

## Evaluation of Caudal Epidural Analgesia for Relieving Post-Operative Pain in Paediatric Surgical Patients

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### Abstract

### Original Research Article

Post-operative pain poses major problem in children undergoing surgery. The use of caudal epidural analgesia as an adjuvant to general anaesthesia reduces intraoperative requirement of analgesics and post-operative pain relief. Caudal epidural analgesia in children is safe and effective in hands of experts. **Materials & Methods:** This study was conducted in children from age group 1month to 12 years undergoing umbilical and infra-umbilical surgeries after taking permission from institutional ethics committee. Out of 150 operated patients, 100 Patients were posted for umbilical and infra-umbilical surgeries. Caudal epidural analgesia was used along with general anaesthesia. Patients with sacral anomalies, skin infection, poor bony land marks, movements and previous operation were not included in study. 1% lignocaine hydrochloride without adrenaline with 0.25% Sensorcaine was used. Children were observed for pain as well as for any untoward effects in post-operative period. **Results:** In this study caudal block was successful in 98 (98%) cases. The duration of pain relief ranged from 240 minutes to 360 minutes. The average duration was 300 minutes. Blood in epidural tap were observed in 2% cases. Pain at injection site was complained by 6% cases. **Conclusion:** Caudal epidural analgesia is an efficient and safe method for achieving pain relief of reasonable duration in postoperative period in children.

**Keywords:** Post-operative pain, caudal epidural anaesthesia, narcotic analgesics.

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## INTRODUCTION

Post-operative pain needs to be managed in paediatric age group. Very few children presenting for surgery are in pain preoperatively. Opioid analgesics leads to sedation, nausea, vomiting and sometimes respiratory depression prolonging discharge from postoperative care unit and leads to anxiety in parents. Need to supplement oxygen may arise and shifting to ward is delayed. NSAID may not control pain leading to cranky, uncooperative child. This not uncommon to see the children immobilized with splints so that they don't pull out the dressings or disturb the operation wound. Use of spinal anaesthesia in children can lead to spinal headache to motor block and is not preferred. The use of caudal epidural anaesthesia is successful in expert hand and reduces anaesthetic requirement intraoperatively and provides postoperative analgesia, introduced by Sicard in 1901, is a form of regional analgesia given by injecting the anaesthetic solution in the sacral canal to block coccygeal, sacral and lumbar nerves outside the dura [1]. In adults it has not gained much popularity since it is time consuming, technically difficult, and has high incidence of failure. It is easy and effective in children [2, 3].

According to Armitage 1979, in children, a caudal block is performed under general anaesthesia as it is necessary to have immobile child for giving block [4]. Child will not allow prick and will have undesirable memories of anaesthesia and surgery. We can have better control of airway by giving general anaesthesia for giving caudal block. Cases were done under mask or LMA or intubation depending on type of surgery, time required for surgery and muscle relaxation required for it. Decreased anaesthesia requirement causes early recovery of patient and calm patient as pain is taken care of. Caudal block is successful in over 98% of cases, is effective for the operations performed from the umbilicus downwards, takes less than 1 minute to perform [4, 5]. It has all the advantages over spinal as it does not cause motor blockade in given dose of drug. Certain disadvantages of spinal anaesthesia, like troublesome post spinal headache is eliminated., e.g. Anatomical abnormalities of sacrum which make it unpredictable and greater chances of sepsis as the area is close to the anus. These can however be avoided by proper selection of cases and by observing strict aseptic measures. The use of caudal analgesia during the

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immediate post-operative period in children, needs due consideration, since beside relieving pain, it will also keep the patients awake, enable resumption of oral feeds, avoid restlessness. Rakesh Kushwala *et al.*, found that children are pain free in post-operative period, which is important in building up of confidence and morale in them as well as in their parents [6]. This study was planned to clinically evaluate the efficacy, safety and duration of pain relief, following caudal epidural analgesia in children.

## MATERIALS & METHODS

This prospective study was conducted in tertiary care teaching hospital after obtaining clearance from institutional ethical committee. Children from age group 1 month to 12 years who were admitted to hospital for infra-umbilical or umbilical surgeries were included in our study. After confirming NBM status and consent, patient was induced with inj. glycopyrrolate 0.02 mg/kg, inj. emset 0.15 mg/kg, inj. Fentanyl 1mg/kg, inj. Midazolam 0.02mg/kg, inj. propofol 2mg/kg. LMA can be inserted with or without giving relaxant. We can hold mask for short duration surgery or can give relaxant and intubate patient. Anaesthesia was maintained using oxygen, nitrous oxide and sevoflurane and patient was given lateral position. Caudal block was given by senior anaesthetist under all aseptic precautions. Patients with sacral anomalies, skin infection, poor bony landmarks and previous operation were not included in study. 1% lignocaine hydrochloride without adrenaline and 0.25% sensorcaine was used. Total volume of drug varied depending on the site of surgery. Pre-anaesthetic check-up was done in detail by the anaesthesiologist, a day prior to operation. Only patients with ASA Grade I classification were selected for study. Post-operative analgesia was avoided to obviate the confusion in evaluation of pain relief due to caudal block during the post-operative period. Patients were observed in the recovery room till they were fully conscious and then shifted to post-operative ward. Children were observed for pain every half hour. The termination of analgesia was indicated by the following events a) Complaint of pain at the operation site, b) Crying- persisting even after giving feeds and c) Restlessness- with no other obvious

detectable cause. Patients were observed in postoperative period for any untoward effects. Pulse, blood pressure and respiration were recorded half hourly for 24 hr. Headache, nausea, vomiting, hypotension, pain in the back, retention of urine, motor weakness, pain at the site of injection, and any evidence of meningitis were specifically looked for. All the data were recorded in percentage. Time was recorded in minutes.

## RESULT

Total 100 surgical patients in paediatric age group were recruited during the study period. The operations were mainly infra-umbilical or umbilical surgeries (Table 1). All patients selected for study were in the age range of 1 months to 12 years with majority of patients below 6 years of age. All patients were distributed in to 4 age groups (Table 2). In this study caudal block was successful in 98 (98%) cases. In two patients caudal block could not be given. The time taken for surgery for all types of operations ranged from 15 to 60 minutes, with an average of 40 minutes. Dose of lignocaine hydrochloride 1% without adrenaline was used with 0.25% sensorcaine. For circumcision 0.5 ml/kg, for inguinal hernia 0.75ml/kg, for umbilical hernia 1ml/kg of volume was given. Dose of sensorcaine used was 2 mg/kg and lignocaine without adrenaline was 3mg/kg. The duration of post-operative analgesia was recorded from the time of injecting the drug into the epidural space to the onset of pain at operation site as evidenced by crying, restlessness, or complaint of pain by the patients. Onset of analgesia was taken as time of injection, since by the time patients came out of GA, the effects of caudal block invariably set in. The duration of pain relief ranged from 240 minutes to 360 minutes. The average duration was 300 minutes. Blood pressure was monitored during the postoperative period using appropriate size cuff. Any fall or rise in the BP was taken note of. None of the cases showed any significant fall in BP. The patients were observed carefully during injection and in the post-operative period. The records were maintained about their progress. The patients were visited and examined every day in the postoperative period, and complications if any were recorded.

**Table 1: Surgical procedure undertaken in the present study**

Sr. No	Type of surgery	No of patients
1	phimosis	22
2	hypospadias	24
3	Urethral meatal stenosis	1
4	Inguinal hernia	23
5	Hydrocele	5
6	Hernia with hydrocele	6
7	Bilateral inguinal hernia	2
8	Epigastric hernia	1
9	Anal dilatation	2
10	Perianal abscess	2
11	Intestinal obstruction	1
12	Umbilical hernia	3

Sr. No	Type of surgery	No of patients
13	Umbilical granuloma	1
14	Appendicectomy	2
15	Incompletely covered anus	1
16	Urethral fistula	4

**Table 2: Age wise distribution of patients**

Age group	No of patients
1 month	4
1 year	21
1-3	20
3-6	27
6-9	20
9-12	8

**Table 3: Mean weight of patients in diff age groups**

Age groups	Mean weight in kg
1 month to 6 months	6
6 months to 3 years	11.0
3- 6 years	14.0
6-9 years	20.5
9-12 years	24.5

There is no significant fall in BP

**Table 4: Details of complications**

<b>A: Immediate</b>		
Sr. No	Complications	Number of cases (%)
1	Haematoma	0
2	Blood in epidural tap	2
3	Dural puncture	0
4	Convulsions	0
5	Total spinal	0
6	Total body caudal	0
7	Hypotension –	0
<b>B: Delayed</b>		
Sr. No	Complications	Number of cases (%)
8	Headache	0
9	Pain at the site of injection	6
10	Retention of urine	0
11	Nausea and vomiting	0
12	Motor weakness	0
13	Back pain	0
14	Miscellaneous	0

**Table 5: Duration of analgesia**

Duration of Pain Relief	Duration
Minimum	240 Minutes
Maximum	360 Minutes
Average	300 Minutes

## DISCUSSION

Pain relief during post-operative period is an extremely important aspect of post-operative care. Conventionally narcotic analgesics were used which are not without hazards particularly in children. Spinal anaesthesia in children is avoided as it may give rise to headache and other complications. Caudal block is commonly used for post-operative and intraoperative

pain relief in children as an adjuvant to general anaesthesia [7].

In our study caudal epidural analgesia was given for umbilical and infraumbilical surgeries. All these patients were operated under general anaesthesia. Patients were given caudal block while still under the effects of general anaesthesia. The failure rate with our

technique was 2%. The failure rates reported by other workers in this age group are Armitage 1979 (2%), and McGown 1982 (2.8%). Our failure rate is similar to that reported by other workers [4, 8]. We attribute our low failure rate to proper selection of cases and caudal blocks being given by experts. Great importance was attached to the detection of any sacral anomaly which is an important cause of failure. Correct placement of needle in the caudal epidural space was ensured in all the cases prior to injection of the drug. The volume of drug to be injected in each case depends on type of surgery [10]. Dose of sensorcaine used was 2 mg/kg and lignocaine without adrenaline was 3mg/kg. Touloukian 1971 have used doses upto 8 mg/kg [9] and Hassan 1977 has used upto 11 mg/kg in infants without untoward effect [10]. For circumcision 0.5 ml/kg, for inguinal hernia 0.75ml/kg, for umbilical hernia 1ml/kg of volume was given. Duration of analgesia was measured from time of caudal block given, to onset of pain. The end point of analgesia was taken with the complaint of pain, restlessness without other cause or crying persisting in spite of feeding in case of infants and young children. The duration of pain relief ranged from 240 minutes to 360 minutes with an average of 300 minutes. Kay 1974 studied post-operative pain relief in children with Bupivacaine 0.5% and reported pain relief lasting till bed time in majority of patients [11]. Jensen 1981 studied caudal block for post-operative pain relief in children after genital operations, with Bupivacaine. He reported duration of pain relief ranging from 245 to 515 minutes [12]. There were no complications in his study. These results are comparable with our study. The quality of analgesia so obtained was good to excellent. The patients were wide awake after surgery and were able to take oral feeds. The younger children who reacted to pain by crying probably did so in the early stages when it was still felt as mild discomfort, whereas the older complained of it when it had increased in intensity. In our study, there was no significant fall in BP in various age groups. Hasan 1977 used lignocaine 1.5% in 50 infants for caudal block and reported no noteworthy change in pulse, blood pressure, respiration and ECG [10]. McGown 1982 reported hypotension in 2% cases in his study of 500 cases, using 1% lignocaine with 1:2000000 adrenaline. He however achieved blocks up to second to eight thoracic segments [8]. Our findings are in agreement with those of Hassan 1977 [12]. The cardiovascular stability observed in our cases. Blood in epidural tap was observed in 2% cases. McGown 1982 has reported incidence of sacral vein puncture in 10% of the cases in his study [8]. Retention of urine was not recorded. The inability to pass urine after anorectal and genital surgery is not infrequent. The main causes for this are post-operative pain of injured tissue and drugs such as opiate. Use of caudal block helped in pain relief. Patients remain wide awake and have effective post-operative analgesia. Lunn 1979 and Jensen 1981 have reported the incidence of nausea and vomiting as 23% and 33% respectively following caudal block [12, 13]. We did not encounter this complications as preoperative

antiemetics were given and repeated if needed. Pain at injection site was complained by 6% cases. On examination there was no evidence of local sepsis. Two patients had blood in epidural tap and procedure was abandoned. Patient were given other modes of analgesia {opioids and NSAID} In all these cases 6 patients complained of pain at site of injection which subsided on administration of oral analgesics. Other complications like dural puncture, convulsions, total spinal, headache and motor weakness of lower limbs were not encountered in my study.

## CONCLUSION

Caudal block in addition to general anaesthesia using lignocaine with bupivacaine is an efficient and safe method for achieving pain relief in post-operative period and reduces intraoperative anaesthetic requirement in children. It is effective and safe if given by expert and reduces risk of complications. Depending on type of surgery, doses is adjusted to achieve desired effect.

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