

Evaluation of the Analgesic Effect of Caudal Dexamethasone with Bupivacaine in Paediatric Genitourinary Surgeries

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Abstract

Caudal epidural block is one of the most common regional techniques in pediatric anaesthesia. Epidural route of dexamethasone prolongs analgesic effect. Bupivacaine acts mainly by blockade of voltage gated NA⁺channel in the axonal membrane. Dexamethasone have a local anesthetic effect on nerve by direct membrane action.

Methodology: A randomized, prospective, interventional study. 80 paediatric patients were allocated into two equal groups. BD group received 1.0 ml/kg of 0.25% bupivacaine with 0.1mg/kg of dexamethasone and B group received 1.0ml/kg of 0.25% bupivacaine. Patients more than 6 years were excluded from the study.

Results: In our study FLACC scores in group BD was reduced as compared to group B. Mean duration of analgesia was 279.8±11.54 minutes in group B was increased by adding Dexamethasone to 486.07±3.72 minutes in group BD.

Conclusion: The study was conducted in 80 children, aged 6months to 6 years of ASA I AND II undergoing elective Genitourinary surgeries under general anaesthesia. It is found that addition of Dexamethasone to Bupivacaine in caudal analgesia significantly increases the duration of postoperative analgesia without much side effects.

Key words : Caudal Anaesthesia; Pediatrics patients.

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Aims and Objectives

1. Intraoperative hemodynamic parameters.
2. Intraoperative concentration of inhalation agent required.
3. Perioperative and postoperative complications.
4. Comparison of duration of analgesia between the two groups.
5. To assess the requirements of supplemental analgesics, if any.
6. To study the side effects, if any.

Materials and Methods

After obtaining approval from institutional ethical committee, written informed consent was taken. Total 80 paediatric patients were randomly

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allocated into two equal groups (n= 40 in each group) using random number, the allocation ratio was 1:1. BD group received 1.0 ml/kg of 0.25% bupivacaine with 0.1 mg/kg of dexamethasone and B group received 1.0 ml/kg of 0.25% bupivacaine.

Inclusion criterias

1. Age between 6 months to 6 years.
2. Genders: Both.
3. ASA physical status I, II.
4. Elective Genitourinary surgeries.
5. Duration of surgery not more than two hours.

Exclusion criterias

1. ASA status III, IV, V.
2. Emergency surgeries.
3. Local infection of the caudal area.
4. History of allergic reactions to local anaesthetics, bleeding diathesis.
5. Pre-existing neurological or spinal diseases, mental retardation, neuromuscular disorders.

Preoperative assessment: In pre-operative assessment of the patient's birth history, general examination, systemic examination, immunization, allergy, operative history with all required investigations (Hb%, complete blood count, random blood sugar, blood urea, serum creatinine, liver function test, ECG, chest X-ray) done a day before operation. Patient was advised to remain NBM for 6 hours. Informed and written consent was taken.

Preparation in OT: Baseline vitals like ECG, Pulse, Blood pressure, SpO₂, Temperature was recorded in all patients. Patients was monitored with ECG, NIBP, SpO₂, EtCO₂, and Temperature. Then an intravenous line was secured with 24 or 22 gauge intravenous cannula and started i.v. fluids. Patients was Premedicated with Inj. Glycopyrrolate 4µg/kg, Inj. Ondansetron 0.15mg/kg. Preoxygenation was done with 100% oxygen at 5-7 L/Min for 3-5 mins via Jackson-Rees circuit. Induction was done using inhalation method with 50% oxygen and 50 % nitrous oxide with sevoflurane 2-7% Airway was secured with I-gel or ET tube after the effect of I.V. succinylcholine 2 mg/kg.

Caudal epidural was performed with a 22-gauge caudal epidural needle under complete aseptic precaution. Child was put in a left lateral position with their both hips and knees flexed. The sacral hiatus and caudal space was identified by the pop up felt when penetrating the sacrococcygeal ligament, sudden loss of resistance and after correct placement of needle in the caudal space and after

negative aspiration for cerebrospinal fluid or blood and then 1 ml/kg of the blinded study solution injected.

Group BD - 1.0 ml/kg of 0.25% bupivacaine with 0.1 mg/kg of dexamethasone. Group B - 1.0 ml/kg of 0.25% bupivacaine.

The patients was repositioned supine. Patients was maintained with 50% O₂ and 50% N₂O mixture with sevoflurane 2-4%. Patient's hemodynamic parameters i.e. NIBP, HR, SpO₂, EtCO₂, Temperature will be recorded pre-op, at the time of premedication, induction, laryngoscopy, after caudal then every five minutes till 30 minutes after intubation and then every 15 minutes till 90 minutes. Intraoperative ringer lactate or DNS solution was infused as per the requirement of surgery.

During surgery adequate analgesia was evaluated by hemodynamic parameters like change in heart rate and systolic blood pressure at +/- 15% of baseline values and requirement of sevoflurane concentration. An increase in heart rate and systolic blood pressure within 15-20 minutes of skin incision was considered as a failure of caudal anaesthesia. Extubation: After oropharyngeal suction, patient was extubated when patient has established protective airway reflexes with adequate tidal volume and hemodynamic stability.

Post-operative period: Postoperative pain was evaluated by FLACC score (maximum score of 10) using faces, legs, activity, cry, and consolability tool at 30 minutes interval up to first 2 hours, one hour interval for next three hours and thereafter every 2 hours interval. As an when FLACC score was >4 rescue analgesic was given.

Sedation was assessed by using sedation score (0-spontaneous eye opening, 1-eye open on speech, 2-eye open on shake, 3-unarousable).

Results

Table 1 and graph 1 shows the comparison of postoperative pain (FLACC) scores at 0, 6, 12, 24 hours postoperatively.

Table 1: Postoperative Pain Score (FLACC).

Pain score	Group BD (n=40)	Group B (n=40)	P value
Immediate	0	0	0
06 hr	1.08±0.27	2.08±0.27	<0.001
08 hr	1.13±0.33	4.13±0.33	<0.001
12 hr	2.13±0.33	5.58±0.5	<0.001
24 hr	8.08±0.27	8.48±0.68	1

Adding Dexamethasone significantly reduce the FLACC scores in group BD as compared to group B. Higher FLACC scores were observed in plain Bupivacaine group (group B). Table 2 and graph 2 shows postoperative sedation score.

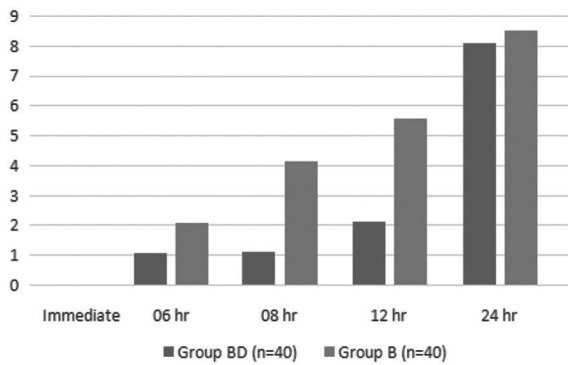
Table 2: Postoperative Sedation Score.

Sedation Score	Group BD (n=40)	Group B (n=40)	P value
Immediate	1.1±0.30	1.15±0.36	0.1
06 hr	0	0	0
12 hr	0	0	0
24 hr	0	0	0

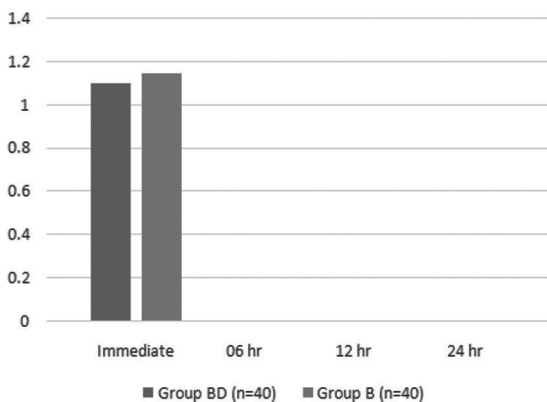
Table 3: Mean Duration of Analgesia.

	Group BD (n=40)	Group B (n=40)	P value
Duration of analgesia	486.07±3.72	279.8±11.54	<0.0001

Graph 1: Postoperative Pain Score.



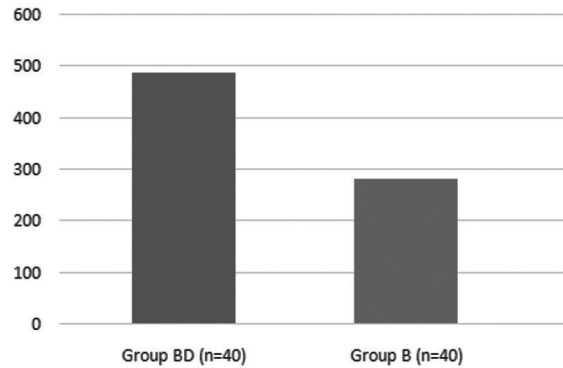
Graph 2: Postoperative Sedation Score.



There was no significant difference observed in postoperative sedation score between two groups ($p>0.05$). Table 3 and graph 3 shows the mean duration of caudal analgesia in two groups. This duration was significantly prolonged by addition of Dexamethasone to Bupivacaine (group BD) in

comparison to Bupivacaine alone (group B). There was statistically significant difference in duration of caudal analgesia between both the groups ($p<0.05$).

Graph 3: Mean Duration of Analgesia.



Discussion

Caudal block has been found to be an excellent and safe technique for providing postoperative analgesia in paediatric population with a high success rate.

Bupivacaine is an amide type, long acting local anesthetic agent. It reversibly binds to specific sodium ion channels in the neuronal membrane, resulting in a decrease in voltage dependent membrane permeability to sodium ions and membrane stabilization. It also inhibits the depolarization and nerve impulse conduction and causes a reversible loss of sensation.

Dexamethasone is commonly used in the perioperative period to reduce postoperative nausea and vomiting.(1)Additionally, it has been reported to have analgesic effects(2). Dexamethasone might have a local anaesthetic effect on nerve by direct membrane stabilizing action . Therefore, dexamethasone might potentiate the effect of bupivacaine and prolong the duration of analgesia. Another possible mechanism involves the effect of dexamethasone on the spinal cord. The transcription factor, nuclear factor- κ B (NF- κ B) is expressed throughout the nervous system and plays an important role in the development of pathological pain. Dexamethasone could regulate NF- κ B. More specifically, epidural injection of corticosteroid has been reported to inhibit development of hyperalgesia with associated reduction in NF- κ B levels (3)

In present study dexamethasone 0.1mg/kg combined with bupivacaine 0.25% 1ml/kg was given caudally to evaluate intraoperative hemodynamic changes, requirement of inhalational agent, perioperative complications, evaluate the

efficacy of analgesic effect of dexamethasone with bupivacaine and requirement of rescue analgesics.

Conclusion

This study was conducted in 80 children, aged 6 months to 6 years of ASA I & II, undergoing elective urogenital surgeries under general anaesthesia. The patients were assigned randomly into two groups of 40 patients each. Caudal epidural was given in all patients according to their group after giving general anaesthesia. Group B: Bupivacaine 0.25% 1.0ml/kg and group BD: Bupivacaine 0.25% 1.0ml/kg with Dexamethasone 0.1 mg/kg. The patients were observed for intraoperative hemodynamic parameter, intraoperative concentration of inhalation agent required, perioperative complications and postoperatively for duration of caudal analgesia (using FLACC score). It was found

that addition of dexamethasone to bupivacaine in caudal analgesia significantly increases the duration of postoperative analgesia without much side effects.

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