Original article:

Comparative study of Use of Caudal Versus Intravenous Dexamethasone in Epidural Block Amongst Children: A Prospective Institutional Based Study

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Abstract:

Background: Various achievements have occurred in the field of paediatric anaesthesia. It included advances in not only in technology and pain management technique. The major drawback of using caudal block is the short duration of anaesthesia even with the use of some longer acting anaesthetics like bupivacaine. The present study was conducted with the chief aim to compare the use of caudal versus intravenous dexamethasone as an adjunctive aid with epidural block.

Materials and Methods: The present prospective randomised double blind trial was conducted in the Department of Anaesthesia, Government Medical College, Haldwani, Uttarakhand (India) during a period of one year. Only children belonging to ASA I and ASA II category were enrolled in the study. Complete detail of the demographics like age, weight was recorded during the preoperative visit. Patients' complete and detailed history was obtained. All patients underwent routine laboratory investigations and physical examination. Any side effects were noted during the entire procedure. All the results was arranged in a tabulated form and analysed using SPSS software. Chi square test was used and p value of less than 0.05 was taken as significant.

Results: A total of 90 patients took part in the study with 30 patients in each group. The mean age of the study population was 3.6 +/- 1.2 years. The mean age in Group I, Group II and Group III was 3.5 +/- 1.6, 3.8 +/-1.2 and 4.1 +/-2.2 respectively. The mean weight amongst the subjects of Group I was 14.3 +/-3.1 kgs, in Group II was 13.8 +/-3.8 and in Group II was 13.4 +/- 4.2. The time for first rescue analgesia in Group I, Group II and Group III was 3.6 +/- 1.3, 13.2 +/- 2.4 and 10.3 +/-2.9 respectively. There was significant difference in the three groups as p value was less than 0.05.

Conclusion: From the above study it is clear that addition of dexamethasone provides significant advantages for epidural block

Keywords: Caudal, Dexamethasone, Epidural, Intravenous.

INTRODUCTION

Various achievements have occurred in the field of paediatric anaesthesia. It included advances in not only in technology and pain management techniques[1] but also in the better understanding of pain physiology and pain perception. A child's health care behaviour, immune function and attitude are greatly affected by the amount of untreated pain.[2] There has been an increase in the use of regional anaesthesia compared to general anaesthesia.In paediatric practice, caudal block is the most reliable and extensively used technique of regional analgesia. The major drawback of using caudal block is the short duration of anaesthesia even with the use of

some longer acting anaesthetics like bupivacaine. To prolong its duration of action, various additives like opoids, neostigmine, alpha agonists and ketamine are added.[3] Dexamethasone, a corticosteroid is widely used preoperatively for its analgesic and antiemetic properties. It also carries anti-inflammatory properties. Studies have been conducted amongst adults and have shown that addition of dexamethasone reduces the severity of pain.[4] Dexamethasone has also shown to reduce the incidence of vomiting, nausea and fever amongst children.[5] Various studies have been conducted in the past to establish and compare different uses of dexamethasone during epidural block. The present study was conducted with the chief aim to compare the use of caudal versus intravenous dexamethasone as an adjunctive aid with epidural block.

MATERIALS AND METHODS

The present prospective randomised double blind trial was conducted in the Department of Anaesthesia, Government Medical College, Haldwani, Uttarakhand (India) during a period of one year. Only children belonging to ASA I and ASA II category were enrolled in the study. Subjects of urogenital surgeries were included in the study. The study was approved by the institutional ethical committee and all the subjects were informed about the study and a written consent was obtained from all in their vernacular language. Children with known allergies, bleeding disorders, belonging to ASA III category, neurological disorders or infection at the site of puncture were excluded from the study. Complete detail of the demographics like age, weight was recorded during the preoperative visit. Patients' complete and detailed history was obtained. All patients underwent routine laboratory investigations and physical examination. Patients were kept fasting before the procedure and premedicated with 0.01 mg/kg iv atropine, 0.05 mg/kg iv midazolam and 1.5 microgm/kg iv fentanyl. Three groups were made and a person who was not involved in the study made 1 ml similar syringes of drug to be injected in the study and control population. Subjects baseline parameters like heart rate, oxygen saturation and mean arterial pressure were obtained on arrival at the operation theatre. In all the cases induction was done with sevoflurane in 8 % oxygen. A 22 gauge cannula was secured and RL was initiated at 4ml/ kg/hr. Airflow of 3-4 L/min was maintained throughout. Caudal block was given using 23 gauge hypodermic needle. Group I patients received 0.15% of ropivacaine with 0.025 ml/kg of caudal normal saline. Group II patients received 0.15% ropivacaine along with 0.1 mg/kg dexamethasone and 0.125 ml/kg iv normal saline. Group III patients received 0.15% ropivacaine and 0.025 ml/kg of normal saline caudally and 0.5 mg/kg intravenous dexamethasone. 10 minutes after the initiation of caudal block, surgery was initiated. 50:50 ratio of sevoflurane in oxygen was maintained. Changes in the hemodynamics were noted during the entire procedure. Discontinuation of sevoflurane was done after surgery. Postoperative vitals were monitored for 3 hours and later after every 3 hours. The first analgesic time was noted. For rescue analgesia 15 mg/kg of paracetamol was done. Any side effects were noted during the entire procedure. All the results was arranged in a tabulated form and analysed using SPSS software. Chi square test was used and p value of less than 0.05 was taken as significant.

RESULTS

A total of 90 patients took part in the study with 30 patients in each group. The mean age of the study population was 3.6 +/- 1.2 years.

Table 1 demonstrates the demographic data, end tidal sevoflurane concentration and duration of surgery. The

mean age in Group I, Group II and Group III was 3.5 +/- 1.6, 3.8 +/-1.2 and 4.1 +/-2.2 respectively. The mean weight amongst the subjects of Group I was 14.3 +/-3.1 kgs, in Group II was 13.8 +/-3.8 and in Group II was 13.4 +/- 4.2. The end tidal concentration of sevoflurane in Group I, Group II and Group III were 3.6 +/- 0.2, 3.5 +/- 0.4 and 3.3 +/- 0.2 respectively. 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 demonstrates various other parameters observed in the study. The time for first rescue analgesia in Group I, Group II and Group III was 3.6 +/- 1.3, 13.2 +/- 2.4 and 10.3 +/-2.9 respectively. There was significant difference in the three groups as p value was less than 0.05. In Group I the mean number of rescue analgesia dose was 2.0 +/- 0.2, in group it was 1.4 +/- 0.1 and in Group III it was 1.2 +/- 0.2. The p value was less than 0.05 indicating significant difference between the three groups. Clear fluids were initiated comparatively early in Group II (5.4 +/-0.3hours) 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 1: Demographic data, end tidal conc of sevoflurane and duration of surgery

Parameters	Group I	Group II	Group III
Age (Years)	3.5 +/- 1.6	3.8 +/-1.2	4.1 +/-2.2
Weight (Kgs)	14.3 +/-3.1	13.8 +/-3.8	13.4 +/- 4.2
Male:Female	3:1	16:3	8:3
End tidal conc of sevoflurane	3.6 +/- 0.2	3.5 +/- 0.4	3.3 +/- 0.2
Duration of surgery (mins)	36.64 +/-9.87	30.97 +/- 12.1	40.11 +/-9.03

Table 2: Other comparative parameters

Parameters	Group I	Group II	Group III	P value
Time for 1st rescue analgesia (hrs)	3.6 +/- 1.3	13.2 +/- 2.4	10.3 +/-2.9	<0.05
Number of analgesia doses	2.0 +/- 0.2	1.4 +/- 0.1	1.2 +/- 0.2	<0.05
Time for initiation of clear fluids (hrs)	7.4 +/- 1.7	5.4 +/-0.3	6.1 +/- 0.1	<0.05
Time to discharge (days)	1	1	1	>0.05

DISCUSSION

Control of pain is of paramount importance especially amongst children. Along with pain there is bombardment of other unpleasant sensations like anxiety, fear and insomnia which makes the children irritable. Pain is also associated with nausea, vomiting, disturbances in sleep and dissatisfaction amongst parents.[6-8] Studies have

been undertaken to increase the duration of epidural block, the various steps include addition of dexamethasone through caudal route or through intravenous route.[9] Its addition increases the duration of analgesia by significant amount. In the present study, the mean age in Group I, Group II and Group III was 3.5 +/- 1.6, 3.8 +/-1.2 and 4.1 +/-2.2 respectively. The mean weight amongst the subjects of Group I was 14.3 +/-3.1 kgs, in Group II was 13.8 +/-3.8 and in Group II was 13.4 +/- 4.2. The end tidal concentration of sevoflurane in Group I, Group II and Group III were 3.6 +/- 0.2, 3.5 +/- 0.4 and 3.3 +/- 0.2 respectively. All these parameters were comparable to each other and there was no significant difference between them. The mechanism of action of dexamethasone is decrease in the tissue levels of bradykinin by inhibition of the release of neuropeptides from the nerve endings. Dexamethasone also inhibits COX-2 enzyme which is also responsible for nociception impulses.[10,11] In the present study, the time for first rescue analgesia in Group I, Group II and Group III was 3.6 +/- 1.3, 13.2 +/- 2.4 and 10.3 +/-2.9 respectively. There was significant difference in the three groups as p value was less than 0.05. In Group I the mean number of rescue analgesia dose was 2.0 +/- 0.2, in group it was 1.4 +/- 0.1 and in Group III it was 1.2 +/- 0.2. The p value was less than 0.05 indicating significant difference between the three groups. Clear fluids were initiated comparatively early in Group II (5.4 +/-0.3hours) compared to Group III and Group I. The difference was significant amongst the groups. The results of the present study were in accordance with the various other studies indicating that addition of dexamethasone either caudally or intravenously prolongs the duration of analgesia and hence decreasing the need for rescue analgesic doses. According to a study by by Castill J et al[12], there was prolongation in the duration of sciatic nerve block on addition of dexamethasone to bupivacaine microspheres. According to a study by Thomas S et al[13], there was a decrease in the postoperative pain and analgesic requirement during laparoscopic cholecystectomy after addition of dexamethasone to epidural block. In our study there was no effect seen on the motor block and delayed complications were not taken into consideration.

CONCLUSION

From the above study it is clear that addition of dexamethasone provides significant advantages for epidural block. It is necessary for a safe, efficient and effective analgesia. Dexamethasone decreases the number of rescue analgesics and decreases the time of first analgesia

REFERENCES

1. Motoyama EK, Davis PJ, editors. Special characteristics of paediatric anaesthesia. In: Smith's Anaesthesia for Infants and Children. 7th ed. Philadelphia: Elsevier; 2005.
2. Young KD. Pediatric procedural pain. Ann Emerg Med 2005; 45:160- 171.
3. Karaaslan K, Gulcu N, Ozturk H, Sarpkaya A, Colak C, Kocoglu H. Two different doses of caudal neostigmine co-administered with levobupivacaine produces analgesia in children. Paediatr Anaesth 2009;19:487-93.
4. Khafagy HF, Refaat AI, El‐Sabae HH, Youssif MA. Efficacy of epidural dexamethasone versus fentanyl on postoperative analgesia. J Anesth 2010;24:531-6.
5. Hanasono MM, Lalakea ML, Mikulec AA, Shepard KG, Wellis V, Messner AH. Perioperative steroids in tonsillectomy using electrocautery and sharp dissection techniques. Arch Otolaryngol Head Neck Surg

2004;130:917-21.

6. Chatterjee US. Preemptive analgesia in paediatric surgery. Afr J Paediatr Surg. 2011; 8: 267-8.
7. Jaichandran VV, Indermohan B, Jagadeesh V, et al. A multimodal approach to postoperative pain relief in children undergoing ambulatory eye surgery. Indian J Anaesth. 2008; 52: 794.
8. 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.
9. Hong JY, Han SW, Kim WO, Kim EJ, Kil HK. Effect of dexamethasone in combination with caudal analgesia on postoperative pain control in day‐case paediatric orchiopexy. Br J Anaesth 2010;105:506-10.
10. Hargreaves KM, Costello A. Glucocorticoids suppress levels of immunoreactive bradykinin in inflamed tissue as evaluated by microdialysis probes. Clin Pharmacol Ther 1990;48:168-78.
11. Hong D, Byers MR, Oswald RJ. Dexamethasone treatment reduces sensory neuropeptides and nerve sprouting reactions in injured teeth. Pain 1993;55:171-81.
12. Castill J, Curley J, Hotz J, et al. Glucocorticoids prolong rat sciatic nerve blockade invivo from bupivacaine microspheres. Anesthesiology 2002;85:1157–66.
13. Thomas S, Beevi S. Epidural dexamethasone reduces postoperative pain and analgesic requirements. Can J Anaesth 2006 Sep;53(9):899–905.