

ORIGINAL ARTICLE

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Evaluation of single low-dose caudal epidural block effectiveness in children undergoing circumcision surgery: Single center experience **Volkan Ozen***Prof. Dr. Cemil Tascioglu City Hospital, Department of Anesthesiology and Reanimation, Istanbul, Turkey*

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Abstract

The aim of this study was to evaluate the effectiveness of a single-dose caudal epidural block administered during circumcision surgery on postoperative analgesia. The study was conducted with the permission of the local ethics committee by screening the files of the patients with ASA I status between the ages of 4-9 years who had undergone circumcision surgery under general anesthesia at the Anesthesiology and Resuscitation Department of a training and research hospital between July 2018 and January 2019. Data were collected by using the anesthesia follow-up form of the participants and the Children's Hospital of Eastern Ontario Pain Scale when post-operative pain was evaluated. Descriptive statistics of the constant numerical variables were presented with median, IQR [interquartile range] while number (n) and percentage (%) were used for the categorical variables. A total of 149 patient files were screened within the scope of the study. The median [IQR] age was 7 [6-9] years. No side effect developed and no analgesic was required during hospitalization in any patient. The median [IQR] of CHEOPS score was 4 [4-4] with a range of 4 to 6. When asked, 98.0% of the parents said that they were perfectly satisfied with the surgery. Effective postoperative analgesia was provided without any side effects or complications with the use of 0.25% bupivacaine at a low single dose of 0.2 ml/kg for caudal epidural block in the pediatric population undergoing circumcision surgery.

Keywords: Caudal epidural block, postoperative pain, CHEOPS, parent satisfaction, analgesia**Introduction**

Circumcision is one of the most common penile surgical procedures performed as a day case in the pediatric population. This common procedure makes families uncomfortable by causing severe pain in the postoperative period and can thus affect the quality of the recovery process negatively. The anesthesia and analgesia methods administered should therefore have a short recovery period but also provide postoperative analgesia, ensuring a high degree of patient and patient relative satisfaction [1, 2].

Regional analgesia methods are widely used to provide analgesia in many department [3]. Caudal epidural block is a commonly used technique. This easy and safe technique is one of the neuro-axial block methods and can be used to administer a single dose for sub-umbilical surgeries [4]. The aim of using a single-dose caudal epidural block in circumcision surgery is to provide effective pain control and decrease the amount of analgesics required in the postoperative period [5]. This will shorten patient stay in the recovery unit and help increase the quality of care received by the patient [6].

The aim of this retrospective study was to evaluate the effectiveness of single-dose caudal epidural block for circumcision surgery on postoperative analgesia.

Materials and Methods

The study was conducted with the permission of the local ethics committee (Meeting Date: 04/16/2019, Decree No: 1257) by screening the files of 149 ASA I patients between the age of 4-9 years who had undergone circumcision surgery and received general anesthesia at the Anesthesiology and Reanimation Department of a training and research hospital between July 2018 and January 2019. In addition to the existing follow-up forms of the patients in the recovery unit and the hospital department, the Children's Hospital of Eastern Ontario Pain Scale (CHEOPS) had been used to evaluate the pain in the postoperative period. If the scale point ≥ 7 it means that the patient has pain.

The anesthesia follow-up forms revealed that the patients had not received premedication and standard monitorization had been used to monitor blood pressure, heart rate and peripheral oxygen saturation (SpO_2). The patients were administered 2-3 mg/kg intravenous (IV) propofol and 1 mcg/kg IV fentanyl for general anesthesia induction. They were then connected to the anesthesia device by inserting a laryngeal mask of suitable size. Anesthesia maintenance was with 2% sevoflurane and 50% air + 50% oxygen mixture. The patient was then placed in the left lateral decubitus

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position and administered caudal epidural block using 0.2 ml/kg 0.25% bupivacaine with a 24-gauge needle by an experienced anesthesia specialist after the required area preparation. The operation was started 10 minutes after the block. The caudal block was accepted as unsuccessful if the heart rate increased by 20% or more of the baseline after the start of the surgical procedure and the patient was then administered 10 mg/kg IV paracetamol. Vital signs were recorded every five minutes during surgery. The patients were discharged 12 hours after they woke up. The parents were asked by the department nurse whether the child experienced pain and were invited to evaluate their satisfaction as good, bad or perfect before discharge.

Statistical Analysis

The SPSS 15.0 software program was used in the statistical analysis of the data obtained in the study. The compliance of the measured values with a normal distribution was investigated with the "Shapiro-Wilk Test". Descriptive statistics of the constant numerical variables were presented with median, IQR [interquartile range] while number (n) and percentage (%) were used for the categorical variables.

Results

A total of 149 patient charts were screened in this study. Information on the descriptive characteristics of the participants is presented in Table 1.

Table 1. Information of the descriptive characteristics of the participants

	n	%
Age (years)	7 [6-9]	
Height (cm)	126 [119-136]	
Weight (kg)	28 [24-36.5]	
Surgery duration (minutes)	14.2 [13.4-14.45]	
CHEOPS score average	4 [4-4]	
CHEOPS 30th minute		
4 points	124	83.2
5 points	23	15.4
6 points	2	1.3
CHEOPS 1st hour		
4 points	149	100
CHEOPS 2nd hour		
4 points	149	100
CHEOPS 6th hour		
4 points	145	97.3
5 points	4	2.7
CHEOPS 12th hour		
4 points	147	98.6
5 points	1	0.7
6 points	1	0.7
Parent satisfaction		
Good	3	2.0
Perfect	146	98.0
State of analgesic use		
Not used	149	100

Data was presented as median [IQR] and number, percentage.
CHEOPS: Children's Hospital of Eastern Ontario Pain Scale.

The median [IQR] of age, height, weight was 7 [6-9] years, 126 [119-136] cm, 28 [24-36.5] kg, respectively. No side effect developed in any patient and no patient required any analgesic during hospitalization. The median [IQR] of CHEOPS score was 4 [4-4] with a range of 4 to 6. Perfect satisfaction with the surgery was reported by 98.0% of the parents.

Discussion

No postoperative pain was seen at the patients who underwent circumcision surgery and no block-related side effect was developed in this retrospective study. Also, none of the patients required analgesia. The satisfaction of the parents in the postoperative period was perfect at a rate of 98.0%.

A caudal epidural block can be administered quickly, ensures postoperative pain control for 6-12 hours and can be administered without the use of ultrasound [6]. It is especially useful to obtain effective postoperative analgesia in the pediatric population undergoing circumcision surgery [7, 8]. We obtained effective postoperative analgesia in our patients with this block, similar to the literature [9, 10]. We only had one patient with a score of 6, at the postoperative 12th hour, using the CHEOPS scale where the lowest score is 4 and pain is indicated by a score of 7 or more. None of the patients in the Beyaz [11] study had a Face, Legs, Activity, Cry, Consolability (FLACC) score of 5 or more that would indicate pain. No additional analgesic was required during the postoperative period following caudal bloc administration in our study, similar to the literature [12, 13].

Circumcision surgery causes serious pain especially during the first two postoperative hours, followed by a gradual decrease [14]. It is very important for the patient not to experience postoperative pain from the ethical, humanitarian and physiological points of view [15, 16]. Analgesics were required after 4-6 hours in the study of Yeoman et al. [17], after 6-8 hours in the study of Demiraran et al. [4] that was conducted with 0.2 ml kg⁻¹ 0.25% bupivacaine, and after 7.5 hours in the study of Kazak Bengisun et al. [18] conducted with 1 mg kg⁻¹ 0.25% levobupivacaine while no additional analgesic was required in any of the patients in our study. The duration of the motor blockage provided with bupivacaine is associated with the dose [19, 20]. Bupivacaine administered at a low dose was seen to shorten the duration of motor block and prolong the analgesic effect in the study of Silvani et al. [21]. The administration of low-dose (0.2 ml/kg) 0.25% bupivacaine could be the reason for the lack of side effects due to motor blockage and no need for additional analgesia until the 10th postoperative hour in our study.

Although the prevalence of side effects and complications due to the reliable and easy-to-use caudal epidural method is low [22], subcutaneous or intravenous injection, urinary retention, nausea and vomiting, hematoma, perforation of the dura and total spinal block due to local anesthetic drug administration to the

subarachnoid region have been reported [23]. The complication rate has been reported as 0.07-4.98% in the literature [24, 25]. No side effect or complication related to caudal block administration was seen in our study, similar to other studies [10, 11, 26]. The use of a low dose of 0.25% bupivacaine and the block being performed by an experienced anesthesiologist could be the reasons in our case.

The success of the caudal block is indicated by no need for additional narcotic agents in the postoperative period and the start of lower extremity movements in the early period [27]. In addition, parent satisfaction is reported to be high as there is no pain and oral intake can start early, shortening the hospitalization duration [24, 28]. We also found a high rate of perfect satisfaction of the parents due to positive effects such as the lack of surgical procedure-related pain and side effects as a result of the single-dose caudal epidural block, similar to the literature [13, 24, 29, 30]. The high parent satisfaction may be due to reasons such as the patients not crying in the postoperative period, lack of side effects and the early discharge.

The present study has some limitations. First, the results may not be generalized as it was a single center retrospective study. Second, the results of this study are from children aged 4-9 years who have undergone circumcision surgery and it may not be possible to generalize it to other age groups. Third, the study was retrospective design. Comparative studies should be done in the future.

Conclusion

Effective postoperative analgesia is provided without the development of any side effects or complications with the use of 0.25% bupivacaine at a dose of 0.2 ml/kg as a single low dose for caudal epidural block in the pediatric population undergoing circumcision surgery. A single-dose caudal epidural block also ensures early discharge without requiring additional analgesia and there is a high rate of perfect satisfaction of the parents.

Conflict of interests

The authors declare that they have no conflict of interest

Financial Disclosure

All authors declare no financial support

Ethical approval

University of Health Sciences, Clinical Ethical Committee of Okmeydanı Training and Research Hospital (Meeting Date: 04/16/2019, Decree No: 1257)

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