

Comparative study of Caudal and Intravenous Dexamethasone as Adjuvant to Epidural Block: An Institution Based Study

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ABSTRACT

Background: Pain management is of prime concern when operating adults. Caudal block is the most reliable technique for regional analgesia amongst most of patients. The present study was designed to compare caudal versus intravenous dexamethasone as adjunct to epidural block.

Materials and Methods: The present prospective double blind study was conducted in the Department of Anesthesia, M M Medical College & Hospital, Kumarhatti, Solan, Himachal Pradesh (India) over a period of one year. A total of 60 adults belonging to ASA I and ASA II category who underwent urogenital surgeries were enrolled in the present study. Group I patients were given 0.2% of ropivacaine along with 0.025 ml/kg normal saline caudally. Group II patients were given 0.2% ropivacaine with 0.1 mg/kg of dexamethasone and 0.125 ml/kg normal saline intravenously. Group III patients were given 0.2% ropivacaine with 0.025 ml/kg of normal saline caudally and 0.5 mg/kg of dexamethasone intravenously. The maximum concentration of sevoflurane that was used was noted. The first analgesic time was also recorded.

Results: The time of first rescue analgesia was significantly longer in Group II (12.1 +/- 2.3 hours) and Group III (10.2 +/-

3.1 hours) as compared to Group I (3.7 +/- 1.2 hours). Total rescue analgesia doses were recorded to be 2.1 +/- 0.2 in Group I, 1.3 +/- 0.1 in Group II and 1.1 +/- 0.1 in Group III.

Conclusion: Combination of dexamethasone with ropivacaine in either forms- intravenous or caudally provides effective analgesia compared to ropivacaine alone.

Keywords: Caudally, Dexamethasone, Epidural, Intravenous.

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INTRODUCTION

Significant advancements have occurred in the anaesthesia. It includes advances in general anaesthesia, regional anaesthesia and pain management¹ as well as better understanding of the physiology of pain perception. Inadequate relief of pain and distress during painful medical procedures may have long-term negative effects on future pain tolerance and pain responses.² In today's era there is a paradigm shift from general anaesthesia to regional anaesthesia.

Caudal block is the most reliable technique for regional analgesia surgeries. However the major disadvantage associated with caudal block is shorter duration of action despite of use of longer acting bupivacaine. Its duration of action can be prolonged by addition of various adjuncts like neostigmine, opioids, ketamine, and alpha 2 agonists.^{3,4} Dexamethasone is used as analgesic and antiemetic perioperatively. It is a corticosteroid with enormous anti-inflammatory and analgesic properties. It has been used in adults to decrease the incidence severity of pain.⁵ It also decreases the incidence of nausea, vomiting and fever in children.⁶ The present study was commenced to compare caudal versus intravenous dexamethasone as adjunct to epidural block.

MATERIALS AND METHODS

The present prospective double blind study was conducted in the Department of Anesthesia, M M Medical College & Hospital, Kumarhatti, Solan, Himachal Pradesh (India) over a period of one year. A total of 60 adults belonging to ASA I and ASA II category who underwent urogenital surgeries were enrolled in the present study. Ethical committee approval was obtained prior to the study and informed consent from all the patients was obtained.

Patients belonging to ASA III category, any known drug allergies, coagulopathy, pre-existing neurological diseases or spinal deformity, infection at the puncture site were not included in the study. Patient's age, weight and baseline parameters were recorded during preoperative visit.

Complete history, general, physical examination and routine laboratory investigations were done. Patients were kept fasting 6 hours before surgery. Premedication was done with 0.01 mg/kg iv atropine, 300-350 mcg/kg iv midazolam and 1.5 microgm/kg iv fentanyl. Patients were randomly divided into three groups. Preoperatively 1 ml syringe of the required drugs to be injected were prepared by the person not participating in the study and

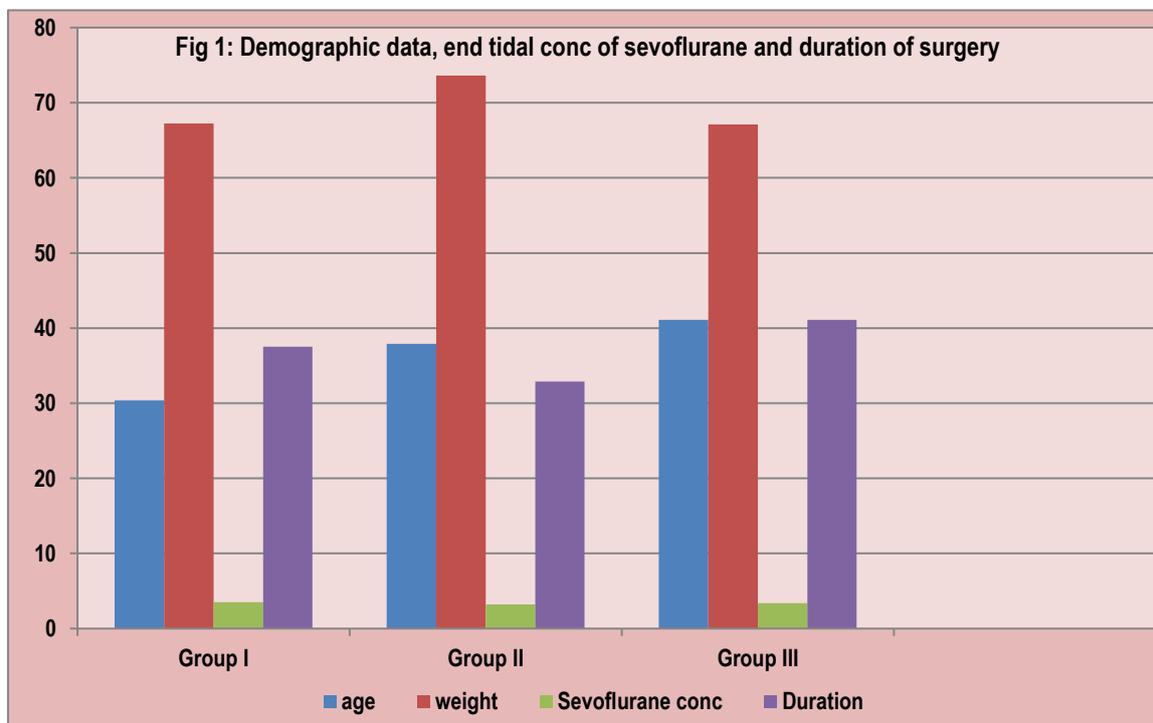
marked as iv test and caudal test. On arrival of the patient to operation theatre, baseline blood pressure, heart rate, oxygen saturation and mean arterial pressure were recorded. Induction was done with sevoflurane in 8 % oxygen and air. Intravenous line was secured with 22 gauge cannula and ringer's lactate was started at a rate of 4ml/kg/hr. Laryngeal mask airway was inserted and patients were kept in left lateral decubitus position. A constant flow of 5 L/min was maintained.

Using 23 gauge hypodermic needle, caudal block was given. Group I patients received 0.2% of ropivacaine along with 0.025 ml/kg of caudal normal saline. Group II patients received 0.2% ropivacaine with 0.1 mg/kg of dexamethasone and 0.125 ml/kg of iv normal saline. Group III patients received 0.2% ropivacaine with 0.025 ml/kg of normal saline caudally and 0.5 mg/kg of dexamethasone intravenously.

The surgery was initiated 10 minutes after caudal block and time of caudal block was noted. Sevoflurane in oxygen and air was maintained at 50:50 ratio and any hemodynamic changes that occurred were noted. After surgery sevoflurane was discontinued and laryngeal mask airway was removed. Postoperative monitoring of vitals was done hourly for 3 hours and afterwards every 3 hours. The maximum concentration of sevoflurane that was used was also noted. The first analgesic time i.e. time interval from caudal block to the time of severe pain was recorded. Paracetamol 15 mg/kg was given as rescue analgesia. The side effects like nausea; vomiting or dizziness occurring during the entire period of study was also noted. All the data was recorded in a tabulated form and SPSS software was used for analysis. Results are expressed as mean +/- Standard deviation. Chi square test was applied as a test for significance.

Table 1: Demographic data, end tidal conc of sevoflurane and duration of surgery

| Parameters | Group I | Group II | Group III |
|-------------------------------|---------------|----------------|----------------|
| Age (Years) | 30.4 +/- 1.8 | 37.9 +/-1.3 | 41.1 +/-2.1 |
| Weight (Kgs) | 67.22 +/-3.2 | 73.6 +/-3.9 | 67.1 +/- 4.1 |
| Male:Female | 3:1 | 17:3 | 7:3 |
| End tidal conc of sevoflurane | 3.5 +/- 0.2 | 3.2 +/- 0.3 | 3.4 +/- 0.1 |
| Duration of surgery (mins) | 37.54 +/-9.87 | 32.87 +/- 11.1 | 41.11 +/-10.02 |



RESULTS

Table 1, Fig 1 demonstrates the demographic data, end tidal sevoflurane concentration and duration of surgery. All these parameters were comparable to each other and there was no significant difference between them. Hemodynamic parameters were stable and comparable during the entire study, no special intervention was required.

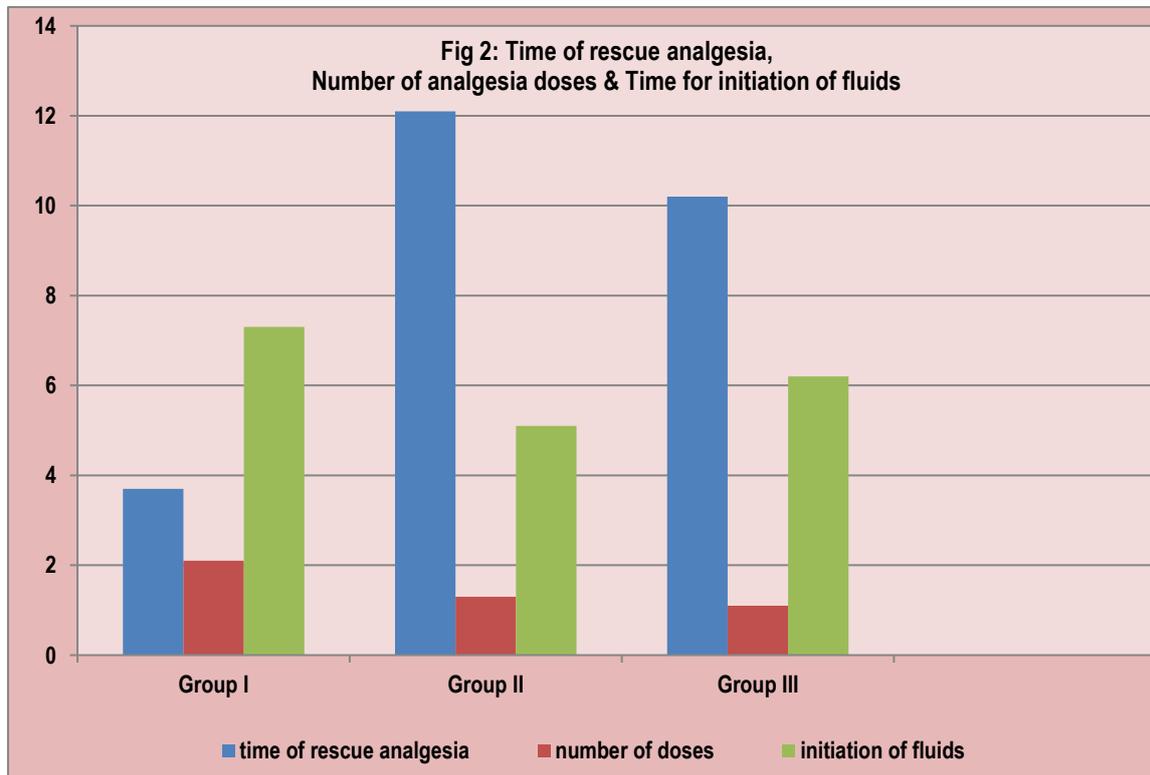
Table 2 & Fig 2 demonstrates the time of first rescue analgesia. It was significantly longer in Group II (12.1 +/- 2.3 hours) and Group III (10.2 +/- 3.1 hours) as compared to Group I (3.7 +/- 1.2 hours).

Total rescue analgesia doses were recorded to be 2.1 +/- 0.2 in Group I, 1.3 +/- 0.1 in Group II and 1.1 +/- 0.1 in Group III. The difference was significant between the groups. Clear fluids were initiated comparatively early in Group II (5.1 +/- 0.3 hours) compared to Group III and Group I. The difference was significant amongst the groups. the time of discharge was same between all the groups.

There were no adverse events or side effects noted during the study.

Table 2: Other comparative parameters

| Parameters | Group I | Group II | Group III | P value |
|---|-------------|--------------|-------------|---------|
| Time of 1 st rescue analgesia (hrs) | 3.7 +/- 1.2 | 12.1 +/- 2.3 | 10.2 +/-3.1 | <0.05 |
| Number of analgesia doses | 2.1 +/- 0.2 | 1.3 +/- 0.1 | 1.1 +/- 0.1 | <0.05 |
| Time for initiation of clear fluids (hrs) | 7.3 +/- 1.8 | 5.1 +/-0.3 | 6.2 +/- 0.2 | <0.05 |
| Time to discharge (days) | 1 | 1 | 1 | >0.05 |



DISCUSSION

Pain control is of paramount importance postoperatively. With pain comes anxiety, fright, insomnia and hence the patient is bombarded with unpleasant sensations. Various other consequences of pain are vomiting, nausea, sleep disturbance.⁷⁻⁹ Oral analgesics are not suitable during immediate postoperative period. The technique of regional analgesia not only reduces pain but also reduces stress of surgery.¹⁰ Caudal block is local anaesthesia injection in caudal epidural space and is the most commonly used method of providing regional analgesia. Single dose of caudal block provides limited period of analgesia. Various adjuncts are added to prolong this duration. Various studies have been undertaken which involve addition of dexamethasone through caudal¹¹ or intravenous route.^{12,13}

Dexamethasone is a corticosteroid that decreases the tissue levels of bradykinin and inhibits the release of neuropeptides from nerve endings. COX-2 enzyme in central nervous system is also inhibited by dexamethasone resulting in decreased production which is responsible for enhanced nociception.^{14,15} Our present study was in accordance with the various studies, as addition of dexamethasone by intravenous or caudal route significantly prolonged the time to first rescue analgesia. Even systemic administration of steroids is an effective tool to decrease postoperative pain but the results are inconclusive.

In a study conducted by Yousef GT et al¹⁶, a significant reduction in the total number of rescue doses and prolongation of analgesia

time was seen. The results were similar to our study with a difference that in their study, the incidence of nausea, vomiting was more in group without dexamethasone but there were no adverse events in our study. Dexamethasone also exerts antiemetic property which is because of its direct action on nucleus tractus of central nervous system and its interaction with serotonin and protein tachykinin NK1 and NK2. The main limitation of our study was that motor block was not evaluated and delayed complications were not taken into consideration.

CONCLUSION

We can conclude that dexamethasone acts as a useful adjunct to ropivacaine in caudal block to provide efficient and effective analgesia without any harmful side effects.

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