

Is penile block better than caudal epidural block for postcircumcision analgesia?

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Abstract

Purpose. To compare caudal and penile block for postoperative analgesia in children undergoing circumcision with respect to efficacy, complication rates, and parental satisfaction.

Methods. The study population consisted of 100 ASA 1 and 2 boys aged 3 to 8 years who were undergoing circumcision for religious reasons. In all participants, inhalation anesthesia was administered with oxygen:nitrous oxide (1:2) and halothane. The participants were allocated randomly into two groups of 50 children each. Group 1 received penile block and Group 2 caudal block. The penile block was achieved by injecting bupivacaine into the two compartments of the subpubic space, with an additional ventral infiltration of a small volume of bupivacaine along the raphe of the penis. For caudal block, 1 ml·kg⁻¹ body weight of 0.25% bupivacaine was administered.

Results. Penile block shortened the induction-incision time and enabled earlier discharge home compared with caudal block. One patient undergoing penile block and nine patients undergoing caudal block vomited.

Conclusions. Penile and caudal block are equally effective for postcircumcision analgesia and neither is associated with serious complications. Anesthesiologist preference should be the deciding factor in choosing one technique over the other.

Key words Postoperative analgesia · Circumcision · Penile block · Caudal block

Introduction

Jewish ritual circumcision is performed usually in newborns and rarely in older children. Circumcision is the most commonly practiced surgical procedure in

children [1], with approximately 1 200 000 performed in the United States in 1992 [2]. Since most circumcisions are performed in newborns, it is difficult to assess the intensity of postoperative pain. It is widely accepted that pain control should be provided after circumcision for ethical, humanitarian, and physiological reasons [3,4].

Caudal block and penile block are widely used for postoperative analgesia, but the best technique for postcircumcision pain control has not been determined to date. The large wave of immigration from the former Soviet Union to Israel provided us a population who could self-report pain intensity and assess the quality of postoperative analgesia after circumcision.

The aim of this study was to compare the quality of postcircumcision analgesia with penile block or caudal anesthesia in children aged from 3 to 8 years using a visual scale.

Methods

The ethics committee of the hospital approved the study, and informed written consent was obtained from all the subjects' parents.

One hundred consecutive ASA I and II children aged from 3 to 8 years undergoing circumcision for religious reasons were enrolled in this study and allocated to two groups of 50 patients each by a lottery of closed envelopes.

General anesthesia was induced in all patients with halothane in an admixture of nitrous oxide:oxygen (2:4:1·min⁻¹). Once adequate anesthesia was obtained, penile block was performed in the 50 patients in Group 1 by injection of bupivacaine 0.5%, 0.2 ml·kg⁻¹ of body weight into the two compartments of the subpubic space, which is traversed by the nerve before it enters the base of the penis [5]. An additional amount of the same local anesthetic (0.1 ml·kg of body weight) was

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Table 1. Comparative data

Variable	Group 1	Group 2	<i>P</i> value
Age (yr)	5 ± 2	5 ± 2	0.41
Weight (kg)	20 ± 4	20 ± 4	0.64
Induction-incision time (min)	4.5 ± 1	6.4 ± 1.8	0.001
Pain score	1.0 ± 1.2	1.5 ± 2.1	0.1
Paracetamol in recovery room (<i>n</i>)	0/50	2/50	0.324
Time to discharge home (min)	122 ± 4.6	159 ± 46	0.001

injected into the dorsal aspect of the penis, along the raphe of the penis near the scrotum [6]. In the 50 patients in Group 2, caudal block was carried out in the lateral position, with 1 ml·kg⁻¹ body weight of plain 0.25% bupivacaine (up to 20 ml).

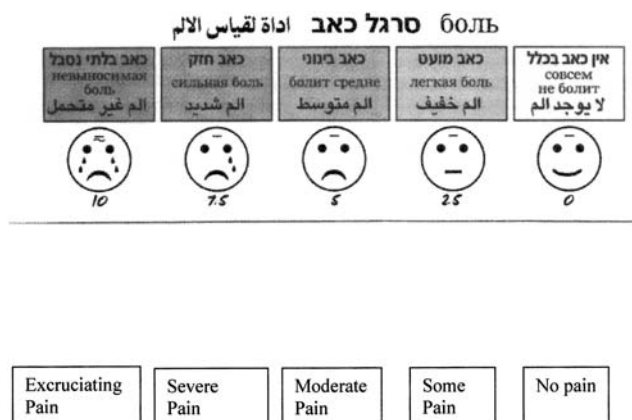
In both groups, after the block was accomplished, anesthesia was maintained with halothane 0.5% in 70% nitrous oxide [7] delivered through a Jackson-Rees attachment and face mask with spontaneous respiration. When signs of insufficient anesthesia, such as phonation, movements, tachycardia, and hypertension, were observed, the concentration of halothane was increased until the signs disappeared. Significant bradycardia and hypotension were treated by administration of atropine, fluids, or both, as required.

A circulating operating room nurse who was unaware of the block technique recorded the induction-incision time (the time interval from the beginning of the halothane administration until the beginning of surgery).

An anesthesiologist who was not involved in the study reviewed the automatic record of the anesthesia monitor (ASA 3, Datex, Instrumentarium Corp, Helsinki, Finland) at the end of each procedure. A variation of 20% or more in blood pressure and pulse rate in either direction was considered clinically significant [8].

Immediately after surgery, the children were transferred to the recovery room where a nurse who was unaware of the study protocol applied the five-point Faces Pain Assessment Ruler [9] (Fig. 1) when the child was fully awake for pain intensity self-assessment. Other parameters recorded in the recovery room were time to respond to commands (TRC), discharge time to the day care infirmary, and complications. When the pain assessment indicated a distressing or excruciating degree of severity, 15 mg·kg⁻¹ of body weight of oral paracetamol, as syrup or tablet according to the child's preference, was administered for postoperative pain relief.

The children were discharged home from the day care infirmary after 120 min, unless any complication occurred, in which case the clinic nurse recorded the cause of delay in discharge to home.

**Fig. 1.** Five-point face pain assessment ruler

The parents were requested to observe and record the need for paracetamol at home during the first postoperative day and to report it to the case surgeon at the routine 24-hour postoperative visit. The parents were also asked to rate their degree of satisfaction with the postoperative course by means of a 10-cm visual analogue scale (0, not satisfied at all; 10, extraordinarily satisfied).

Statistical analysis was performed with the Epi-Info (CDC, Atlanta, GA, USA) Software Package. Fisher's exact test was applied for qualitative data and Student's *t*-test for quantitative data. A *P* value <0.05 was considered statistically significant.

Results

Table 1 summarizes the comparative results between the two groups.

There were no differences related to age and weight between the children of the two groups. The induction-incision time was 4.5 ± 1 min in group 1 and 6.4 ± 1.8 min in Group 2 (*P* < 0.001). There was no difference in pain severity between the two groups (*P* = 0.10). Paracetamol was given in the postanesthesia care unit to two patients of Group 2 and in none of Group 1 (*P* = 0.324).

The frequency of intraoperative events was also similar in both groups. Tachycardia was observed in three patients in Group 1 and six patients in Group 2 ($P = 0.49$). Phonation was found in one patient in Group 1 and three in Group 2 ($P = 0.32$). Movement was observed in two patients in Group 2 and none in Group 1 ($P = 0.495$). Vomiting occurred in one patient in Group 1 and nine in Group 2 ($P = 0.019$).

The children in Group 1 were discharged home after 122 ± 5 min (range, 120 to 150 min), compared with 159 ± 46 min (range, 120 to 300 min) in Group 2 ($P < 0.001$).

A hematoma was seen at the base of the penis in three patients in Group 1, and motor block occurred in eight patients in Group 2. Six patients in Group 1 and 10 patients in Group 2 required paracetamol at home ($P = 0.484$).

There were no significant differences in parental satisfaction between the two groups (9 ± 1 in Group 1 and 8.9 ± 1.4 in Group 2; $P = 0.484$).

Discussion

Postoperative pain in children is a well-recognized phenomenon and should be prevented as much as possible for both medical and ethical reasons [10]. Children experience postoperative pain with the same intensity as adults [11]. Circumcision in children is followed by severe pain [12], especially during the first 2 h postoperatively, after which its intensity decreases [13]. Adequate control of pain following surgery increases patient satisfaction and shortens hospital stay [12].

Many techniques have been recommended for postcircumcision pain relief, including penile or caudal block, penile ring infiltration, and topical application of EMLA (AstraZeneca) or lidocaine jelly and parenteral opioids.

Parenteral opioids can lead to the well-known side effects of respiratory depression, alterations of consciousness, nausea, and vomiting. The topical application of local anesthetic does not provide adequate analgesia and has not been adopted universally for postcircumcision analgesia [14,15].

Since caudal block and dorsal penile block compare favorably with ring block [16,17], we have adopted both these techniques for postcircumcision analgesia in our routine practice. Nevertheless, the ideal regional anesthesia for analgesia after circumcision has still not been determined.

The large numbers of relatively older children among new immigrants undergoing circumcision for religious reasons in our country enabled us to conduct studies based on the self-report of pain intensity to assess the best techniques for postcircumcision pain control. Self-report, which is not possible in the age group that tradi-

tionally undergoes circumcision, is the gold standard for the assessment of pain intensity [18].

We decided to recruit children aged 3 to 8 years for this study because they represent the largest subgroup of patients coming to our practice for circumcision, and because children in this age group are capable of quantifying the intensity of pain using a face pain scale [19].

Patient satisfaction is an important measure of the quality of health care services and can become the basis for future recommendation to other potential patients [20].

In order to assess the quality of the service provided among the parents, we used a visual analogue scale of 10 cm, rating zero as "not satisfied at all" and 10 as "extraordinarily satisfied" [21]. In addition to grading their degree of satisfaction, the parents were asked to record the number of doses of paracetamol administered during the first 24 h after surgery.

The optimal dosage of local bupivacaine for penile block is not well defined and varies from 1.0 to $1.5 \text{ mg} \cdot \text{kg}^{-1}$ of body weight [5,16,22,23]. We arbitrarily chose a dose of $1.5 \text{ mg} \cdot \text{kg}^{-1}$ of body weight injected at three points.

We found long-lasting postoperative analgesia in both groups. We were surprised that only a few children required paracetamol administration at home, but this has been reported in children undergoing circumcision with penile block with 0.25% bupivacaine [24].

Both regional techniques have potential complications. Caudal anesthesia can cause motor block, delayed first micturition, and an incidence of nausea and vomiting varying from 12% to 37% [7,19,25]. Penile block can cause local hematoma, mild local edema [26], systemic toxic effects due to absorption of the local anesthetic [27], and rarely ischemia of the glands due to arterial compression [28] or the vasoconstrictor property of the local anesthetic drug [29]. Motor block was seen only among caudal block patients, and hematoma of the penis only in the penile block group.

We were unable to demonstrate any difference in the quality of the postoperative analgesia between penile block or caudal block as an adjuvant to general anesthesia in circumcision. There were also no differences between the techniques in parental satisfaction. There were no statistically significant differences in the rescue doses of paracetamol administered during the first postoperative day.

We have demonstrated that the induction-incision time and time to discharge to home were both shorter in the group receiving penile block. We believe that a shorter induction-incision time and a faster discharge to home in a day clinic allow better utilization of the hospital resources and can justify the use of penile block. Further studies are necessary to assess this assumption.

Vomiting was more frequent in the children who received caudal block than in those who had penile block, but it did not affect time to discharge from the recovery room or parental satisfaction.

Our results do not demonstrate a clear advantage of one technique over the other. Therefore, we believe that the choice of penile block or caudal block as adjunct to general anesthesia for circumcision in children should be based on the preference and skill of the attending anesthesiologist.

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