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Dexmedetomidine an Adjuvant in Anaesthesia for Functional Endoscopic Sinus Surgery (FESS)

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Abstract

Introduction: Dexmedetomidine can provide controlled hypotension, analgesia, and sedation. The present study aimed to evaluate advantages of dexmedetomidine as an adjuvant in anesthesia for FESS(Functional Endoscopic Sinus Surgery**)**. *Materials and Methods:* Study was conducted in 50 patients form April -2015 to March -2016 after obtaining approval from ethical committee and informed consent from the patients. who were ASA grade I/II, aged between 18-55years scheduled for FESS. Patients were randomly allocated into two groups of Group D(n=25)which received injection Dexmeditomidine as loading dose of 1mcg/kg intravenously followed by maintenance infusion of 0.6mcg/kg intravenously and Group NS(n=25) received normal saline in similar volume. *Results:* The baseline mean systolic blood pressure was lower during surgery in patients of group D, but not statistically significant . At the end of surgery and after recovery, blood pressure is significantly lower in group D (114± 11 vs. 131 ± 9 mmHg; $P < 0.05$). Baseline values of the mean heart rate intraoperatively was significantly reduced compared with the baseline value in group D ($P < 0.05$), After extubation, the heart rate was found to be higher in patients of the Group-NS (98 ± 4 vs. 86 ± 3 beats/ minutes). Blood losses were lower in group D as compared to group NS (p= 0.03).The Visual Analogue Scale (VAS) scores in the immediate postoperative periods were also significantly lower in the group D (p =0.03). The only side effect noted was bradycardia in 3 patients in group D. Isoflurane requirement was also reduced in the maintenance of anaesthesia. *Conclusion*: Dexmedetomidine as an adjuvant for hypotensive anaesthesia is effective and decreases bleeding thus providing relatively bloodless field during FESS.

Keywords: Sinusitis; Dexmedetomidine; Hypotensive Effect; Anesthesia Adjuvants.

Introduction

Functional endoscopic sinus surgery (FESS) is a widely accepted and increasingly popular procedure which is used in patients who have medically refractory rhino-sinusitis and givess a high success rate [1]. For the anaesthetist, it provides a challenge to use the latest drugs and techniques available in order to allow an optimal operating field while decreasing the risk of surgery and improve patient safety and satisfaction. Bleeding is a commonly encountered problem which reduces the visibility of the surgical field and may even lead to complications orbital hematoma, injury to the optic nerve, cerebrospinal fluid fistula, and intracranial injuries. To minimize these complications, effective control of bleeding at the surgical site is required. Various techniques used to minimize bleeding during sinus surgery are head elevation of 30° (reverse Trendelenburg), infiltration or topical application of epinephrine, and electively controlled hypotension. Controlled hypotension is applied widely in several surgical interventions using different techniques [2]. Therefore the requirement of hypotensive anesthesia is essential in such procedures. Various drugs have been used for this purpose: nitroglycerine (NTG), sodium

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nitroprusside(SNP), propofol, beta blockers, calcium channel blockers, higher concentrations of inhalational anesthetics etc. Since all these drugs have certain limitations there was a search for a safer and more effective drug. Dexmedetomidine, an alpha 2 adrenoceptor agonist, was primarily introduced for producing sedation and analgesia in critically ill patients but has gained popularity among anesthetists because of its spectrum of beneficial effects viz. analgesia, lowering of blood pressure,"conscious sedation" without respiratory depression etc [3,4,5]. Thus it has been used for procedures performed under monitored anaesthesia care and also for administering hypotensive anaesthesia. Fulfils this requirement since it is relatively short acting, has no residual effects, produces sedation and analgesia and reduces mean arterial pressure thereby reducing intraoperative blood loss.

The present study was aimed to study the efficacy of dexmedetomidine in providing hypotensive anaesthesia so as to minimize bleeding during FESS.

Materials and Methods

This study was conducted from April -2015 to March -2016 after obtaining approval from the ethical committee and informed consent from the patients.

Inclusion Criteria

The patients were ASA grade I/II, aged between 18-55 years scheduled for elective FESS

Exclusion Criteria

Patients having hypertension, coronary artery diseases, renal, hepatic or cerebral insufficiency, coagulation disorders or those receiving drugs influencing blood coagulation.

Patients were randomly allocated into two groups of.

Group D-(n=25)- received injection Dexmeditomidine as loading dose of 1mcg/kg diluted in normal saline intravenously followed by maintenance infusion of 0.6mcg/kg intravenously in normal saline drip.

Group NS-(n=25) received plain normal saline considered as control group.

The loading dose was given slowly over 15 minutes. Both the anaesthetist administering the drug and the patients were blinded to the study. Patients were premedicated with ranitidine 150 mg. and alprazolam 0.25 mg orally a night before surgery. On the operating table, routine monitoring applied and intravenous access was obtained. Intravenous fluids started at the rate of 6-8 ml/kg.

Thereafter the infusion of the study drug was started via another line.

The readings of mean blood pressure (MAP), pulse rate, blood oxygen saturation (SpO_2)and endotraceal CO_2 were monitored at regular intervals before and after starting the study drug and during surgery. E.C.G. was also continuously monitored. After completion of the loading doses, anaesthetic induction was commenced. Patients were preoxygenated for five minutes and premedication done with inj.glycopyrrolate 0.2mg, inj. midazolam 1mg and inj.fentanyl 50µg intravenously. Induction was done withinj.propofol in the doses of 2 mg/kg intravenously so as to produce loss of eyelash reflex. Endotracheal intubation was facilitated with inj.vecuronium 0.1mg/kg. Anaesthesia was maintained with nitrous oxide: oxygen 66%:33%,inj vecuronium top up and isoflurane.

Surgery was performed. Haemodynamic variables were recorded at baseline, before intubation, 5,30,60 minutes and after intubation. After recovery from neuromuscular blockade, patients were administered neostigmine 0.05mg / kg and glycopyrrolate0.01mg/kg. There after endotracheal extubation was done. Intra operative bleeding was assessed on a 4 point scale by the surgeon who was blinded to the study (0=no bleeding, excellent surgical conditions; 1=minimum bleeding, sporadic suction; 2=diffuse bleeding, repeated suction and 3=considerable troublesome bleeding, continuous suction) [5].

The incidence of side effects such as vomiting, bradycardia and hypotension were recorded, if any. In the postoperative period, oxygen inhalation was given and vitals monitored at an interval of 10 minutes. In the recovery room, pain scores were assessed using Visual Analogue Scale (VAS) scores. (0=no pain to 10=severe pain).

Statistical analysis was performed using SPSS 6.0 version software. Continuous data were presented as Mean ± Standard deviation (SD) and analyzed using student t test. Categorical data were presented as numbers and analyzed using chi square test. p value<0.05 considered statistically significant.

Results

There was no significance between two groups in the study.

The baseline mean systolic blood pressure is lower during surgery in patients of group D, with no statistically significant difference. At the end of surgery and after recovery, blood pressure was significantly lower in group D (114± 11 vs. 131 ± 9 mmHg; $P < 0.05$).

Baseline values of the mean heart rate intraoperatively, there is a statistically significant reduction in the mean heart rate compared with the baseline value in group D ($P < 0.05$), After extubation, the heart rate was found to be higher in patients of the control group (98 ± 4 vs. 86 ± 3 beats / min).

Blood losses were lower in group D as compared to group NS (p= 0.03). The VAS scores in the immediate postoperative periods were also significantly lower in the group D (p=0.03). The only side effect noted was bradycardia in 3 patients in group D which however reverted with discontinuation of the drug and excluded from study.

Table 1: Demographic details

Characteristics	Group-NS	Group-D
Number of patients	25	25
Age(in years)Mean±SD	28.0+6.3	27.4+6.1
weight(kgs) Mean±SD	56.2+13.3	55.8+13.9
Sex		
Number of Males	13	14
Number of Females	12	11
ASA status		
Number of ASA status I	10	8
Number of ASA status II	15	17
Surgical time(min) Mean±SD	107+27.7	99+25.3

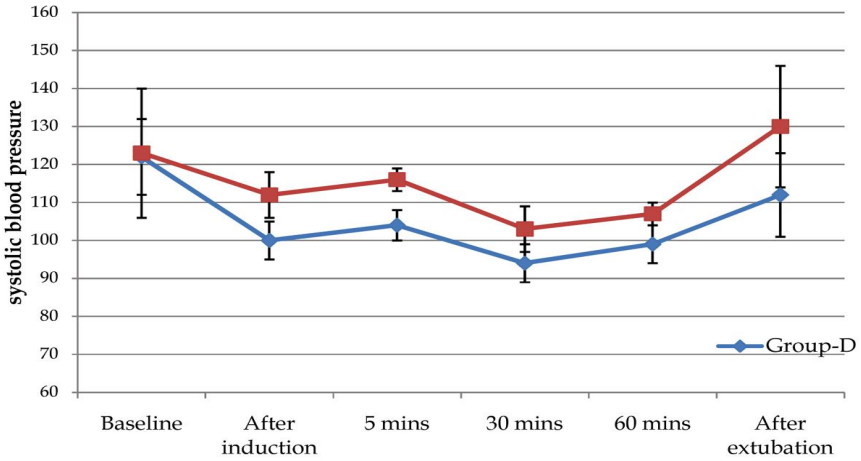

Fig. 1: Diagram showing systolic blood pressure trend in both the groups

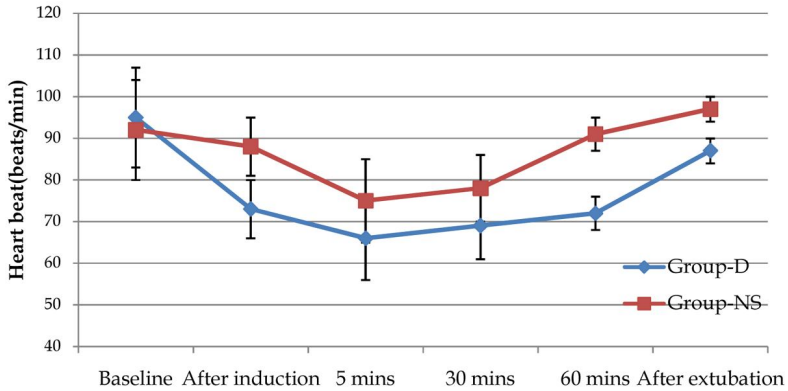

Fig. 2: Diagram showing Heart rate in beats per minute in both the groups

Table 2: Intra operative bleeding and Postoperative VAS scores

	Group-NS	Group-D
Intra operative bleeding scores		
0	0	1(2%)
1	8(16%)	16(32%)
2	9(18%)	5(10%)
3	8(16%)	3(6%)
Postoperative VAS scores		
0-4	6(12%)	5(10%)
5-7	11(22%)	13(26%)
8-10	8(16%)	7(14%)

Discussion

Premedication with intravenous inj dexmedetomidine before induction of anesthesia has significantly decreased the heart rate, blood pressure, and bleeding at the surgical site, which is attributed to the known sympatholytic effects of α_2-adrenergic agonists. They regulate the autonomic and cardiovascular systems by acting on blood vessels, where they mediate vasoconstriction, and on sympathetic terminals, it attenuates the heart rate and blood pressure by inhibiting norepinephrine release [6].

The efficacy of inj dexmedetomidine in providing an ideal surgical field during controlled hypotension has been reported previously during middle ear and maxillofacial surgery [7]. Its hemodynamic effects are predictable and dose dependent. Many studies have investigated the effects of inj dexmedetomidine before induction of anesthesia and reported a significant reduction in heart rate and blood pressure [8,9].

Present study proves dexmedetomidine is effective in providing hypotensive anaesthesia and minimize bleeding during FESS which is in agrrement with stdies of Guven et al [10] and Goksu et al [11] reported better hemodynamic stability, visual analog scale for pain, clear surgical field, and few side effects when dexmedetomidine was administered for FESS. In the present study, the efficacy of dexmedetomidine in reducing the bleeding of the surgical site was examined. There was a significant improvement in the quality of the surgical field and an ideal surgical field was achieved in 86% of patients of group D with little bleeding that did not hamper the surgical procedure.

Dexmedetomidine was associated with significantly longer emergence time and time to total recovery from anesthesia. Richa et al [12] reported a significantly slower extubation time in patients receiving dexmedetomidine compared with those receiving remifentanil for controlled hypotension. In the present study, patients of the dexmedetomidine group had slower but smooth emergence from anesthesia compared with the control group .

Dexmedetomidine provided analgesia through binding in the spinal cord. In the present study, intraoperative injection fentanyl 50µg intravenously consumption was significantly less in group D compared with the control group. Studies by Durmus Met al [13] and Ayoglu H et al [14] have advocated the use of dexmedetomidine for providing hypotensive anaesthesia during septoplasty and tympanoplasty. Dexmedetomidine exerts analgesic, sedative and anxiolytic effects after intravenous administration.

The findings of the present study indicates that dexmedetomidine is an effective adjuvant for hypotensive anaesthesia to decrease bleeding and thus provide a relatively bloodless field during FESS .It also decreases the dose requirements of propofol and isoflurane. It is also an effective analgesic agent. Moreover it is safe drug, the only side effect being bradycardia .

Conclusion

Dexmedetomidine has effectively provided the ideal oligemic surgical field during FESS and offers the inherent advantages of analgesia, sedation, and anesthetic-sparing effects. However, dexmedetomidine was associated with longer but smoother recovery time from anesthesia.

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