

ORIGINAL ARTICLE

Intravenous Dexamethasone as an Adjuvant to Caudal Analgesia for Post Herniotomy Pain

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ABSTRACT

Objective: To compare the outcomes of caudal block with or without intravenous dexamethasone in controlling post-herniotomy pain in pediatric population

Patients and Methods: A total of 90 patients who underwent inguinal herniotomy were included in this prospective comparative study. The study was conducted in a tertiary care setup in Qatar from Jan-2020 to May-2021. Patients were randomly allocated to two groups. Group A (dexamethasone) patients received dexamethasone intravenous 0.25 mg/kg in 5 ml of distilled water, 10 minutes before surgery. Group B (control) received 5 ml of normal saline, 10 minutes before surgery. The patients were followed for up to 240 minutes after surgery to determine adequate pain relief.

Results: Mean age of the children included in this study was 7.11 ± 1.95 years. There were 46 (51.1%) female children and 44 (48.9%) male children. Adequate post-operative pain relief was achieved in 30 (33.33%) patients, while rescue analgesia was needed in remaining 60 (66.67%) patients. Adequate pain relief was achieved in 24 (53.3%) children in dexamethasone group and in only 06 (13.3%) children in control group (p-value 0.001).

Conclusion: In children undergoing herniotomy, Intravenous 0.25 mg/Kg of dexamethasone when used as an adjunct to bupivacaine for caudal block significantly reduces post-operative pain.

Keywords: Caudal Block, intravenous dexamethasone, Post-operative pain Relief.

INTRODUCTION

Pain after surgery adversely affects health outcomes.¹ Untreated pain may have long-term deleterious impacts on pain sensitivity, immunological function, neurophysiology, attitudes, and health-care behavior, according to evidence.² When compared to adults, postoperative pain in children was mostly disregarded or undertreated in the 1970s and 1980s.³ This has been shown to have substantial consequences for children both in the immediate postoperative time and in the extended postoperative term. As a result, diagnosing, monitoring, and treating pain in children is critical.⁴

According to reports, up to 40% of children who have surgery experience moderate to severe post-operative pain.⁵ Almost all treatments involving the lower abdomen and lower limbs need caudal anesthesia for pre- and post-operative analgesia, particularly in newborns and young children.⁶ In pediatric patients, a caudal epidural block is a typical regional approach for providing intra- and post-operative analgesia for surgical operations below the umbilicus.⁷ It's often a one-shot approach. The procedure's shortcomings include the procedure's very brief duration of single-shot caudal injection with local anesthetic.⁸ Clonidine, midazolam, ketamine, neostigmine, and tramadol are some of the adjuncts that have been added to local anesthetics to prolong analgesia of single-shot caudal analgesia, but their use has been limited due to unacceptable side effects or safety concerns, especially in preservative-containing agents.⁹ Dexamethasone is a corticosteroid that has powerful anti-inflammatory effects.¹⁰ Dexamethasone has traditionally been used in anesthetic treatment to lower the occurrence of post-operative nausea and vomiting (PONV). When given intravenously,

dexamethasone has been shown to offer sustained post-operative analgesia.⁷ When paired with a caudal block, intravenous dexamethasone has been shown to improve postoperative analgesia. The aim of this study was to compare the outcomes of caudal block with or without intravenous dexamethasone in controlling post-herniotomy pain in pediatric population.

MATERIAL AND METHODS

A total of 90 patients who underwent herniotomy were included in this prospective comparative study. The study was conducted in a tertiary care setup in Qatar from Jan-2020 to May-2021. Patients of age 4-10 years, with ASA status I-II, having inguinal hernia were included. Patients with coagulation disorders as deranged PT, APTT values, INR >1.5, pre-existing neurological disease like cerebral palsy (CP), and spine abnormalities or any infection at the local site were excluded. Approval from ethical committee of the hospital was taken.

Patients were randomly allocated to two groups by lottery method. We used 0.25% Bupivacaine (1ml/kg), 10 minutes before surgery as caudal analgesia in all patients of both groups. Group A (dexamethasone) patients received dexamethasone intravenous 0.25 mg/kg in 5 ml of distilled water, 10 minutes before surgery and note the response in terms of pain relief after the end of surgery up to 240 minutes. Group B (control) received 5 ml of normal saline, 10 minutes before surgery and note the response in terms of pain relief after the end of surgery up to 240 minutes.

At the end of surgery post-operative pain was assessed by the resident anesthetist neither involved in study nor in the surgical procedure and recorded in both

groups at post-anesthesia care unit (PACU), using the Visual Analogue Scale (VAS) as defined in operational definition. The effectiveness (in terms of pain relief) (yes/no) was noted for each patient. The patients having score <3, up to 240 minutes after the end of surgery was considered as having adequate pain relief.

All data was entered using software SPSS version 21. Mean and standard deviation was calculated for age and BMI. Frequencies and percentages were calculated for gender, residential status, and pain relief in both groups. Chi-square test was applied to compare the outcome (pain relief) in both groups at p value of ≤ 0.05 as significant.

RESULTS

Mean age of the children included in this study was 7.11 ± 1.95 years. Mean BMI of study children was 23.41 ± 2.66 Kg/m². Minimum BMI was 18.70 Kg/m² and maximum BMI was 31.10 Kg/m². There were 46 (51.1%) female children and 44 (48.9%) male children in this study.

Adequate post-operative pain relief was achieved in 30 (33.33%) patients, while rescue analgesia was needed in remaining 60 (66.67%) patients. On comparison of Adequate post-operative pain relief between the groups, adequate pain relief was found in 24 (53.3%) children in dexamethasone group and in only 06 (13.3%) children in control group (p-value 0.001) [Table 1].

Table 1. Comparison of Post-Operative Pain Relief Between the Groups.

Pain Relief	Study Groups		P-value
	Dexamethasone (Group A)	Normal Saline (Group B)	
Yes	24 (53.3%)	06 (13.3%)	<0.001
No	21 (46.7%)	39 (86.7%)	

DISCUSSION

Caudal blocking, sometimes known as "the single most significant pediatric regional anesthetic technique," is an effective and safe way to provide surgical anaesthetic and postoperative analgesia for children's lower abdomen surgeries.¹¹ The length of analgesia from the block, which is usually provided as a single injection, is a constraint. As a result, there has been a lot of interest in so-called adjuvants, or drugs that extend the length of the block. Dexamethasone is one such adjuvant, and it has been shown to prolong the duration of peripheral nerve blocks when administered through both the intravenous (IV) and perineural routes.¹² Dexamethasone is routinely used to alleviate surgical nausea and vomiting during the perioperative phase. It has also been reported to have analgesic properties.¹³ Several studies have recently shown that administering dexamethasone by epidural injection prolongs analgesic effects and reduces analgesic needs in adults.¹⁴ Dexamethasone was also used as an adjuvant to local anaesthetics during brachial plexus block, which increased the quality of analgesia without causing any adverse effects. Dexamethasone is thought to have anti-inflammatory characteristics as well as a direct impact on nociceptive fibers.¹⁵

In present study we evaluated the analgesic efficacy of intravenous administration of 0.25 mg/Kg of dexamethasone as an adjunct to bupivacaine in children

undergoing herniotomy. We found significant beneficial effect of dexamethasone in reduction of post-operative pain. In our study, post-operative pain relief was found in 53.3% children in whom dexamethasone was given and in only 13.3% children in whom dexamethasone was not given.

A study conducted by Kim et al. found significant pain relief in 50% patients after 48 hours of surgery and in only 10.8% of the patients in normal saline group.¹⁶ That is similar to the results of our study.

In the study of Bangash et al. the mean duration of analgesia was 621.60 ± 25.74 minutes and 402.40 ± 34.79 minutes in group A (with dexamethasone) and group B (with normal saline) respectively.¹⁷

A most recent study used 0.1 mg/kg of dexamethasone with caudal block in children undergoing herniotomy and found 50% pain relief in dexamethasone group than control group as 10.7%.¹⁸

The dose of dexamethasone employed in this study was half that used by Hong et al. in their study in order to find out if this dose can adequately prolong analgesia, and for how long. There is paucity of studies investigating intravenous dexamethasone combined with caudal or other neuraxial blocks. Also there is lack of dosage standardization regarding the use of intravenous dexamethasone for analgesia in children.¹⁹

Intravenous dexamethasone has improved duration of analgesia with other types of blocks. Desmet et al. in a randomized placebo-controlled study, reported statistically significant difference ($p < 0.0001$) in the time to first analgesic request in adults that had intravenous dexamethasone in addition to interscalene brachial plexus block compared to control group.²⁰

Also, a systematic review and meta-analysis of RCT involving perineural dexamethasone in addition to local anaesthetic agents, compared with local anaesthetic alone for brachial plexus block by Choi et al, obtained a longer analgesic duration in the dexamethasone group (1306 min) compared with the local anaesthetic only group (730 min).²¹

We didn't look at some of dexamethasone's possible side effects, such as hyperglycemia and adrenal suppression, in this research. Actually we did not want to employ invasive procedures for blood drawing since the children who had a day-case herniotomy do not need postoperative laboratory tests. Previous research has shown, however, that a single little dosage of dexamethasone does not cause substantial adverse effects.

CONCLUSION

In children undergoing herniotomy, Intravenous 0.25 mg/Kg of dexamethasone when used as an adjunct to bupivacaine for caudal block significantly reduces post-operative pain.

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