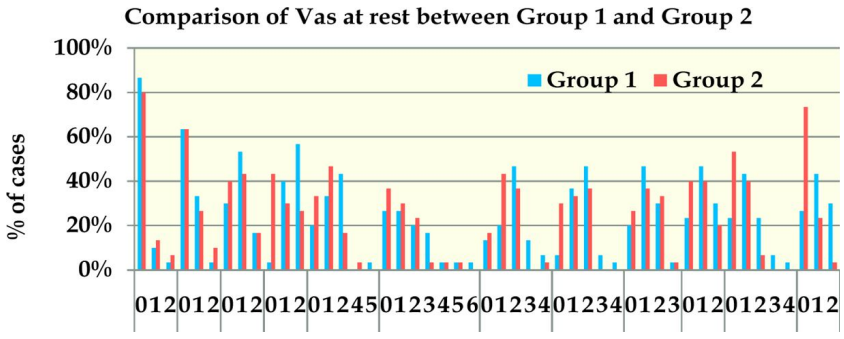
1 = satisfied

2= unsatisfied

At the end of study, data was pooled and analysed. The comparison of normally distributed continuous variables between the groups was performed using Student's t test. Nominal categorical data between the groups were compared using Chi-squared test or Fisher's exact test as appropriate. $p<0.05$ was considered statistically significant. Patient demographics (age, gender, weight) and VAS (rest and movement), motor block, sedation, patient satisfaction, rescue analgesia and hemodynamics at 15, 30, 45minutes (min), 1 hour (hr), 4, 8, 12, 16, 20, 24, 32 and 48hrs were observed in Dexmedetomidine (group 2) and Fentanyl (group 1) groups. Conclusion was drawn regarding the effectiveness of postoperative analgesia and relative efficacy of the two drugs.

Results

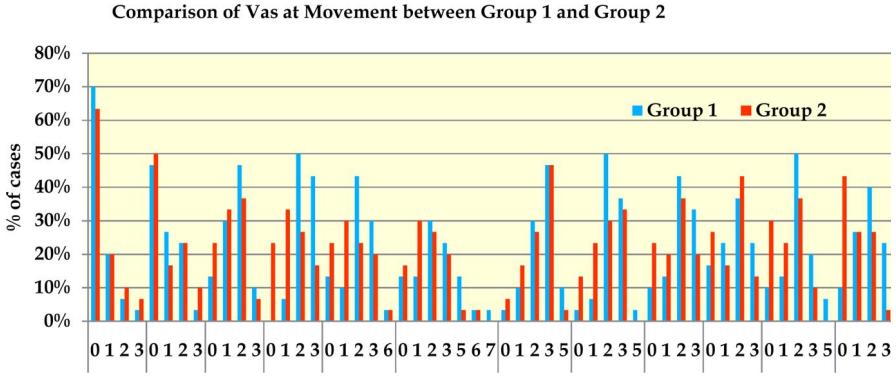
In demographics with respect to age, sex, weight, gender and ASA grading no significant difference between two groups was noted.



Graph 1: Comparison of VAS at rest between the two groups

Table 1: Comparison of VAS at rest between two groups

VAS at rest		Group 1 (n=30) Frequency	%	Group 2 (n=30) Frequency	%	p Value
15 min	0	26	86.7%	24	80.0%	0.757
	1	3	10.0%	4	13.3%	
	2	1	3.3%	2	6.7%	
30 min	0	19	63.3%	19	63.3%	0.543
	1	10	33.3%	8	26.7%	
	2	1	3.3%	3	10.0%	
45 min	0	9	30.0%	12	40.0%	0.691
	1	16	53.3%	13	43.3%	
	2	5	16.7%	5	16.7%	
1 hr	0	1	3.3%	13	43.3%	0.001
	1	12	40.0%	9	30.0%	
	2	17	56.7%	8	26.7%	
4 hrs	0	6	20.0%	10	33.3%	0.125
	1	10	33.3%	14	46.7%	
	2	13	43.3%	5	16.7%	
	4	0	0.0%	1	3.3%	
	5	1	3.3%	0	0.0%	
8 hrs	0	8	26.7%	11	36.7%	0.639
	1	8	26.7%	9	30.0%	
	2	6	20.0%	7	23.3%	
	3	5	16.7%	1	3.3%	
	4	1	3.3%	1	3.3%	
	5	1	3.3%	1	3.3%	
	6	1	3.3%	0	0.0%	
12 hrs	0	4	13.3%	5	16.7%	0.117
	1	6	20.0%	13	43.3%	
	2	14	46.7%	11	36.7%	
	3	4	13.3%	0	0.0%	
	4	2	6.7%	1	3.3%	
16 hrs	0	2	6.7%	9	30.0%	0.097
	1	11	36.7%	10	33.3%	
	2	14	46.7%	11	36.7%	
	3	2	6.7%	0	0.0%	
	4	1	3.3%	0	0.0%	
20 hrs	0	6	20.0%	8	26.7%	0.874
	1	14	46.7%	11	36.7%	
	2	9	30.0%	10	33.3%	
	3	1	3.3%	1	3.3%	
24 hrs	0	7	23.3%	12	40.0%	0.355
	1	14	46.7%	12	40.0%	
	2	9	30.0%	6	20.0%	
32 hrs	0	7	23.3%	16	53.3%	0.053
	1	13	43.3%	12	40.0%	
	2	7	23.3%	2	6.7%	
	3	2	6.7%	0	0.0%	
	4	1	3.3%	0	0.0%	
48 hrs	0	8	26.7%	22	73.3%	0.001
	1	13	43.3%	7	23.3%	
	2	9	30.0%	1	3.3%	

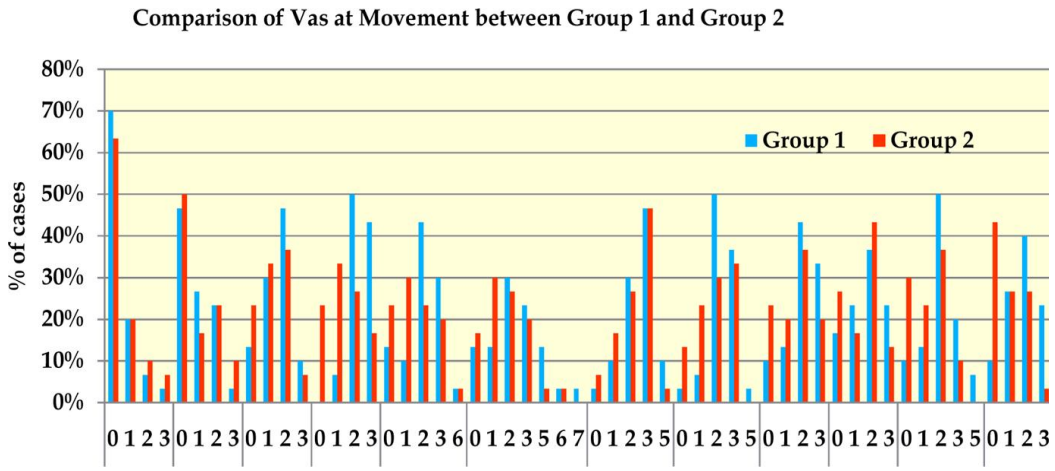


Graph 2: Comparison of VAS on movements between the two groups

1. Quality of analgesia – VAS score

VAS at rest at 1 hr and 48hours of the study was lower in Dexmedetomidine group, having statistically significantly p value of 0.001.

VAS on movements at 1 hr and 48hours was lower in Dexmedetomidine group, having statistically significant p value of < 0.001 and 0.009 respectively.



Graph 2: Comparison of VAS on movements between the two groups

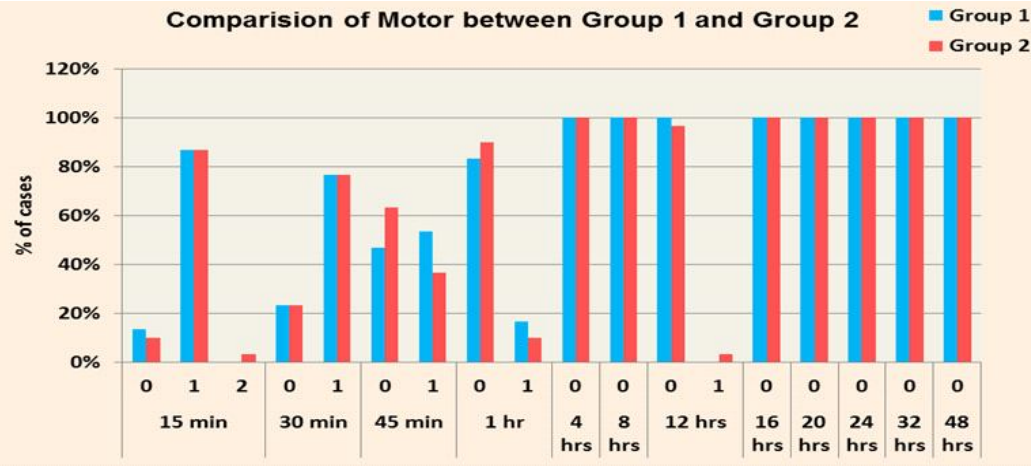
Table 2: Comparison of VAS at movement between two groups

VAS at movement		Group 1 (n=30)		Group 2 (n=30)		p value
		Frequency	%	Frequency	%	
15 min	0	21	70.0%	19	63.3%	0.889
	1	6	20.0%	6	20.0%	
	2	2	6.7%	3	10.0%	
	3	1	3.3%	2	6.7%	
30 min	0	14	46.7%	15	50.0%	0.631
	1	8	26.7%	5	16.7%	
	2	7	23.3%	7	23.3%	
	3	1	3.3%	3	10.0%	
45 min	0	4	13.3%	7	23.3%	0.698
	1	9	30.0%	10	33.3%	
	2	14	46.7%	11	36.7%	
	3	3	10.0%	2	6.7%	
1 hr	0	0	0.0%	7	23.3%	<0.001
	1	2	6.7%	10	33.3%	
	2	15	50.0%	8	26.7%	
	3	13	43.3%	5	16.7%	
4 hrs	0	4	13.3%	7	23.3%	0.183
	1	3	10.0%	9	30.0%	

	2	13	43.3%	7	23.3%	
	3	9	30.0%	6	20.0%	
	6	1	3.3%	1	3.3%	
8 hrs	0	4	13.3%	5	16.7%	0.548
	1	4	13.3%	9	30.0%	
	2	9	30.0%	8	26.7%	
	3	7	23.3%	6	20.0%	
	5	4	13.3%	1	3.3%	
	6	1	3.3%	1	3.3%	
	7	1	3.3%	0	0.0%	
12 hrs	0	1	3.3%	2	6.7%	0.756
	1	3	10.0%	5	16.7%	
	2	9	30.0%	8	26.7%	
	3	14	46.7%	14	46.7%	

VAS at movement		Group 1 (n=30) Frequency	%	Group 2 (n=30) Frequency	%	p Value
20 hrs	0	3	10.0%	7	23.3%	0.367
	1	4	13.3%	6	20.0%	
	2	13	43.3%	11	36.7%	
	3	10	33.3%	6	20.0%	
24 hrs	0	5	16.7%	8	26.7%	0.570
	1	7	23.3%	5	16.7%	
	2	11	36.7%	13	43.3%	
	3	7	23.3%	4	13.3%	
32 hrs	0	3	10.0%	9	30.0%	0.115
	1	4	13.3%	7	23.3%	
	2	15	50.0%	11	36.7%	
	3	6	20.0%	3	10.0%	
	5	2	6.7%	0	0.0%	
48 hrs	0	3	10.0%	13	43.3%	0.009
	1	8	26.7%	8	26.7%	
	2	12	40.0%	8	26.7%	
	3	7	23.3%	1	3.3%	

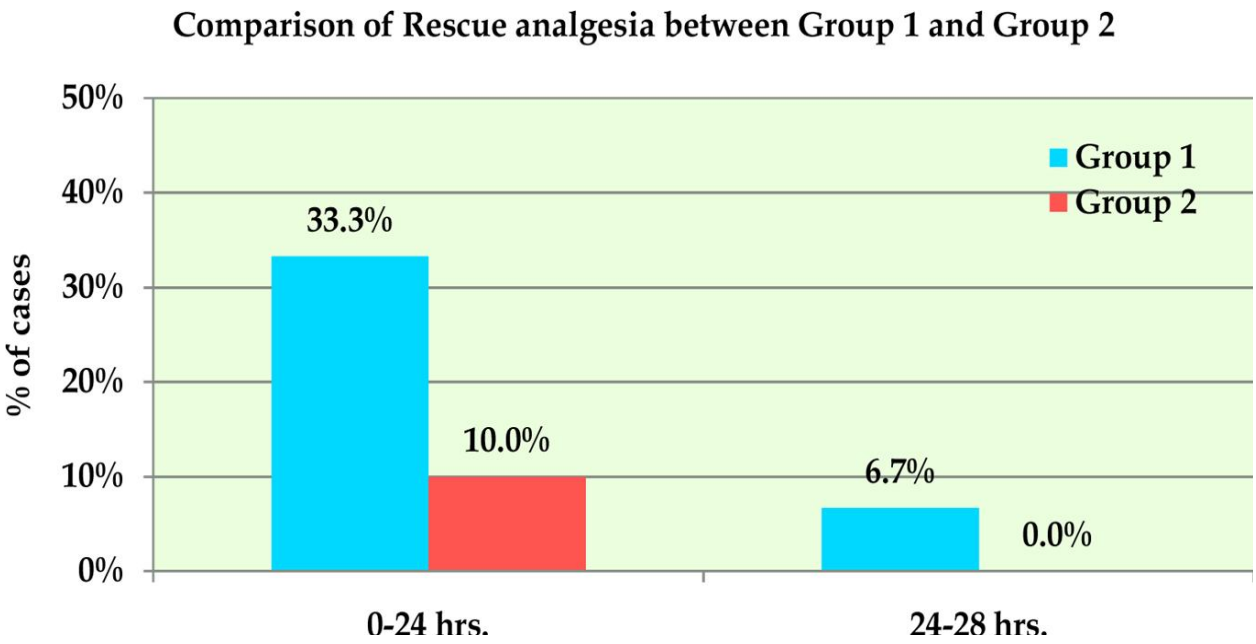
2. Motor Block: No statistically significant difference in motor blockade between two groups.



Graph 3: Motor block

Table 3: Comparison of motor blockade between two groups

Motor		Group 1 (n=30) Frequency	%	Group 2 (n=30) Frequency	%	p value
15 min	0	4	13.3%	3	10.0%	0.565
	1	26	86.7%	26	86.7%	
	2	0	0.0%	1	3.3%	
30 min	0	7	23.3%	7	23.3%	1.000
	1	23	76.7%	23	76.7%	
45 min	0	14	46.7%	19	63.3%	0.194
	1	16	53.3%	11	36.7%	
1 hr	0	25	83.3%	27	90.0%	0.706
	1	5	16.7%	3	10.0%	
4 hrs	0	30	100.0%	30	100.0%	–
8 hrs	0	30	100.0%	30	100.0%	–
12 hrs	0	30	100.0%	29	96.7%	1.000
	1	0	0.0%	1	3.3%	
16 hrs	0	30	100.0%	30	100.0%	–
20 hrs	0	30	100.0%	30	100.0%	–
24 hrs	0	30	100.0%	30	100.0%	–
32 hrs	0	30	100.0%	30	100.0%	–
48 hrs	0	30	100.0%	30	100.0%	–



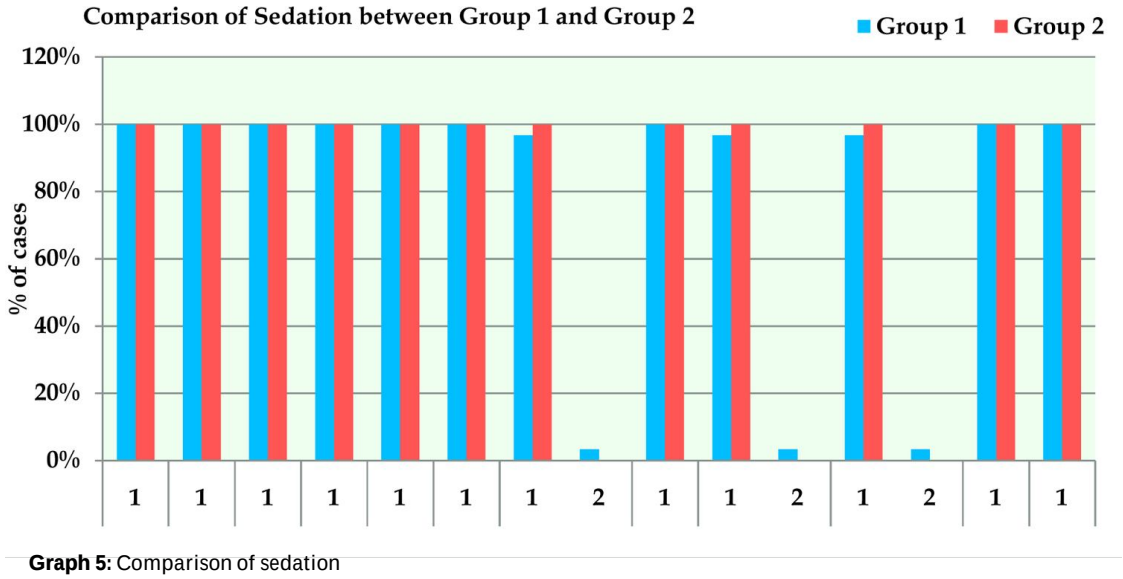
Graph 4: Rescue analgesia

3. Rescue Analgesia

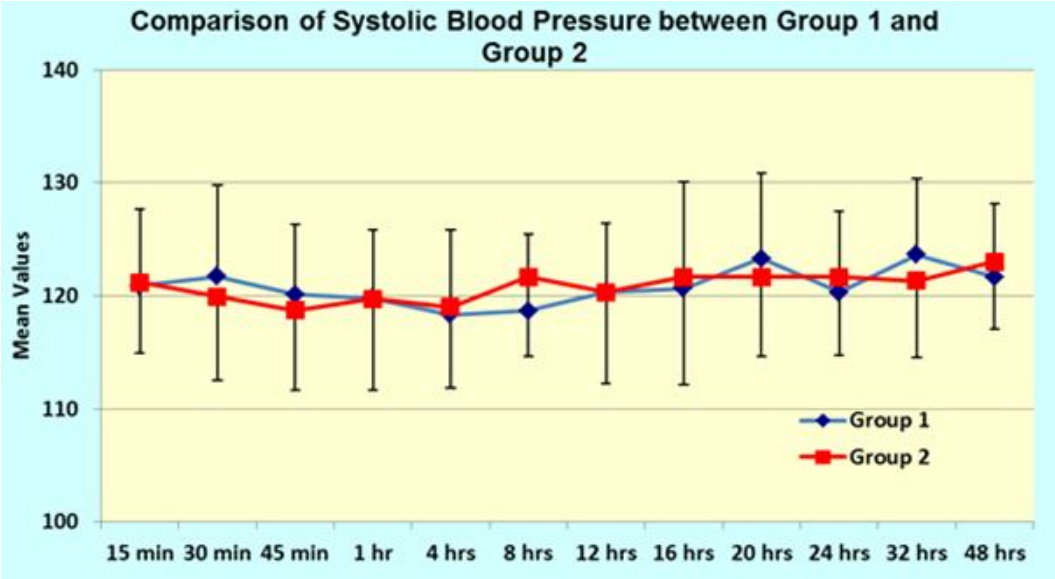
Only 3 patients who were administered Dexmedetomidine required rescue analgesia in the first 24 hours after the surgery, whereas none of them required rescue analgesics in the next 24 - 48 hours. In Fentanyl group, 10 patients in the first 24 hours and 2 patients in 24-48 hours required rescue analgesics. But these figures were not statistically significant.

4. Sedation

No statistically significant difference between both groups with respect to sedation.



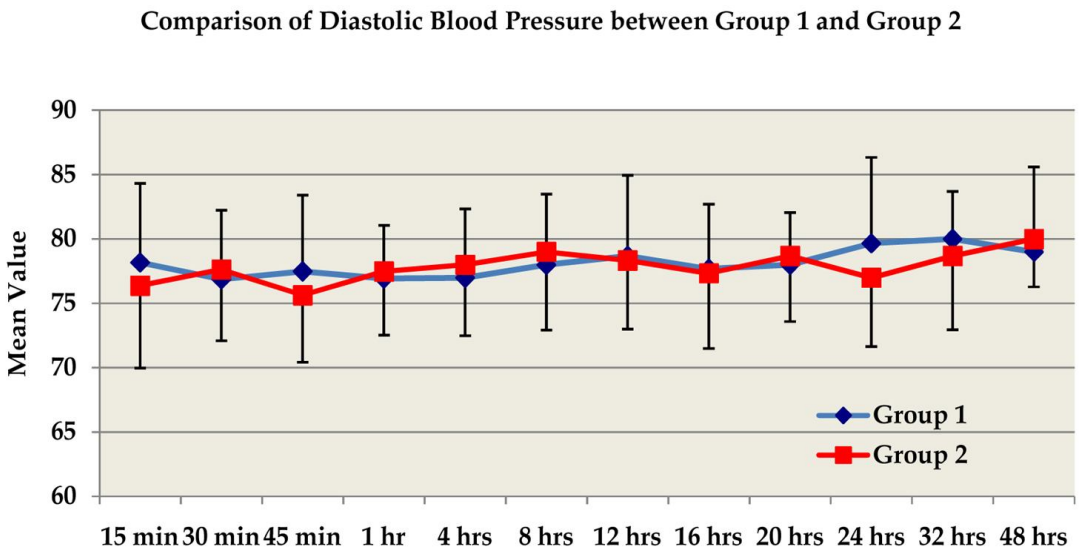
Graph 5: Comparison of sedation



Graph 6: Systolic blood pressure comparison

Table 5: Comparison of sedation between two groups

Sedation		Group 1 (n=30) Frequency	%	Group 2 (n=30) Frequency	%	p Value
15 min	1	30	100.0%	30	100.0%	-
30 min	1	30	100.0%	30	100.0%	-
45 min	1	30	100.0%	30	100.0%	-
1 hr	1	30	100.0%	30	100.0%	-
4 hrs	1	30	100.0%	30	100.0%	-
8 hrs	1	30	100.0%	30	100.0%	-
12 hrs	1	29	96.7%	30	100.0%	1.000
	2	1	3.3%	0	0.0%	
16 hrs	1	30	100.0%	30	100.0%	-
20 hrs	1	29	96.7%	30	100.0%	1.000
	2	1	3.3%	0	0.0%	
24 hrs	1	29	96.7%	30	100.0%	1.000
	2	1	3.3%	0	0.0%	
32 hrs	1	30	100.0%	30	100.0%	-
48 hrs	1	30	100.0%	30	100.0%	-



Graph 7: Diastolic blood pressure comparison

Table 6: Comparison of systolic blood pressure between two groups

SBP	Group 1 (n=30) Mean ± SD	Group 2 (n=30) Mean ± SD	p Value
15 min	120.90 ± 6.74	121.20 ± 6.29	0.859
30 min	121.73 ± 8.08	119.93 ± 7.41	0.372
45 min	120.10 ± 6.18	118.73 ± 7.10	0.442
1 hr	119.77 ± 6.04	119.73 ± 8.09	0.986
4 hrs	118.33 ± 7.47	119.00 ± 7.12	0.725
8 hrs	118.67 ± 6.81	121.67 ± 6.99	0.098
12 hrs	120.30 ± 6.15	120.33 ± 8.09	1.000
16 hrs	120.67 ± 9.44	121.67 ± 9.50	0.684
20 hrs	123.33 ± 7.58	121.67 ± 6.99	0.380
24 hrs	120.33 ± 7.18	121.67 ± 6.92	0.855
32 hrs	123.67 ± 6.69	121.33 ± 6.81	0.186
48 hrs	121.67 ± 6.48	123.00 ± 5.96	0.410

Table 7: Comparison of diastolic blood pressure between two groups

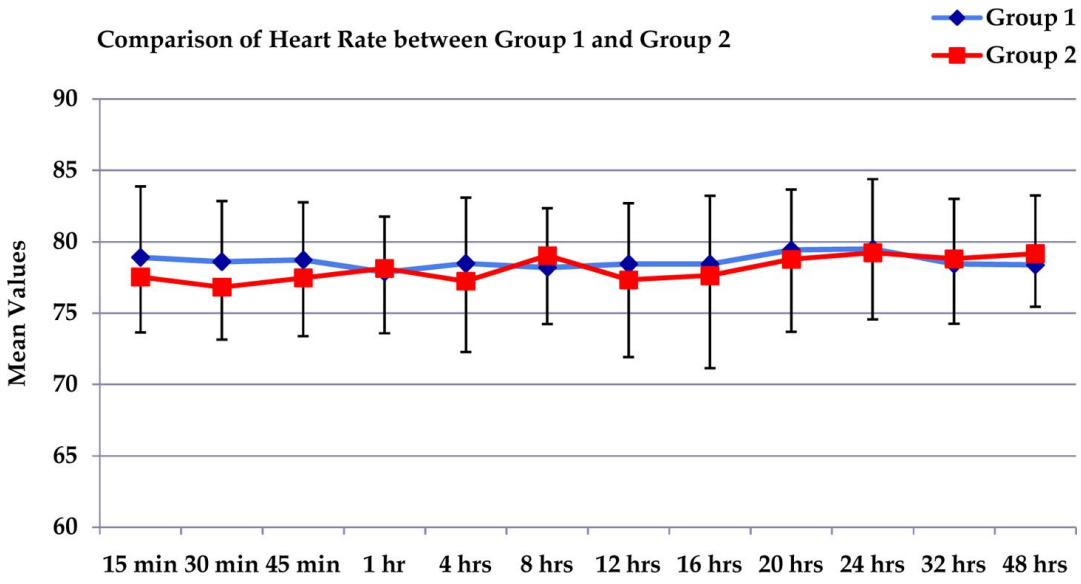
DBP	Group 1 Mean ± SD	Group 2 Mean ± SD	p Value
15 min	78.17 ± 6.16	76.37 ± 6.39	0.271
30 min	76.87 ± 5.39	77.63 ± 5.53	0.589
45 min	77.47 ± 5.95	75.63 ± 5.19	0.209
1 hr	76.93 ± 4.14	77.47 ± 4.93	0.652
4 hrs	77.00 ± 5.35	78.00 ± 5.51	0.479
8 hrs	78.00 ± 5.51	79.00 ± 6.07	0.507
12 hrs	78.67 ± 6.29	78.33 ± 5.31	0.825
16 hrs	77.67 ± 5.04	77.33 ± 5.83	0.814
20 hrs	78.00 ± 4.07	78.67 ± 5.07	0.577
24 hrs	79.67 ± 6.69	77.00 ± 5.35	0.093
32 hrs	80.00 ± 3.71	78.67 ± 5.71	0.288
48 hrs	79.00 ± 6.62	80.00 ± 3.71	0.473

5. Comparison of systolic and diastolic blood pressure between two groups

Monitoring of systolic and diastolic pressures throughout the infusion period in both groups did not show any significant statistical difference and there was no episode of hypotension or hypertension at any of the time intervals

6. Comparison of heart rate between the two groups

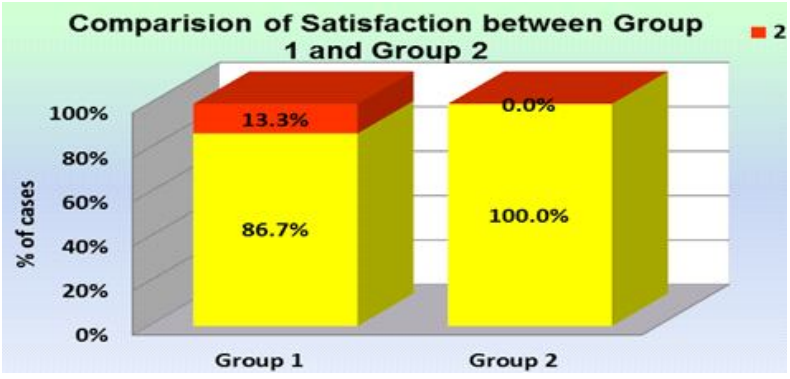
Heart rate remained stable around 76-79 in both the groups without any statistically significant



Graph 8: Heart rate comparison

Table 8: Comparison of heart rate between two groups

HR	Group 1 Mean ± SD	Group 2 Mean ± SD	p value
15 min	78.90 ± 4.99	77.53 ± 3.88	0.241
30 min	78.60 ± 4.27	76.83 ± 3.67	0.091
45 min	78.73 ± 4.04	77.47 ± 4.08	0.232
1 hr	77.87 ± 3.90	78.13 ± 4.53	0.808
4 hrs	78.47 ± 4.63	77.23 ± 4.94	0.322
8 hrs	78.20 ± 4.16	79.03 ± 4.78	0.474
12 hrs	78.43 ± 4.29	77.33 ± 5.40	0.386
16 hrs	78.43 ± 4.81	77.63 ± 6.48	0.726
20 hrs	79.43 ± 4.24	78.77 ± 5.08	0.583
24 hrs	79.50 ± 4.90	79.23 ± 4.67	0.830
32 hrs	78.43 ± 4.59	78.80 ± 4.54	0.757
48 hrs	78.37 ± 4.88	79.17 ± 3.70	0.477



Graph 9: Satisfaction score

Graph 9: Satisfaction score

Satisfaction	Group 1 Frequency	%	Group 2 Frequency	%	p value
1	26	86.7%	30	100.0%	0.112
2	4	13.3%	0	0.0%	
Total	30	100%	30	100%	

difference between them. There was no incidence of bradycardia in any patient.

7. Satisfaction Score

All the 30 patients in Dexmedetomidine group were satisfied with the analgesia given to them as compared with 26 in the Fentanyl group. But as p value was > 0.05, this difference was considered to be statistically insignificant.

There were no adverse drug reactions in any patient in both the groups in the present study.

Discussion

Central neuraxial blockade in the form of epidural is very popular for lower limb surgeries as this technique avoids the disadvantages associated with general anaesthesia like airway manipulation, poly pharmacy and other untoward effects like postoperative nausea, vomiting and the need for supplemental intravenous analgesics. Epidural anaesthesia can be used as sole anaesthetic for procedures involving the lower limbs, pelvis, perineum and lower abdomen. It has the ability to maintain continuous anaesthesia after placement of an epidural catheter, thus making it suitable for procedures of long duration.

Demographics

There was no statistically significant difference between age, sex, weight and ASA grading-- in the present study. This was comparable to other studies [2,3,4,5].

Comparison of the Hemodynamic Variables

In the present study, there were no statistically significant differences observed between Dexmedetomidine and Fentanyl in terms of blood pressure, pulse rate, and oxygen saturation throughout the study.

In the study by Bajwa et al in orthopaedic surgeries [2], though there was a decrease in heart rate and MAP (mean arterial pressure) in Dexmedetomidine group 30-35 min and 30-50 min after the bolus injection of epidural respectively, the hemodynamics remained stable in both Fentanyl and Dexmedetomidine groups postoperatively. This can be explained by the bolus injection of the drugs given at the time of start of the study. In the study by Ashraf et al [4] where they compared Dexmedetomidine and Bupivacaine with only Bupivacaine, heart rate was significantly lower in Dexmedetomidine group. These results of Bajwa et al and Ashraf et al can be explained by the bolus administration of the drugs. But in the studies by Bajwaet al [3] in vaginal hysterectomies and Saravana Babu et al [5], there were no statistically significant differences in mean arterial pressure and heart rate between their groups which is comparable to the present study.

Motor Block [2]

Motor block was assessed by modified Bromage scale. The present study did not find any significant difference in the motor blockade between the two groups. There was no motor blockade i.e. modified Bromage scale grade 0 at 4, 8, 16, 20, 24, 32 and 48 hours in both the groups.

Other studies [2,3], have assessed motor blockade during the intraoperative period for surgical anaesthesia where they have assessed the time for complete motor blockade to Bromage grade 3 and the mean time for regression to Bromage grade 1.This is not comparable to the results of the present study because we gave a continuous analgesic infusion and assessed motor block postoperatively only. Hence, our study did not measure the time for regression to Bromage scale 1 and 3.

Assessment of Pain by VAS

Pain was assessed by visual analogue scale (VAS) score from 0 to 10 in the present study. We measured pain as VAS at rest and VAS on movements). The present study did not find any statistically significant differences in VAS at rest and at movements between the two groups except at 1 hour (p value 0.001 at rest and < 0.001on movements)and 48 hours (p value 0.001at rest and 0.009 on movements) after the start of study which revealed better analgesia in Dexmedetomidine group. Since the studies done previously gave the drug bolus at the time of epidural insertion for both anaesthesia and postoperative analgesia rather than starting a continuous infusion, so they compared the VAS scores for surgical anaesthesia and duration of analgesia or the mean time to sensory regression in Fentanyl and Dexmedetomidine groups.

In the study by Bajwa et al [2] for lower limb orthopaedic surgeries, where they administered Ropivacaine, 15 ml of 0.75% epidurally in both the groups with addition of 1 μg/kg of Dexmedetomidine in one group and 1 μg/kg of

Fentanyl in the other, the mean time to sensory regression in Dexmedetomidine group was 366 min and in Fentanyl group was 242 min. So the duration of postoperative analgesia was significantly prolonged in Dexmedetomidine group.

Rescue Analgesia

In the present study, rescue analgesia was given when the VAS score was > 4 which was similar to other studies. Considering the total amount of rescue analgesia used over and above the continuous infusion for the entire study period of 48 hours in the present study, the number of patients receiving rescue analgesia in the first 24 hours (10 patients–Fentanyl group, 3 patients – Dexmedetomidine group) was less than in the subsequent 24 hours (2 patients – Fentanyl group, 0 patients – Dexmedetomidine) in the study population. This can be explained by the psychological factor for pain in the patients in the first 24 hours after the surgery. The difference between Dexmedetomidine and Fentanyl was not statistically significant with respect to requirement of rescue analgesia. This result was not comparable to the results of Bajwa et al [2] in lower limb orthopaedic surgeries where the time to first rescue top up was 366.62 min in Dexmedetomidine group and 242.16 min in Fentanyl group and the number of analgesic top up doses in Dexmedetomidine were significantly lower. The study by Bajwa et al [3] in vaginal hysterectomies also had similar results.

Sedation

In the studies by Bajwa et al [2] in lower limb orthopaedic surgeries and vaginal hysterectomies [3], the drugs were given epidurally for surgical anaesthesia also. So they assessed sedation as a useful property of the adjuvants used. They found that the sedative properties of Dexmedetomidine were far superior to Fentanyl. The sedation scores were significant on statistical comparison. Ashraf et al [4] reported a significant increase in sedation score in the Dexmedetomidine group. But none of the patients in the studies by Bajwa et al and Ashraf et al had respiratory depression. Saravana Babu MS et al [5] assessed sedation as a side effect of their study. They found that sedation was similar in both the groups and statistically non-significant. This was comparable to the results of the present study.

Side Effects

None of the patients of either group in the present study had any side effects.

In the study by Bajwa et al [2] in orthopaedic surgeries, the incidence of nausea and vomiting was significant in Fentanyl group at doses of 1 µg/kg. Dry mouth was significant in the Dexmedetomidine group at doses of 1µg/kg. None of the patients in either group had respiratory depression.

Bajwa et al [3] in vaginal hysterectomies compared 1.5µg/kg Dexmedetomidine with 2µg/kg Clonidine in vaginal hysterectomies. They observed dry mouth as a side effect in both the groups but was statistically non-significant. Other side effects like nausea, vomiting, headache, shivering and dizziness were comparable in both groups and statistically non-significant. Respiratory depression was not observed in any patient in either group. These side effects can be explained by the bolus administration of the drugs in larger doses as compared to the present study in which a continuous analgesic infusion was given.

Saravana Babu MS et al [5] found that the incidence of side effects was comparable in both the groups in their study and was statistically non-significant. None of the patients showed respiratory depression or motor block.

Patient Satisfaction

In our study, 86.7% of the patients who were administered Fentanyl were satisfied as compared to 100% of the patients who were given Dexmedetomidine. Other studies did not assess the patient satisfaction hence could not be compared with. The drugs were not withdrawn in any patient at any point of time.

Limitations of the Study

- The dose equivalence of Dexmedetomidine and Fentanyl when used in epidural anaesthesia could not be calculated because no previous studies were available for the reference of dose equivalence.
- Another limitation is that the analgesic infusion in the present study was started at the end of 3rd hour after the epidural Ropivacaine bolus. To prevent the acute postoperative pain window and its impact on morbidity, the present study has not considered waiting till sensory regression.

Recommendations

1. The present study recommends the use of Dexmedetomidine as an adjuvant to Ropivacaine

for postoperative analgesia in lower limb vascular surgeries

2. Both Dexmedetomidine and Fentanyl provide stable hemodynamics, no unwarranted motor blockade and minimal sedation without any adverse effects when used as an infusion with Ropivacaine.
3. The present study does not recommend using Dexmedetomidine over Fentanyl as no additional benefits were observed at the infusion doses used in the study .
4. Both the adjuvants are comparable in terms of patient satisfaction and the requirement of rescue analgesia.
5. This study recommends continuous infusion of Local anaesthetics with Dexmedetomidine and Fentanyl over bolus doses to minimise the side effects.

References

1. Casati A, Borghi B, Fanelli G, Montone N, Rotini R, Fraschini G, et al. Interscalene Brachial Plexus Anesthesia and Analgesia for Open Shoulder Surgery: A Randomized, Double-Blinded Comparison Between Levobupivacaine and Ropivacaine. AnesthAnalg 2003;96:253–9.
2. Bajwa SS, Arora V, Kaur J, Singh A, Parmar SS. Comparative evaluation of dexmedetomidine and fentanyl for epidural analgesia in lower limb orthopedic surgeries. Saudi J Anaesth. 2011 Oct-Dec; 5(4):365–370.
3. Bajwa SS, Arora V, Kaur J, Singh G, Gupta S, Kulshrestha A, et al. Dexmedetomidine and clonidine in epidural anaesthesia: A comparative evaluation. Indian J Anaesth. 2011 Mar-Apr;55(2):116–21.
4. Ashraf M, Ayman ME. Effects of epidural dexmedetomidine and low-volume bupivacaine on postoperative analgesia after total knee replacement. Ains Shams Jr Anesthesiol. 2014;7(2):193-7.
5. Sarvana BM, Verma AK, Agrawal A, Tyagi CM, Upadhyay M, Tripathi S. A comparative study in the postoperative spine surgeries: Epidural ropivacaine with dexmedetomidine and ropivacaine with clonidine for postoperative analgesia. Indian J Anaesth. 2013 July;57(4):371-6.

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Fluid Therapy in Gastrointestinal Surgeries

Gunjan[1], Swati Singh[2], Akhileshwar[3], Ravi Kant[4], Deepak[5]

[1,3]Senior Resident [2]Associate Professor [4]Junior Resident [5]Assistant Professor, Department of Anaesthesiology, Indira Gandhi Institute of Medical Sciences, Patna, Bihar 800014, India.

Abstract

Gastrointestinal surgery is a major physiological insult to the body accounting for significant fluid and electrolyte disturbances. Therefore a judicious peri-operative fluid therapy needs to be considered in such cases to overcome the risks associated with organ hypo- or hyperperfusion. By large, two main fluid therapy regimens- liberal and restricted-have been proposed for gastrointestinal surgeries by various study groups, each having merits and demerits of its own. Goal directed therapy (GDT), a new term coined, emphasises on use of fluid therapy only when clearly indicated and also recommends that functional haemodynamic parameters should be assessed to judge fluid responsiveness and avoid unnecessary fluid loading. Several trials such as the Albios, the Cristal and the Cochrane meta-analyses were taken up in varied clinical scenarios as to conclude which of the two, crystalloid or colloid, have shown beneficial effect on the outcome of the patient. Monitoring of the hemodynamic parameters plays a vital role in assuring adequate global perfusion without any inadvertent fluid overload. However a peri-operative fluid plan should be personalised for each case based on patient status**,** surgical risk**,** selection of hemodynamic monitoring based upon patient and surgical risk, and anaesthesiologists' needs. The contents of this article is largely taken from websites such as google scholar and pubmed, and related scholarly journals and research articles. Textbooks such as Miller's Anaesthesia, Current Diagnosis and Treatment of Paediatrics (McGraw Hill) and Textbook of Paediatric Surgery (Elsevier Saunders) were also referred to.

Keywords: Gastrointestinal Surgery; Fluid; Liberal; Restricted.

Introduction

G I Surgery is a major physiological insult to the body with significant morbidity and mortality. It leads to serious fluid and electrolyte disturbance accounting for poor outcome and recovery of the patient. Thereby, a judicious peri-operative fluid management plays a vital role in such cases. It not only maintains or restores effective circulating blood volume during the immediate peri-operative period but also ensures adequate organ perfusion while avoiding the risks associated with either organ hypo- or hyperperfusion [1]. However, it has remained a debated topic with large difference in individual and institutional protocols. Currently taught and practiced methods rely upon body weight per unit time and magnitude of surgical trauma.

Why is Fluid Therapy Significant in GI Surgery?

1. To combat the increased sympathetic stimulation leading to tachycardia, vasoconstriction and stress.
2. Hypovolemia during major surgery leads to increased aldosterone secretion which subsequently decreases the post operative requirement of sodium for few hours.

Corresponding Author: Gunjan, Senior Resident, Department of Anaesthesiology, Indira Gandhi Institute of Medical Sciences, Patna, Bihar 800014, India.
E-mail: gunjansmc@gmail.com

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3. Post operative pain and stress results in increased ADH secretion transiently, leading to decreased urine output and less maintenance fluid requirement in the first few hours.
4. Fluid deficit due to overnight fasting needs to be considered.
5. Pre –existing hypovolemia needs to be corrected prior to onset of surgery.
6. Special consideration is needed in patients with electrolytes and acid-base imbalance.
7. Considerable third space loss occurs during major surgical procedures.

Physiological Basis of Fluid Therapy

It is the first line support to combat the decreased circulatory blood volume following induction of anaesthesia and surgical trauma. Peri operative hypovolemia usually seen in patients posted for GI surgery is largely due to pre-operative fasting, hypertonic bowel preparation, effect of anaesthetic agents, positive pressure ventilation and loss from surgical site. Fluid therapy is aimed to achieve specific hemodynamic goals such as : adequate blood volume, cardiac output, sustained perfusion pressure, adequate oxygen delivery. Fluid infusions directly increase vascular volume, subsequently and usually improve global and regional perfusion and blood pressures if the heart is preload-responsive, and often improve oxygen delivery and tissue oxygenation. However, these changes are profoundly influenced by the cardiac and peripheral vascular status [2].

Liberal Vs Restrictive Fluid Therapy

Fluid management continues to be a daily challenge in anaesthesia practice. The impact of the two intraoperative fluid regimens –RESTRICTIVE AND LIBERAL- on postoperative outcome were studied in various patients undergoing elective gastrointestinal surgeries. In the restrictive group, patients received fluid at the rate of 4ml/kg/hr whereas in the other group, fluid was given at the rate of 10ml/kg/hr. Restrictive fluid therapy improves outcome in GI surgery where titrated and has become the standard of choice. Associated complications are less resulting in decreased hospital stay. Serum albumin and hematocrit is also maintained in the initial postoperative period [3].

Liberal fluid therapy leads to pulmonary, cardiac, gastrointestinal and renal dysfunction due to fluid overload. Current fluid therapy in major surgery causes a weight increase of 3–6kg [4-6].

Intravenous fluid overload during or after surgery has been shown to decrease muscular oxygen tension and delay recovery of gastrointestinal function. Furthermore, postoperative weight gain and intraoperative fluid overload have been associated with poor survival and complications. Fluid overload may cause general edema, impeding tissue healing and cardiopulmonary function.

A different school of thought, however, recommends the liberal fluid administration advocating that it helps in maintaining adequate blood flow to the kidneys thus protecting it from any injury and subsequent shut-down.

In yet another study, epidural anaesthesia with local anaesthetics wss used in gastro-intestinal surgery and liberal fluid was instituted to combat the resulting hypotension. Neither any delay in return of gastrointestinal transit nor any anastomotic leak was seen as per the study [7].

Goal Directed Therapy (GDT)

GDT focuses attention on the type of surgery being performed and the impact of the following outcomes: 1) the type of fluid being administered; 2) the timing of fluid administration; 3) the rate of fluid administration; 4) the total amount of fluid administered; and 5) the best measures to both optimize and individualize perioperative fluid therapy [8]. It emphasises on use of fluid therapy only when clearly indicated and also recommends that functional haemodynamic parameters should be assessed to judge fluid responsiveness and avoid unnecessary fluid loading.

Preoperative Fluid Shifting

Fluid shifting out of the vasculature primarily depends on the body temperature. Below 30°C, a significant decrease of plasma volume, accompanied by a decrease in central venous pressure, and an increase in pulmonary and systemic vascular resistance, and hematocrit is seen [9]. However, between 33°C and 37°C, no significant dependence on body temperature is observed. This causes a deficit of 3-6 litres in the sensible perioperative fluid balance. It causes not only intraoperative but postoperative problems as well. The peak of fluid shifting is maximum at 5 hours after trauma and persists for up to 72 hours, depending on the location of the operation site and the duration of surgery [10].

Perioperative weight gain, being the most reliable marker of fluid storage outside the circulatory space, is strongly related to patient mortality. A gain of less than 10% body weight shows mortality of 10%, whereas the mortality increased to 32% in case of 20% weight gain, and a mortality rate of 100% in case of weight gain of more than 20%.

Composition of Fluid Therapy

Three categories basically constitutes fluid therapy - crystalloids, colloids and blood. Each has unique and characteristic role in fluid therapy.

Crystalloids are electrolyte solutions which are best used to replace extracellular volume losses from perspiration, respiration, and urine output. Although crystalloids increase vascular volume and may improve haemodynamics, the effectiveness is transient and less than colloid solutions. Crystalloids can be classified by their composition and osmolality. *Colloids* are solutions of macromolecular solutes that exert a colloid osmotic pressure across the microvascular tissue barrier and retain fluid in the intravascular bed. Colloids efficiently increase vascular volume, preload, cardiac output, and tissue perfusion in volume responsive patients. Many of the GDT trials that have shown improved outcomes employ the use of iterative infusions (small volume boluses) of colloid [11].

Several trials were taken up in varied clinical scenarios as to conclude which of the two, crystalloid or colloid, have shown beneficial effect on the outcome of the patient. Few of such important trials are as mentioned :

1. Cristal Trial
2. Albios Trial
3. Cochrane Meta –Analyses

Cristal Trial

This trial compared the fluid resuscitation with colloids vs crystalloids on mortality in ICU patients with hypovolemic shock. Results showed no difference in 28 day mortality but 90 days mortality was significantly reduced in patients treated with colloids [12].

Albios Trial

This study compared fluid resuscitation with 20% albumin and crystalloid vs crystalloid alone in patients with sepsis. Results showed higher mean arterial pressure observed for 7 days in the colloid group. However 28 days and 90 days mortality was similar in both the groups [13].

Cochrane Meta-Analyses

It concluded that there is no evidence that resuscitation with colloids instead of crystalloids, reduces the risk of death in patients with trauma, burns or following surgery [14].

Following the trials, certain generalized recommendations were made, such as [15]:

- Crystalloids for routine surgery of short duration.
- GDT containing colloid and balanced salt solutions in major surgery.
- In US, a black box warning for the use of starch solution exists.
- Careful consideration in patient with known renal dysfunction and sepsis prior to administering starch solution.
- Perioperative fluid plan should be developed by each individual department and health system.

Monitoring

Perioperative assessment of changes in blood volume is difficult and requires evaluation of several clinical and physiologic events that accompany major surgery [16]. In patients with normal cardiac rhythm, the parameters which act as a tool to guide fluid therapy are:- systolic blood pressure, pulse pressure, stroke volume, plethysmographic waveform variation (pulse oximetry). An anesthesiologist may also consider assessing global perfusion by measuring base deficit, lactate, and central and mixed venous oxygen saturation to clarify the impact of selected interventions. Other parameters which may be beneficial in avoiding overload are central venous pressure, pulmonary artery pressure and pulmonary capillary wedge pressure. The use of esophageal Doppler monitoring (EDM) has been advocated by many studies and shows association with improved end organ perfusion. However, it use and implication in cases on daily basis remains controversial and has not been recommended [17].

Pre Operative Fluid Plan should be based on-

1. Patient status (health, age, physiology and comorbidities).

2. Surgical risk (procedure, approach and surgical expertise).
3. Selection of hemodynamic monitoring based upon patient and surgical risk, and anaesthesiologists' needs.

It can be broadly discussed under:

1. Preoperative
2. Intra operative
3. Postoperative

Pre Operative Fluid Therapy generally aims at correction of hypovolemia, anaemia and other disorders like electrolyte imbalance. Hypovolemia jeoparadises oxygen transport, increasing the risk of tissue hypoxia and development of organ failure. It is compensated by increase in vascular resistance and heart rate.

The volume used for preoperative optimization is guided as : Mild dehydration = 4% body weight fluid deficit

Moderate dehydration =6-8% body weight

Severe dehydration =10% body weight

Normal saline and ringer's lactate are commonly used. Improvement in blood pressure and urine output, and lack of tachycardia and orthostatic hypotension points towards optimal preoperative resuscitation.

Correction of anaemia preoperatively is important to establish hemodynamic stability, proper tissue oxygenation, to cope up with possible operative blood loss, adequate recovery and healing. Packed red blood cells is always preferred to correct anaemia as it avoids fluid overload.

Correction of other factors such as hypokalemia in patients posted for GI surgery that is mainly due to vomiting, nasogastric aspiration, ureteroenterostomies, potassium free IV fluids. Patients are at high risk of developing cardiac arrhthmias intraoperatively, respiratory difficulty after extubation and paralytic ileus postoperatively.

Intra Operative Fluid Therapy

It aims to combat the deficit due to loss of blood, fluid depletion (intra-operative fluid loss and maintenance requirment), third space losses, evaporative loss from viscera and wound, hypoxia, vasodilatory effect of anaesthetic agents or neuroaxial blockade. Ringer's lactate is the most commonly used IV fluid in GI surgery to replace intra operative fluid loss.Isotonic saline is used when RL is contraindicated or when large volume needs to be replaced. In paediatric patients, Isolyte P is preferred solution as it avoids sodium overload. It contains high potassium and should be avoided in oliguric patients. Additionally, newborns should be given 10% dextrose to avoid hypoglycemia.

How Much Fluid to Give?

In adult patients, with no fluid deficit, amount of intraoperative fluid can be roughly estimated as:

1. Correction of fluid deficit due to starvation (2 ml/kg/hr).
2. Maintenance requirement for period of surgery (duration of surgery * 2ml/kg/hr).
3. Loss due to hemorrhage and visceral evaporation.
4. Loss due to tissue dissection (third space loss)

Third Space Loss

Internal redistribution of ECF due to sequestration of fluid in body is called third space loss. It decreases the circulating blood volume and produces hypotension and shock. It is usually seen in massive ascites, crush injuries, acute intestinal obstruction, peritonitis, acute pancreatitis, postoperative swelling of bowel wall and mesentery.

Third space loss can be roughly estimated as:

Least trauma	nil
Minimal trauma	4 ml/kg/hr
Moderate trauma	6 ml/kg/hr
Severe trauma	10 ml/kg/hr

The Quadrant Scheme is used for calculating third space loss in children. This scheme called for an additional one fourth of the maintenance volume for each quadrant of the abdominal cavity involved in the surgical procedure [18].

Maximun Allowable Blood Loss

It is the amount of blood loss that does not require blood transfusion.It is calculated as

MABL=(starting hct of pt.–25) × Estimated blood volume starting hct of pt.

Post Operative Fluid Therapy

It depends on clinical judgement of patient's status.

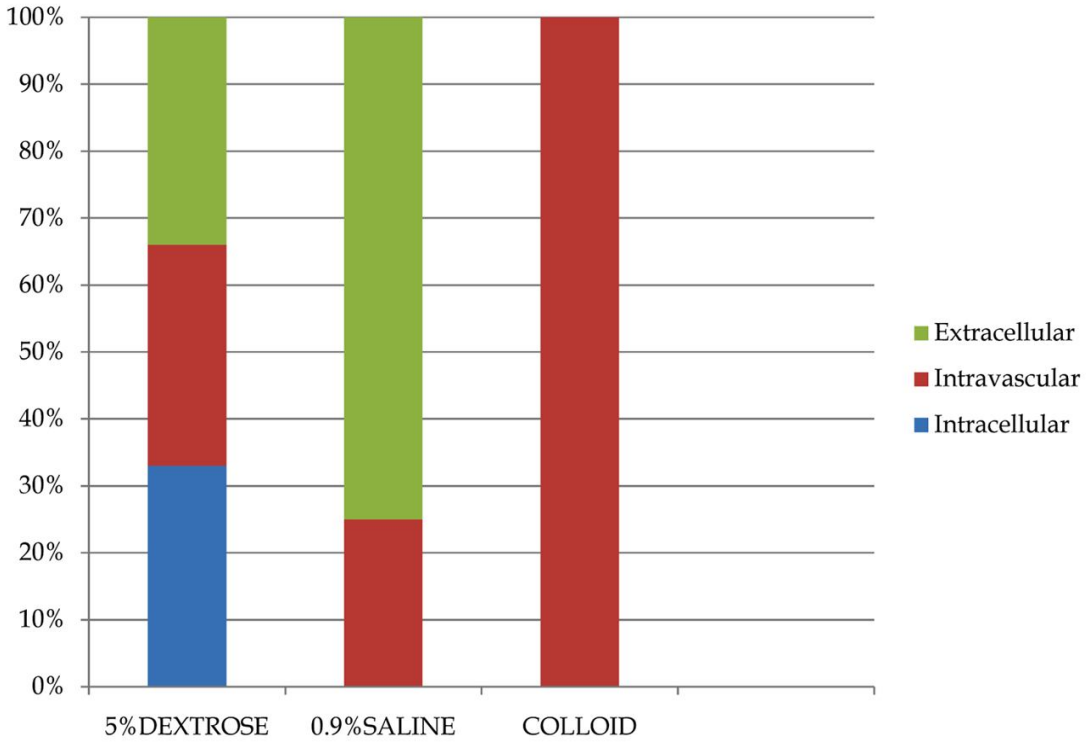

Fig . 1: Distribution of infused fluid in total body water (TBW)

One should aim at maintaining:

- Blood pressure > 100/70 mmHg
- Pulse rate < 120/min
- Urine output >0.5 ml/kg/hr

Patients undergoing short procedure without much gut handling , requires only maintenane fluid, can resume to oral intake after 4-5 hrs. However in major surgeries such as intestinal resection with anastomosis or colostomy, postoperative fluid is continued for few days.

Considerations for Prescribing Post Operative Intravenous Fluid in Paediatric Population [19,20]:

- Age, weight, vitals, hydration status and urine output.
- Pre operative diagnosis, nature of surgery and blood loss.
- Nature and volume of fluid and blood replaced intra operatively.
- Drain output, nasogastric aspiration and fluid loss from suture site.
- Renal status, associated illness (HTN, DM, IHD), electrolyte and acid base imbalance,
- Insensible loss due to atmospheric temperature and hyperventilation.

Maintenance of Fluid and Electrolyte Balance in Intra-Uterine Life:

It is essential for normal cell and organ function during intrauterine development and throughout extrauterine life.

Intrauterine life: early gestation- water 94%, 2/3 extracellular; full term- water 75% 1/2 intracellular; premature – state of total water excess. Extracellular compartment expansion compared to their full term counterpart.

Changes during labour

Increased arterial pressure in response to circulating catecholamine, vasopressin and cortisol hormones influences capillary membrane resulting in shift of fluid from intracellular compartment to the interstitium. Hence less fluid is available for filtration. It serves as a source of volume support for newborn until maternal milk production becomes adequate. Intracellular and extracellular fluid becomes close to adult level after one year of age.

Regulation of body water

Plasma osmolarity which is the concentration of solute particle in plasma remains almost constant at 285-295 mmosm/kg of water regardless of the day to day fluctuation in solute and water intake.

The Basic Plan of Management:

1. Estimation of fluid and electrolyte deficit.
2. Replacement of losses.
3. Maintenance of fluid.
4. Monitoring the adequacy of therapy.

Estimation of Fluid and Electrolyte Deficit

A body water deficit can be estimated on the basis of degree of dehydration.

A. History: Maternal hydration
Drug administration

B.Physical Examination:

a. Birth Weight- Twice Daily.
Term infant loses 10% of body weight
Preterm infant loses 15% of body weight

b. Skin- Turgor, Tension of AF
- Moistness of mucosal membrane
- Peripheral or periorbital edema.

c. CVS- tachycardia- ECG depletion and delayed capillary refill time.
- Hepatomegaly.

Laboratory Investigation

- Serum and plasma osmolality.
- Urine specific gravity
- Urine output <1 ml/kg/hr
- Fe Na excretion = Urine sodium × urine creatinine × 100

Plasma sodium × plasma creatinine

< 1% - full term neonate

<3 % -preterm neonate

Replacement of Losses

- Mandatory loss (urine ,stool)
- Insensible loss through skin and respiratory tract (20 ml/ky/day)

Factors affecting insensible water loss

- Increased respiratory rate, skin injury, congenital malformation (gastroschisis, omphalocele)
- Increased body temperature (30% per °C)
- Decreased ambient humidity
- Increased motor activity.
- Increased phototherapy by 50%.

Maintenance of Fluid

Guideline for fluid therapy:

Birth weight	day 1	day 2	day 3	day 4
1.0-1.5 kg	80	95	110	120
> 1.5 kg	40	75	90	105

(ml/kg body weight)

For Older Children

Upto 10 kg – 100 ml/kg

10 -20 kg -50ml/kg

>20 kg -20 ml/kg

Monitoring of Effectiveness of Fluid Therapy:

Increase the IV fluid if –

a. Weight loss >3% per day
b. Increased serum sodium>145 meq/L
c. Increased specific gravity>1.020
d. Decreased urine output(<1ml/kg/hr)
e. Osmolality >400m osm/L

Decrease the IV fluid if –a) weight loss < 1% per day

b. Decreased serum sodium in presence of weight gain <130meq /L
c. Decreased urine specific gravity <1.005
d. Increased urine output (3ml/kg/hr)

Which Fluid? How Much? How Fast?

The type and quantity of fluid to be given and its rate of administration is governed by a simple rule.

1. The composition and volume of the fluid given should be similar to that which it is replacing.
2. The rate of administration should equal the rate of loss (ongoing loss plus maintenance fluid plus a rapid replacement of any pre-existing deficit).

Absolute fluid deficit – actual fluid loss

Relative fluid deficit – increased intravascular capacitance or septic shock

Choice of Fluid:

D10 – for the first two days

D25 and Isolyte P (1:4) –from third day onwards.

Most physiological fluid is Ringer's Lactate (RL).

References

1. Helena L, Navarro C , Bloomstone JA et al. Perioperative fluid therapy: a statement from the international Fluid Optimization Group. Perioperative Medicine 2015;4:3.
2. Chawla LS, Ince C, Chappell D, Gan TJ, Kellum JA, Mythen M, et al. Vascular content, tone, integrity, and haemodynamics for guiding fluid therapy: a conceptual approach. Br J Anaesth. 2014;113: 748–55.
3. Vadim Nisanevich, Itmar Felsenstein, et al. Effect of intraoperative fluid management on outcome after intraadbominal surgery. Anaesthesiology 2005;103: 25-32.
4. Lobo DN, Bostock KA, Neal KR, et al. Effect of salt and water balance on recovery of gastrointestinal function after elective colonic resection: a randomised controlled trial. Lancet. 2002;359:1812-13.
5. Perco MJ, Jarnvig I, Rasmussen NH, et al. Electric impedance for evaluation of body fluid balance in cardiac surgical patients. J Cardiothorac Vasc Anesth. 2001;15:44-48.
6. Rasmussen LA, Rosenberg J, Crawford ME, et al. [Perioperative regimes for fluid and transfusion therapy]. Ugeskr Laeger. 1996;158:5286-90.
7. Guay J, Nishimori M,et al. Epidural local anaesthetics versus opiod based analgesic regimens for postoperative gastrointestinal paralysis, vomiting and pain after abdominal surgery: a Cochrane review; Dec 2016;123:6.
8. Yeager MP, Spence BC. Perioperative fluid management: current consensus and controversies. Semin Dial. 2006;19:472–9.
9. Hammersborg SM, Farstad M, et al. Time course variation of hemodynamics, plasma volume and microvascular fluid exchange following surface cooling: an experimental approach to accidental hypothermia. Resuscitation 2005;65: 211-9.
10. Robarts WM: Nature of the disturbance in the body fluid compartments during and after surgical operations. Br J Surj 1979;66:691-5.
11. Brandstrup B, Svendsen PE, Rasmussen M, Belhage B, Rodt SÅ, Hansen B, et al. Which goal for fluid therapy during colorectal surgery is followed by the best outcome: near-maximal stroke volume or zero fluid balance? Br J Anaesth. 2012;109:191–9.
12. Annane, D, Siami S, Jaber S et al. Effects of Fluid Resuscitation With Colloids vs Crystalloids on Mortality in Critically Ill Patients Presenting With Hypovolemic Shock :The CRISTAL Randomized Trial; JAMA. 2013;310:1809-17.
13. Caironi P , Tognoni G, Masson S et al. Albumin Replacement in Patients with Severe Sepsis or Septic Shock; N Engl J Med. 2014 Apr 10;370(15):1412-21.
14. Perel P[1], Roberts I, Ker K.Colloids versus crystalloids for fluid resuscitation in critically ill patients. Cochrane Database Syst Rev. 2013 (cited 2013 feb 28). available from CD000567.doi: 10.1002/14651858.
15. Navarro HC, Bloomstone,JA et al. Perioperative fluid therapy: a statement from the international fluid optimisation group. Perioperative medicine 2015;4:3.
16. Junghans T, Neuss H, Strohauer M, Raue W, Haase O, Schink T, et al. Hypovolemia after traditional preoperative care in patients undergoing colonic surgery is underrepresented in conventional hemodynamic monitoring. Int J Colorectal Dis. 2006;21:693–7.
17. Filston HC, Edwards CH III, et al. Estimation of Postoperative Fluid Requirements in Infants and Children. Ann Surg 1982;196:76-81.
18. Hadian M, Angus DC et al. Protocolised resuscitation with esophageal Doppler monitoring may improve outcome in post cardiac surgery patients. Critical Care. 2005;9(4):E7.
19. Paediatric surgery (edited by) Keith W. Askeraff, George Whitfield Holcomb, J. Patric Murphy. 4thedition. Elsevier Saunders (41-43).
20. William W. Hang Jr. ,Myron J. Lewin, Judith M. Sondheimer, Robin R. Deterding .Current Diagnosis and Treatment of Paediatrics vol 2. 20thedition. McGraw Hill. 1300-02.

Case Report

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Foreign Body Bronchus Removed by Tracheotomy

Amarjeet D. Patil[1], Ramlaa Al Qassab[2]

[1]Ex-Specialist Registrar, Anaesthesia and Critical Care, Royal Hospital, Muscat, PO BOX 1331, Oman. Specialist Registrar, Central Manchester University NHS Foundation Trust, Manchester, UK. [2]Senior Consultant, Head of Department, Anaesthesia and Critical Care, Royal Hospital, Muscat, PO BOX -1331, Oman.

Abstract

A 3 year old male child, with 13 kg body weight, referred from a peripheral hospital with suspected foreign body (FB) bronchus. Chest radiograph from that hospital showed absentairo-gram below right bronchus and hyper-inflated left lung, but foreign body could not be seen. Rigid bronchoscopy was performed in emergency theatre under general anaesthesia, with resistance in passing the scopethrough the glottis. The foreign body was difficult to remove after multiple attempts and finally it was removed by the tracheotomy as a life-saving procedure followed by tracheostomy. This patient required an unplanned ICU admission for one day and later shifted to high dependency and then to the ward and he is doing well.

Keywords: Airway Foreign Bodies; Bronchoscopy; Tracheotomy; Tracheostomy; Unplanned ICU Admission.

Introduction

There are many defence mechanisms of human body but inspiteof it is difficult to protect airway of foreign material. Cough reflex is one of them, none of these mechanisms is perfect, and foreign bodies frequently enter in the airways of our paediatric patients [1].

There are multiple reasons for that;for example, absence of molar teeth in children which make them difficult to chew food, tendency to talk, laugh, and activities while eating also increases the incidence.Foreign body aspirations are more common in younger than 3 years because of high respiratory rate and less chewing.

This kind og cases needs immediate diagnosis and management to avoid life threatening complications. Poor history and inability of FB detection radiology make the situation worst [2]. FB aspiration/inhalation is still a cause of death in childhood, usually in pre-school children.

It is noted that when it is difficult to pass the bronchoscopethrough glottic space and flexible bronchoscopy as we know is rarely effective for removal of foreignbodies, leading eventually to surgical removal; for example, tracheotomy, thoracotomy [3].

Case Report

Three year oldmalechild, came to our hospital with history of suspected foreign body aspiration of a ball pen part, some hours before. Thepatient had been transferred from the peripheral hospital due to unavailability of physician performing bronchoscopy. On examination in accident and emergency, patient was tachypnoeic and tachycardic with respiratory rate of 40-50/min and pulse rate of 160-180/min. and maintaining oxygen saturation of 99% even on room air. Air entry on right side is minimal and left side there is good air entry. He had two episodes of vomiting with cough

Corresponding Author: Amarjeet D. Patil, Ex-Specialist Registrar, Anaesthesia and Critical Care, Royal Hospital, Muscat, PO BOX 1331, Oman. Specialist Registrar, Central Manchester University NHS Foundation Trust, Manchester, UK.
E-mail: dramarjeetpatil@gmail.com

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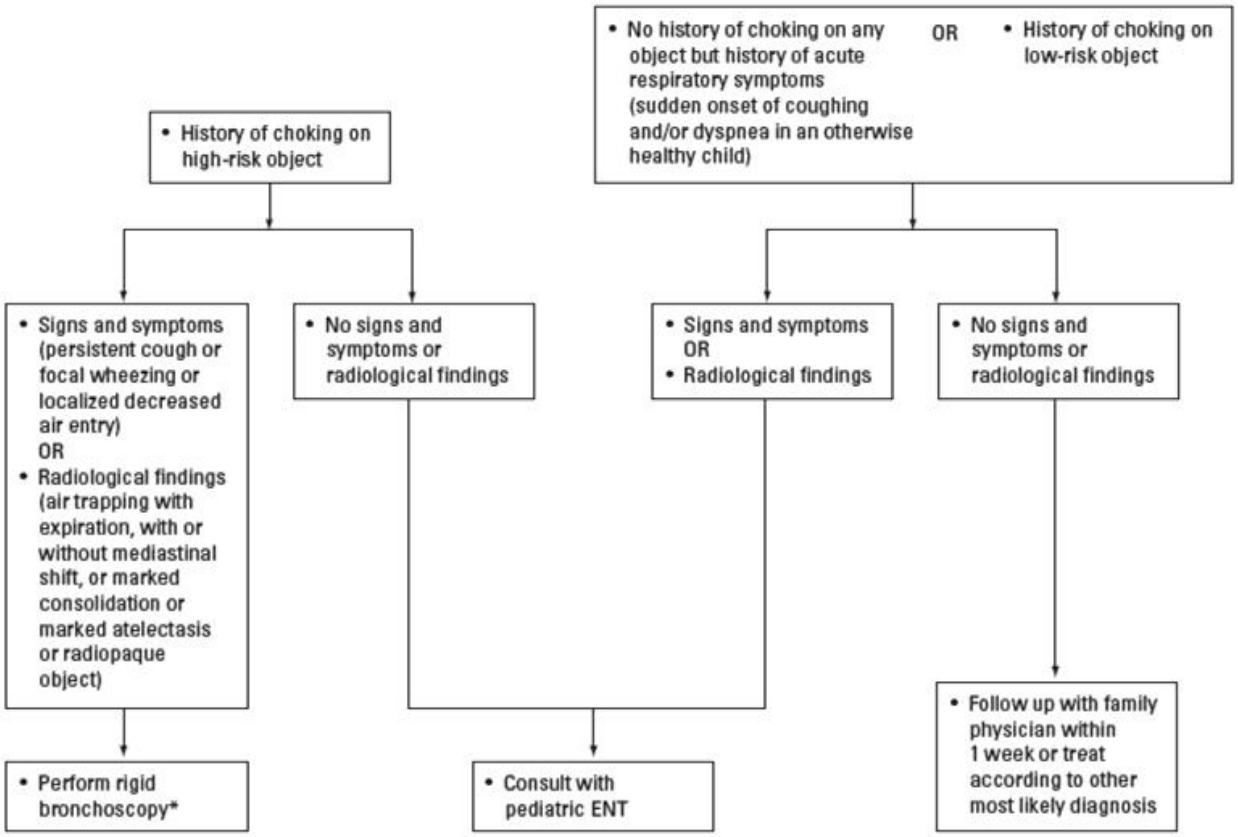
and discharge ofsmall amount of mucoid secretion. Chest X-ray in PA view from peripheral centre showed absence of airo-gram below right bronchus and hyperinflated left hemithorax but there were no signs of associated atelectasia.

The decision is taken for immediate rigid bronchoscopy under generalanaesthesia. Induction of anaesthesia was done as per standard protocol and cisatracurim was given to paralyse himand maintained on sevoflurane and it was uneventful. Rigid bronchoscope was inserted by the most experienced paediatric surgeon who regularly do such kind of cases. There was a difficulty in inserting the scope at the vocal cord level and the same experienced by surgeon in subsequent attempts too. Surgeon could see the foreign body as blue plastic bottom cap of a ball pen in right bronchus. He tried to hold and remove this cap with the forcep couple of times but couldn't be succeeded and then he decided to change the forcep. Patient was maintaining saturation during all this time.

Despite of using 3-4 types of forceps he couldn't be able to retrieve the foreign body above the vocal cords and it slips below subglottic area and due to ventilation it slowly move toward right bronchus each time after removal of scope. Patient was saturating well and hemodynamically stable but once the foreign body goes to right bronchus, chest rise decreases significantly on that side.

Finally,it was decided to do tracheotomy as an emergency lifesaving procedure to remove the foreign body. Once again surgeon did rigid bronchoscopy and caught hold the FB and retrieved it till subglottic area and then another surgeon hold the scope in that position and the main surgeon move to do the tracheotomy.

Surgeon did tracheotomy and remove the FB followed by tracheostomy. It was decided to shift the patient to the paediatric intensive care unit (PICU) for further management, and it was going to be an unplanned in hospital patient's ICU admission. The patient was ventilated in operation theatre for 2 hours post procedure as there was no bed available in PICU and has been allowed to breathe spontaneously and weaned off ventilator and shifted to PICU during late night hours with oxygen by T-piece and tracheostomy.



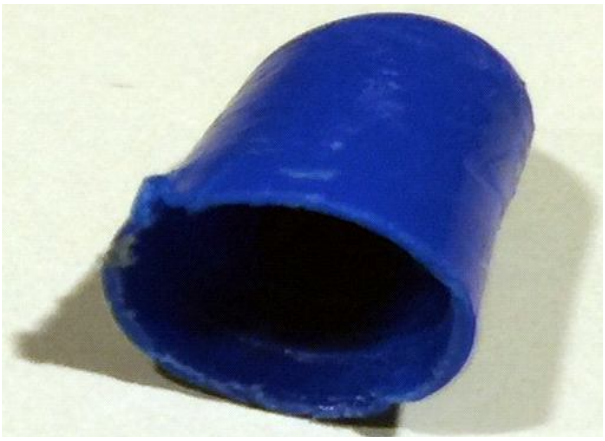


Fig. 2: Foreign body showing signs of multiple attempts of holding it by forceps

Fig. 3: Foreign body showing signs of multiple attempts of holding it by forceps

Discussion

Paediatric patient with foreign material inhalation might show some respiratory discomfort immediately. After these initial symptoms, patient may be asymptomatic, and this is the time when clinician might think that FB might be expelled by the cough or swallowed. Because of this reason physician should always be alert in such kind of cases.

It is highly recommended to managesuch kind of cases at tertiary care hospital with a full backup of paediatric bronchoscopy and anaesthetic equipment and expertise [4]. If we refer to the figure 1 it is clearly mentioned that rigid bronchoscopy is the procedure of choice for the diagnosis and management of FB inhalation in paediatric patient. Peri-operative complications are not correlated with either the choice of agent (volatile or intravenous)or the duration of surgery. A team work and experience paediatric endoscopist can change the scenario from unsafe to safe [5]. Bronchoscopy is a relatively simple procedure in most cases,and we should emphasize the need of appropriate trainingpractice and the right material (rigid bronchoscope of differentsizes and clamps for bronchial foreign bodies). The complications include pneumonia, pneumo-mediastinum,pneumothorax, mediastinitis, respiratory failure and death [6]. Flexible bronchoscopeis rarely efficient to remove foreign bodies, but an attempt should always be made before the surgical procedure which may avoid opening of airway and unplanned critical care admissions.

However, in rare cases, certain materials cannot be removed by traditional endoscopy, and must be removed through an opening in the airway. Marks et al [7], studied 6,393 patients with FBs in the airway showed that when open surgery is indicated for the removal of the FB, thoracotomy (2.5%) is more common than tracheostomy (2%). Of the 104 patients who required tracheostomy, 52 were because of laryngeal edema after bronchoscopy, 12 as a route for the introduction of a bronchoscope, 11 in order to permit assisted ventilation, and only 10 to enable the removal of large objects which would not pass the subglottic region [7]. In 19 patients the indications for tracheostomy were not commented upon [7]. In another study by Fidkowski et al. in 2010 studied nearly 13,000 FB aspiration cases in paediatric and the tracheotomy required only in 7 (0.05%) cases [8].

As we know the subglottic region is the narrowest part of the paediatric airway, any instrumentation can reduce the diameter even further and make it impossible for the FB to come out, and therefore every one dealing with such scenario should have basic knowledge of tracheotomy.

In another study, with the aim of starting a systematic analysis of FB injuries in children living in European Countries, the European Survey on Foreign Bodies Injuries (ESFBI) [10] has studied the phenomenon from a common point of view and conclusions was that 8.8% of this required surgery to remove foreign body.

Conclusion

Some of the paediatricairway FB cannot be removed by bronchoscopy alone, even if performed by an experienced surgeon. Removal of foreign body through tracheotomy is a rare event, and is indicated for patientswho have aspirated particularly wide FBs, which could notpass the subglottic region, or FBs which stuck at subglottic

level and cause acute respiratory obstruction. In this situation patient may require unplanned admission in intensive care or high dependency.

References

1. Pak MW, van Hasselt CA. Foreign bodies in children's airways: a challenge to clinicians and regulators. Hong Kong Med J. 2009 Feb;15(1):4-5.
2. Yadav SP, Singh J, Aggarwal N, et al. Airway foreign bodies in children: experience of 132 cases. Singapore Med J 2007;48:850-3.
3. Marks SC, Marsh BR, Dudgeon DL. Indications for open surgical removal of airway foreign bodies. Annals of Otology Rhinology Laryngology 1993;102 (9):690-4.
4. Ludemann JP, Hughes CA, HolingerLD.Management of foreign bodies of the airway.In: Shields TW, LoCicero J, PonnRB(eds). General Thoracic Surgery. Vol. 1.5th ed. Philadelphia: Lippincott Williamsand Wilkins; 2000:853-862.
5. Pinzoni F, Boniotti C, Molinaro SM, et al. Inhaled foreignbodies in pediatric patients: review of personal experience.Int J PediatrOtorhinolaryngol 2007;71: 1897-903.
6. Inglis AF, Wagner DV. Lower complication rates associated withbronchial foreign bodies over the last 20 years Annals of OtologyRhinology Laryngology 1992;101(1):61-6.
7. Marks SC, Marsh BR, Dudgeon DL. Indications for opensurgical removal of airway foreign bodies. Ann OtolRhinolLaryngol 1993;102:690-4.
8. Christina W. Fidkowski, HuiZheng, Paul G. Firth.
9. Swensson EE, Rah KH, Kim MC, Brooks JW, SalzbergAM.Extraction of large tracheal foreign body through a tracheostomyunderbronchoscopic control. Ann ThoracSurg 1985;39(3):251-3.
10. Dario Gregori, Lorenzo Salerni, Cecilia Scarinzi, Bruno Morra, Silvia Snidero, Roberto Corradetti, DesiderioPassali. The ESFBI Study Group.Foreign bodies in the upper airways causing complications and requiring hospitalization in children aged 0-14 years: results from ESFBI study. Eur Arch Otorhinolaryngol 2008;265:971.

Case Report

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Airway Management in a Case of Neurofibromatosis: Role of I Gel

Priyanka Mishra[1], Jyoti Sharma[2], Sanjay Johar[3], Saumya Saxena[4], Pankaj Kumar Sharma[5]

[1]Junior Resident [2]Assistant Professor [3]Professor [4]Senior Resident, Department of Anaesthesiology, [5]Assistant Professor, Dept. of Orthopaedics, Pandit Bhagwat Dayal Sharma Post Graduate Institute of Medical Sciences, Rohtak, Haryana 124001, India.

Abstract

Neurofibroma is a multi-systemic disorder which may produce considerable challenges in airway management by way of facial asymmetry, macroglossia, parapharyngeal tumors and neurofibromas of pharynx and larynx. Anaesthetic management may further be complicated due to concomitant kyphoscoliosis, sensitivity to neuromuscular blockers and hypertension. We report the case of a 50 year old female, known case of neurofibromatosis, who was posted for open reduction and internal fixation for fracture neck of femur. Patient was planned for General Anesthesia due to multiple neurofibromas over the back and kyphoscoliosis which precluded the use of spinal anesthesia.

Keywords: Neurofibromatosis; Multi system Involvement; I Gel.

Introduction

Neurofibroma is a benign peripheral nerve sheath tumour which arises from schwann cells and perineural fibroblasts. Two clinical types of neurofibromatosis have been described: peripheral-type I; and central- type II. Neurofibromatosis type I, also known as von Recklinghausen's disease, is more common, having widespread effects on ectodermal & mesodermal tissue [1]. NF 2 occurs less frequently than type 1 [2]. The combination of airway involvement in the disease, high likelihood of comorbidities such as hypertension, spinal deformities can make airway management challenging and at the same time necessary, as was observed in this case.

Case Description

A 50y old female, weighing 56kg, and a diagnosed case of Von Recklinghausen's Neurofibromatosis since 15 years, presented with severe pain and swelling in left hip with inability to move after she suffered a fall from height. Upon investigation she was diagnosed to have fracture of the neck of femur left side. Patient was initially managed conservatively and planned to undergo open reduction and internal fixation in elective setting. There was no evidence of abdominal, thoracic or head injury. There was history of surgery for swelling over the left leg 20 yrs back, under spinal anaesthesia, which was uneventful. However since the previous surgery there has been progressive increase in the number of cutaneous neurofibromas as well as the severity of kyphoscoliosis. Patient is a known case of hypertension and was taking 50mg of tablet Atenolol daily since 5 years. Rest of the history was unremarkable. Examination revealed multiple cutaneous neurofibromas present diffusely over her entire body as well as thoracolumbar kyphoscoliosis, Her vitals were stable preoperative with a recorded blood pressure of 150/90 mm Hg and heart rate of 60 bpm with 3-4 missed beats/min. Patient was able to maintain oxygen saturation

Corresponding Author: Jyoti Sharma, Assistant Professor, Department of Anaesthesiology, Pandit Bhagwat Dayal Sharma Post Graduate Institute of Medical Sciences, Rohtak, Haryana 124001, India.
E-mail: doctorjyotisharma@yahoo.in

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on room air, and although air entry was equal on both sides the left hemithorax was significantly reduced in volume due to kyphoscoliosis. Airway examination revealed that her upper incisors were protruding with adequate mouth opening, normal neck and temporomandibular joint movements, Mallampati class II. Blood investigations were within normal limits.

CXR revealed cardiomegaly and significant asymmetry with decreased volume of the left hemithorax. X ray spine revealed severe deviation of thoracolumbar spine. ECG showed bradycardia with occasional premature ventricular contractions.

Pt. was advised tablet Ranitidine 150mg at bed time on the night before and on the morning of surgery following an overnight fast and to take her morning dose of antihypertensive on the day of surgery. High risk was explained to the patient as well as the relatives and an informed written consent for likely postoperative ventilator support was also taken.

Patient's vital parameters were stable before anaesthesia. Difficult airway cart was kept ready before induction. Owing to the presence of thoracolumbar kyphoscoliosis and multiple cutaneous neurofibromas over the back of the patient and the unavailability of a spine MRI for undetected intramedullary lesions, general anaesthesia with I- gel as well as surgery in supine position was planned. Securing the airway of the patient was a challenge in itself due to the presence of kyphoscoliosis. Rolls of sheets were kept under the shoulder to support the upper back and head as well as a ring under the head to bring the oropharyngeal and laryngeal axis in one line on assuming the sniffing position. For pre-medication inj. Glycopyrrolate 0.005 mg/kg, inj. Ondansetron 0.08 mg/kg, inj. Morphine 0.6mg/kg were used. Inj.Propofol 2 mg/kg was administered and 2mg/kg succinylcholine was given as the relaxant. I-gel of size 3 was inserted and fixed after confirming equal, adequate ventilation and no leak. Anaesthesia was maintained with O2 + N2O + Sevoflurane +intermittent inj. Vecuronium. The patient was maintained on pressure controlled ventilation in view of the restrictive lung disease. The peak pressures throughout the surgery were maintained within normal limits Intraoperatively, her vitals were stable. Injection dexamethasone was administered in order to reduce airway oedema and inj.paracetamol 15mg/kg slow infusion for supplemental analgesia was given. Duration of surgery was 2 hrs, with blood loss of 450 ml and urine output of 120 ml. 1500 ml of crystalloids were infused throughout the procedure. At the end of surgery, anaesthesia was reversed by giving inj. Neostigmine 0.05 mg/kg and inj. Glycopyrrolate 0.010mg/kg. After awakening and spontaneous breathing, I-gel was taken out keeping difficult airway cart ready. Post-operative period was uneventful and her vitals remained stable throughout the post-operative observation period.

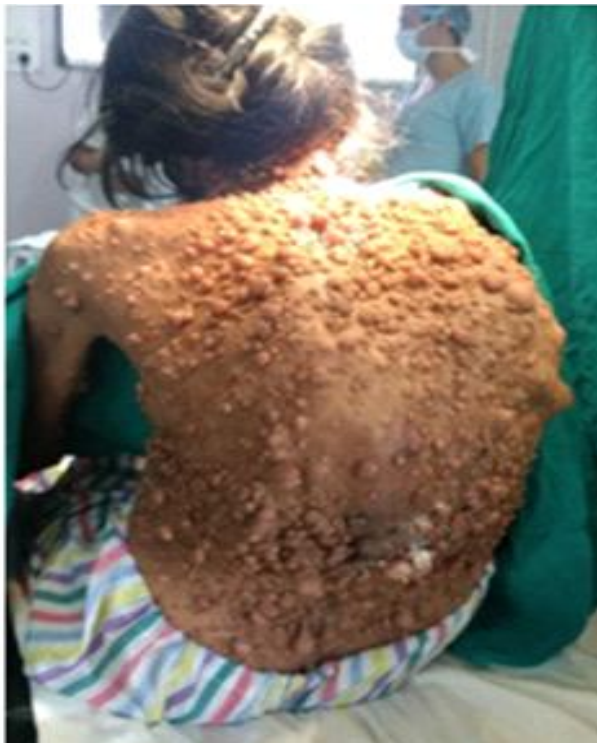

Fig. 1: Picture showing numerous neurofibromas over the back

Fig. 2: Severe thoracolumbar kyphoscoliosis seen in sitting position

Fig. 3: Intraoperative ventilatory parameters with normal airway pressures

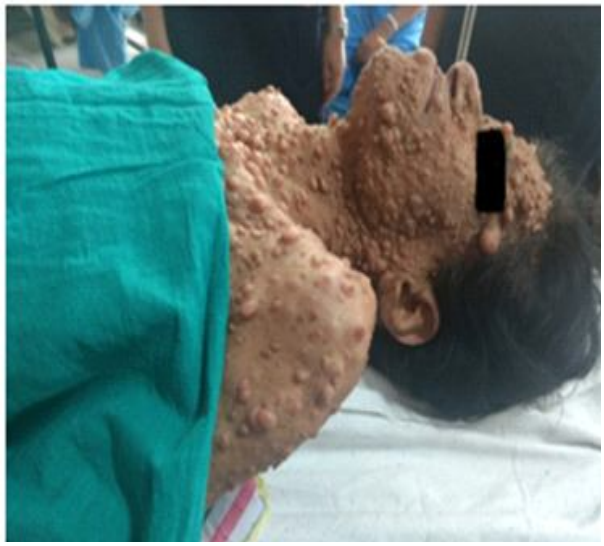

Fig. 4: Patient in supine position

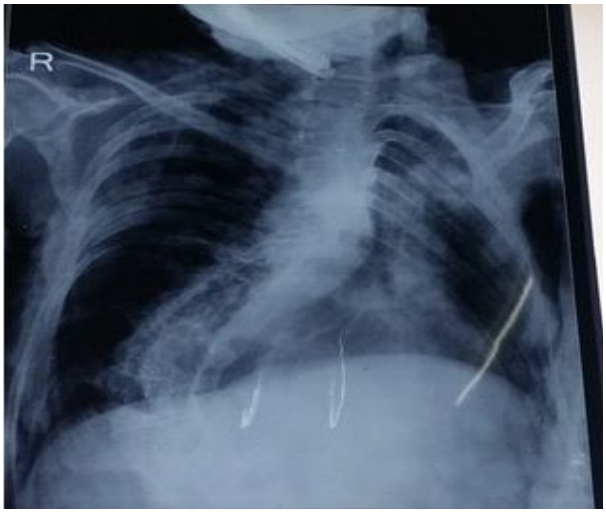

Fig. 5: Xray spine- indicating severe spine deviation

Discussion

Neurofibromatosis is an autosomal dominant disease with widespread effects on ectodermal and mesodermal tissue. The commonest member is Neurofibromatosis type 1 (NF1) which affects all physiological systems. Neurofibromas are the characteristic lesions of this disease and may occur anywhere including dermis, neuraxis, oropharynx and larynx [3]. NF offers a challenge to the anesthesiologist because of the variety of comorbidities in many organs and systems. Some abnormalities of interest for anesthetic-surgical procedures are short stature and bone abnormalities, in addition to cardiovascular abnormalities, such as congenital cardiac malformations, vasculopathy and hypertension. Cognitive disorders, in addition to attention and hyper activity disorders, can be found [4].

Because of the involvement of the CNS, regional anesthesia in NF 2 without careful preoperative examination can be extremely dangerous, and many anesthesiologists prefer general anesthesia. On the other hand, regional anesthesia could be useful in NF 1 because CNS involvement is rare. Additional masses in the tongue, pharynx and larynx in NF 1 may interfere with intubation during general anesthesia, although our patient had no such oral pathology. Endotracheal intubation can be avoided by the use of supraglottic airway devices in surgeries not specifically requiring it, hence minimising hemodynamic stress response to laryngoscopy and intubation as well as post operative pulmonary complications associated with restrictive lung disease.

We secured the airway of the patient with igel. It is a single use supraglottic airway device made of thermoplastic elastomer. It is easy to insert due to the tensile properties of its bowl and the ridge at its proximal end which prevents it from moving upward. I-gel also has the advantage of allowing venting of the air and gastric contents due to its gastric channel and prevent complications like obstruction associated with gastric neurofibromas.

Various Organ System Involvement of Neuro-fibromatosis is Discussed Briefly Below

Airway- Neurofibroma may occur in tongue, pharynx, larynx and may interfere with laryngoscopy and intubation. In the larynx they usually affect supraglottic structure, and are frequently described in arytenoids, aryepiglottic folds and posterior commissure [3,5]. About 80% of

these arise from false vocal cords and aryepiglottic folds. True vocal cords are rare site of location. It may be suspected by history of dysphagia, dysarthria, stridor or change of voice [5,6].

Respiratory system - Mediastinal neurofibromas may result in tracheobronchial compression with rapidly progressive symptoms. Bilateral upper lobe pulmonary fibrosis resulting in restrictive defect may result in pulmonary hypertension and RVF. There may be an intrapulmonary neurofibroma as well.These may be indicated by history of cough and dyspnea. Kyphosis and scoliosis may compromise pulmonary function [3].

Cardiovascular system – Patient may present with essential hypertension. Young patients are susceptible to renal artery stenosis. Sustained, paradoxical or hypertension resistant to treatment should raise the suspicion of pheochromocytoma [3,7].

During the intraoperative period, fluctuations in blood pressure or cardiac arrhythmia should raise the suspicion of a carcinoid tumor or pheochromocytoma. If not diagnosed before surgery, the patient can develop intraoperative hypertensive crisis after surgical manipulation or usage of triggering drugs such as betablockers and ketamine. Micronodular vascular proliferation may cause aortic, cerebral, coronary aneurysms. Neurofibromas may involve the heart causing both hypertrophy and mediastinal tumours may cause superior vena caval outflow obstruction [8,9].

Central nervous system- It is associated with increased incidence of epilepsy and undiagnosed CNS tumors [3]. Involvement of brain stem structures may result in central hypoventilation syndromes, hence may exhibit delayed weaning from mechanical ventilation post-operatively [7].

Gastrointestinal & genitourinary systems- Gastrointestinal neurofibromas may cause pain, obstruction, perforation, hemorrhage. Retroperitoneal neurofibromas may cause ureteric obstruction and hydronephrosis [3]. Musculoskeletal system – Painless dislocation of cervical vertebrae resulting in spinal cord damage during laryngoscopy and tracheal intubation may occur [10]. Spinal deformities may make spinal and epidural procedures difficult [3].

Conclusion

Neurofibromatosis is a group of conditions which vary in severity but have fundamental implications for anesthesiologists. It is hence essential to have a thorough knowledge of clinical manifestations of this disease, so as to adopt a systemic approach to the pre-operative assessment of these patients, aimed at better perioperative management and favourable outcome.

References

1. Khan M, Ohri N. Oral manifestations of Type I Neurofibromatosis in a family. J Clin Exp Dent. 2011; 3(5):e483-6.
2. Neurofibromatosis conference statement (National Institutes of Health consensus development conference), arChives of neuroloGy, 1998;45:575-78,1998.
3. Hirsch N P, Murphy A, Radcliffe J.J. Neurofibromatosis: Clinical presentations and anaesthetic implications. Br J Anaesth. 2001;86:555–64.
4. Hirbe A. C., Gutmann D. H., Neurofibromatosis type 1: a multidisciplinary approach to care, lanCet neuroloGy, 2014;13(8):834-43.
5. Yousem DM and Oberholtzef JC. Neurofibroma of the Aryepiglottic Fold. AJNR 1991 November/ December;12:1176-1178.
6. Sen A, Biswas KD, Ghatak S, Dutta S, Sinha R. Isolated neurofibroma of pyriform fossa- A case report. Int J Res Health Sci. 2014 Oct 31;2(4):1136-42.
7. Ghalayani P, Saberi Z and Sardari F. Neurofibromatosis type I (von Recklinghausen's disease): A family case report and literature review. Dent Res J (Isfahan). 2012 Jul-Aug;9(4):483–488.
8. Mhambrey SS, Hippalgaonkar AV. Endolaryngeal neurofibroma: An unanticipated anaesthetic challenge in a case of kyphoscoliosis correction. Int J Health Sci Res. 2016;6(2):409-413.
9. Oakley R., Grotte G. J., Progressive tracheal and superior vena caval compression caused by benign neurofibromatosis, Thorax, 1994;49(4):380-81.
10. Rahimi M, Kalani P. The Face is the Index of the Mind: Laryngoscopy in a Multiple Endocrine Neoplasia Patient with Mucosal Involvement. Arch Neurosci. 2015 April;2(2):e16498.

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Discussion

Include summary of key findings (primary outcome measures, secondary outcome measures, results as they relate to a prior hypothesis); Strengths and limitations of the study (study question, study design, data collection, analysis and interpretation); Interpretation and implications in the context of the totality of evidence (is there a systematic review to refer to, if not, could one be reasonably done here and now?, What this study adds to the available evidence, effects on patient care and health policy, possible mechanisms)? Controversies raised by this study; and Future research directions (for this particular research collaboration, underlying mechanisms, clinical research). Do not repeat in detail data or other material given in the Introduction or the Results section.

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Standard journal article

[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006; 35: 540-7.

[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003; 61: 347-55.

Article in supplement or special issue

[3] Fleischer W, Reimer K. Povidone iodine antisepsis. State of the art. Dermatology 1997; 195 Suppl 2: 3-9.

Corporate (collective) author

[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000; 71: 1792-801.

Unpublished article

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. Dent Mater 2006.

Personal author(s)

[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion

and composition of saliva. In: Fejerskov O, Kidd EAM, editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. p. 7-27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

Reference from electronic media

[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979-2001. www.statistics.gov.uk/downloads/theme_health/HSQ 20.pdf (accessed Jan 24, 2005): 7-18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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