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Original Research Article

Evaluation of Dexamethasone with Bupivacaine for infra-umbilical surgeries in children

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Abstract: Caudal analgesia is one of the most preferred techniques of analgesia in infants and children for infra-umbilical surgeries. However it has disadvantage of short duration. Dexamethasone is a powerful anti-inflammatory agent and has been demonstrated to reduce morbidity after surgery. The aim of this study was to examine the effects of single dose of IV dexamethasone in combination with caudal block with Bupivacaine for infra-umbilical surgeries. This study was done on CAIMS, Karimnagar. 60 children undergoing infra umbilical surgeries were selected and randomly divided into two groups of 30 each. Group I received 0.25% Bupivacaine (1ml/Kg) caudal block. Group II received 0.25% Bupivacaine (1ml/Kg) and 0.5mg/Kg Dexamethasone IV single dose (maximum 10 mg) after surgery rescue analgesic consumption, pain scores and adverse effects were evaluated after 24 hrs. Pain scores measured at the interval of 1, 2, 4, 6, 12 and 24 Hours post-operatively were lower in Group II compared to Group I. Mean duration of analgesia in Group I was 270 ± 57 min and Group II it was 510 ± 78 min and p values were <0.05. Rescue analgesic requirements were greater in Group I as compared to Group II. No significant incidences of adverse effects were also seen in both Groups. The results shows that IV dexamethasone 0.5mg/kg when used along with caudal block with Bupivacaine increased the duration of post-operative analgesia for pediatric infra-umbilical surgeries. Dexamethasone IV 0.5mg/Kg is good alternative to prolong post-operative analgesia without any adverse effects.
Keywords: Dexamethasone, Bupivacaine, Infra-umbilical Surgeries

INTRODUCTION

Pain defines pain as "An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage" [1]. If pain is left untreated or not managed properly it can progress to chronic pain There is a large amount of evidence for the use of multi-modal approaches to counteract pain in the pediatric population [2]. Postoperative pain management in children is challenging due to strong emotional component and it is also difficult to assess accurately the postoperative pain in children consequently greater focus is now applied on post-operative pain control in children. Various methods have evolved for providing post-op pain relief in pediatric population, some of which are not used because of side effects in children. In children narcotics could cause respiratory depression, Oral analgesics cannot be given some time after general anesthesia due to fear of vomiting and aspiration, and fear of needle stick in case of parentral analgesics. Regional anesthetic techniques significantly decrease the postoperative pain and systemic analgesic requirements. Caudal blocks are most preferred and safe technique for pediatric pain management including infra-umbilical surgeries. It reduces the requirements of inhaled and IV anesthetic agents and facilitates smooth and rapid recovery [3].

Bupivacaine is a long acting Local Anesthetic agent commonly used for caudal analgesia. However despite good initial analgesia from caudal blockade significant number of patients develop moderate to severe pain once duration of action of the Local anesthetic agent is over [4, 5]. Several additives are used in order to improve this drawback and improve its analgesic efficiency [6, 7]. Dexamethasone is a corticosteroid with strong anti-inflammatory effects has shown to provide post-operative analgesia and

improvement in morbidity postoperatively. Dexamethasone due to its potent anti-inflammatory effects, started to be investigated for its analgesic efficacy. In this study we tried to evaluate the analgesic additive effect of dexamethasone when administered IV along with Caudal blocks in children during infra-umbilical surgeries.

MATERIALS AND METHODS

This study was conducted in CAIMS, Karimnagar. Institutional Ethical committee permission was obtained and written informed consent was obtained from parents or guardians. All the patients included in the study were belonging for ASA (American Society of Anaesthesiologists) classification of physical status I and II undergoing herniotomies. All the patients were pre-operatively evaluated to rule out bleeding/coagulation disorders, local infections, sepsis, neurological disorders, allergy to Bupivacaine and drugs to use during and after the surgery. All parents were explained about the anaesthetic technique and perioperative course during a pre-operative visit on the day before surgery. Patients were randomly allocated in two groups. Group I (n=30) they received 0.25% Bupivacaine (1ml/Kg) caudal block. And Group II (n=30) received 0.25% Bupivacaine (1ml/Kg) and 0.5mg/Kg Dexamethasone IV single dose (maximum 10 mg). After inhalational induction of general anaesthesia with sevoflurane 8% and N_2O in 50% O_2 in spontaneous ventilation secured airway with laryngeal mask. Anaesthesia maintained by 2.5% to 3 % sevoflurane. Caudal block was performed by 22G short beveled needle in the lateral decubitus position. The solution was injected slowly with repetitive intermittent aspiration. Surgery was started after 10 min after the block. Standard monitoring was used during anaesthesia and surgery. Pethidine 0.25 mg/kg I.M. was administered as rescue analgesia. All vital signs were continuously monitored during and until the end of surgery. After transferring to the ward, rescue analgesic consumption, pain scores and adverse effects such as post-operative nausea and vomiting, urinary retention were monitored for 24 h. Analgesia when required was provided with paracetamol 15mg/kg postoperatively.

RESULTS

The table 1 shows the details of the patients selected for the study. Group I which received 0.25% Bupivacaine (1ml/Kg) caudal block and Group II received 0.25% Bupivacaine (1ml/Kg) caudal block and 0.5mg/Kg Dexamethasone IV single dose (maximum 10 mg). All the patients selected were belonging ASA classification I or II and the Mean age in years, and other parameters are given.

Table 1: Details of patients selected for the study

	Group I (Mean ± SD)	**Group II (Mean ± SD)**	**P values**
No. of patients	30	30	-
ASA I/II	22/8	25/5	0.12
Age in months	36 ± 1.5	34 ± 1.0	0.53
Height in cms	90.8 ± 10.15	89.9 ± 9.51	0.77
Wight in Kgs	12.56 ± 2.20	11.90 ± 3.5	0.94
Duration of surgery	55.6 ± 10.79	59.0 ± 10.11	0.10

The table 2 shows the duration of absolute analgesia in minutes while the value recorded in the Group I was 270 ± 57 minutes in Group II the value was 510 ± 78 the calculated p values were 0.05 and significant. The number of patients receiving rescue Pethidine 0.25mg/kg was 60 % in Group I and it was 13.34% in Group II the p values were significant. Similarly the number of patients receiving rescue paracetamol was 29 (96.67%) in Group I and 19 (63.34%) in Group II and the calculated p values were found to be significant.

Table 2: Duration of variables recorded postoperatively

Variable	Group I (Mean ± SD)	Group II (Mean ± SD)	P value
Duration of absolute analgesia (min)	270 ± 57	510 ± 78	0.05*
Emergence time	306 ± 50.4	360 ± 90	0.02*
No. of patients received rescue Pethidine 0.25 mg/kg	18 (60%)	4 (13.34%)	0.03*
No. of patients received rescue Paracetamol	29 (96.67%)	19 (63.34%)	0.05*

* P values < 0.05 is significant

The post-operative pain score recorded according to Büttuner W, Finke W Analysis of behavioral and physiological parameters for the assessment of postoperative analgesic demand in new-born, infants and children the parameters and scores given in table 3

Table 3: children and infants Postoperative pain score [8]

Item	Structure	Points
Crying	None Moaning Screaming	0 1 2
Facial Expression	Relaxed/smiling Dry mouth Grimace	0 1 2
Posture Of Trunk	Neutral Variable Rear up	0 1 2
Posture Of Legs	Neutral Kicking about Tightened legs	0 1 2
Motor Restlessness	None Moderate Restless	0 1 2

Table 4 shows the mean values of the post-operative pain scores recorded in the patients in different groups at the intervals of 1,2,4,6 ,12 and 24 hours. The calculated p values were significant at the interval of 4 hours 6 hours and 24 hours.

Table 4: post-operative pain scores

Time in hours	Group I (Mean ± SD)	Group II (Mean ± SD)	P values
1	2.5 ± 0.5	2.0 ± 0.5	0.12
2	3.0 ± 0.5	2.0 ± 0.5	0.60
4	3.5 ± 0.5	2.5 ± 0.5	0.05
6	4.5 ± 0.5	3.0 ± 0.5	0.03
12	4.5 ± 0.5	4.0 ± 0.5	0.11
24	3.5 ± 0.5	3.0 ± 0.5	0.02

* P values < 0.05 is significant

DISCUSSION

In the present study it was seen clearly that significant prolongation of post-operative analgesia was achieved by addition of Dexamethasone IV along with caudal Bupivacaine. Steroids have potent anti-inflammatory action and they have shown to reduce

post-operative pain and swelling after various surgeries [9-12]. The biological actions of steroids have been shown to be mediated by altering functional protein synthesized by translocation of hormone receptor complex into the nucleus [13, 14]. However it is not completely understood whether the anti-inflammatory effects of glucocorticoids mediate via binding to a cytoplasmic receptor in target cells and activation of gene expression [15]. They have been shown to suppress formation of levels of bradykinin, neuropeptides from the nerve endings which are responsible for nociception in inflamed tissue [16, 17]. It also inhibits formation of cyclooxygenase isoform-2 in peripheral tissues and in the central nervous system [18]. Hval *et al.;* have demonstrated that the analgesic effect was prolonged for 3 days when dexamethasone is added to a non-steroidal anti-inflammatory drug (rofecoxib) before breast surgery [19].

In the present study there was a decrease in pain score and the number of patients receiving rescue analgesic requirements was significantly less in the Group II which received Dexamethasone IV along with Bupivacaine. The effect of IV dexamethasone is widely popular in the otolaryngological procedures with dose varying from (0.4 -1.0mg/Kg) [20-22]. In one study by H Y Hong *et al.;* using IV dexamethasone 0.5mg/kg with caudal analgesia reported that IV dexamethasone augmented the intensity and duration of postoperative analgesia without adverse effects [23]. In one similar study by Bangash L.R *et al.;* using IV dexamethasone along with caudal block in children orchidopexy has shown that the dexamethasone significantly prolongs the caudal block which is in agreement with the present study [24]. In this study we found that the duration of absolute analgesia in Group II receiving IV dexamethasone was 510 ± 78 mins Hong *et al.;* have shown the duration prolonged up to 646 minutes after IV dexamethasone. The strong anti-inflammatory action of dexamethasone is thought be involved in the process [25, 26]. In one study by Begat *et al.;* addition of 8 mg of dexamethasone to lignocaine (3mg/Kg) for intravenous regional anaesthesia produced significantly lower pain scores and need for analgesia in first 24 hours after surgery [27]. In this study we found that number of patients requiring rescue analgesia were significantly lesser in Group II as compared to Group I similar observations were made by S choudhary *et al.;* where they used caudal dexamethasone with rupivacaine for post-operative pediatric herniotomies [28]. Dexamethasone has added advantages as reported in previous studies that it does not cause problems of prolonged sedation, vomiting or urinary retention with other analgesic agents, it rather prevents postoperative nausea and vomiting [29, 30]. The anti-emetic action of dexamethasone probably appears due to action via prostaglandin antagonism, serotonin inhibition in the gut and release of endorphins. several studies have also shown that single dose of dexamethasone used perioperatively for pediatric and adult patients undergoing surgical procedures is not associated with a significant increase in the incidence of adverse effect [21, 23]. In the present study we did not recorded any adverse due to use of dexamethasone.

CONCLUSION

The results shows that IV dexamethasone 0.5mg/kg when used along with caudal block with Bupivacaine increased the duration of post-operative analgesia for pediatric infra-umbilical surgeries. Dexamethasone IV 0.5mg/Kg is good alternative to prolong post-operative analgesia without any adverse effects.

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