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Can regional anesthesia have an effect on surgical outcomes in patients undergoing distal hypospadia surgery?

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Summary

Background
Caudal and penile blocks are the most popular regional anesthetic techniques used in infants and children undergoing urological surgery. A recent report has suggested that penile venous pooling resulting from caudal blocks could affect surgical outcomes after hypospadias operations.

Objective
The aim was to report our experience in patients with distal hypospadias undergoing repair with caudal versus penile block.

Study design
A retrospective clinical database was constructed for patients who underwent distal hypospadias repair by a single surgeon (M.P.B.) at our sponsoring institutions for the time period 2008–2013 ($n = 192$). Collected data included hypospadias classification (glanular, coronal, subcoronal), chordee status, perioperative anesthesia (caudal vs. penile), and assessment of postoperative complications (fistula and meatal stenosis).

Results
Risk ratio (RR) analysis for all distal hypospadias cases revealed that there is a higher risk of developing complications in patients who underwent caudal anesthesia than in patients who underwent penile block RR for a complication was 3.70 (95% CI 1.05-13.03; $p < 0.04$) (Figure).

Discussion
Similar to other papers in the literature, we found that patients who underwent caudal anesthesia had more complications than those who underwent penile block. The limitations of this study include not adjusting the results according to the severity of hypospadias.

Conclusion
The main goal of this study was accomplished by demonstrating that, in our series, caudal anesthesia is associated with a higher risk of fistula formation after undergoing distal hypospadias repair than penile block.

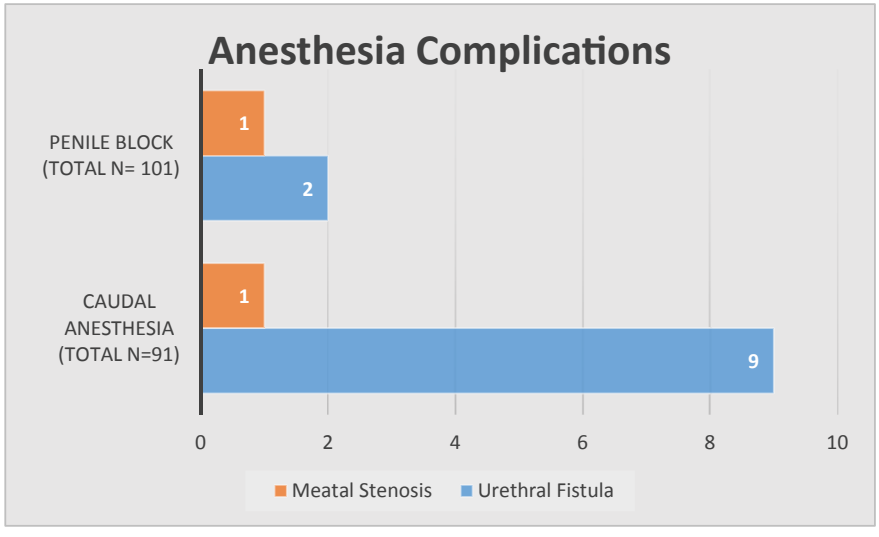

Figure Anesthesia complications.

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Introduction

Caudal and penile blocks are the most popular regional anesthetic techniques used in infants and children undergoing urological surgery [1–3]. Moreover, caudal block has become the preferred method for anesthesia for lower torso surgery in children [4]. Over the last decades, recent advancements in surgical techniques in hypospadias surgery have reduced postoperative complication rates [5–7]. But even with this progress, most authors report a 5–10% complication rate for distal hypospadias repairs [8,9]. Kundra et al. [10] recently reported worse surgical outcomes in patients undergoing hypospadias repair while using a caudal block. This study was designed to report our experience in patients with distal hypospadias undergoing repair with caudal versus penile block with emphasis on postoperative outcomes. Thus, we set to evaluate if, in our series, caudal block outcomes are inferior to penile blocks.

Methods

We retrospectively reviewed 192 patients who underwent distal hypospadias repair by a single surgeon (M.P.B.), a trained pediatric urologist with significant experience before beginning this series at the sponsoring institutions from 2008 to 2013. Collected data included hypospadias classification by its anatomical position (glanular, coronal, subcoronal). All patients underwent tubularization of the urethral plate with or without urethral plate incision. Penile curvature status was also taken in account in this study, given that the presence of chordee may influence the repair [11]. All patients underwent general anesthesia. This study also included a comparison of perioperative, or adjuvant, anesthesia utilized, in order to reduce the use of opioids at recovery room or after discharge. The primary surgeon performed the penile blockage, and generally used bupivacaine 0.25%. In all cases, caudal block was performed by a pediatric anesthesiologist. Moreover, bupivacaine 0.25%, at 1 mL per kilogram, was used in all patients receiving caudal anesthesia. No additives, such as clonidine or epinephrine, were used in any of the adjuvant anesthesia injections. The pediatric anesthesiologist in charge of the case and not the surgeon chose the anesthesia method. Moreover, there were no changes in anesthesia trends over time, and no specific method was selected depending on the severity of hypospadias. Finally, we performed an assessment of postoperative complications including fistulas and meatal stenosis at regular follow-up visits to the clinics. The data were analyzed using risk ratio analysis and the Fisher exact test, to determine if there is a significant risk associated with either of the anesthetic methods.

Results

The characteristics and the techniques used for surgical repair were similar in all patients. Differences in hypospadias location and outcomes are given in Table 1. The mean age for distal hypospadias repair was 11 months in both groups, following the recommended age window for repair [12] with mean follow-up of 4 years. Of the entire sample, 137 patients presented with concomitant chordee. Around 50% of the sample underwent either caudal or penile anesthesia block for postoperative pain control ($n = 91$ vs. 101, respectively). Only 6% of the patients ($n = 13$) developed complications requiring further management. As expected, the most common complication was urethral fistulas, which were detected in 11 patients, followed by meatal stenosis in two patients. Complications occurred in no definite pattern and during different years. No temporal clusters of complications were detected upon reviewing the data. None of the patients had a glandular dehiscence. Interestingly, most patients who developed a urethral fistula underwent caudal anesthesia ($n = 9$, 11%) (Table 1). The degree of chordee in our series of distal hypospadias did not influence the outcomes. Additionally, risk ratio analysis for all distal hypospadias cases revealed that there is a higher risk of developing complications in patients who underwent caudal anesthesia than in patients who underwent penile block. In the caudal anesthesia patients, the risk ratio for a complication was 3.70 (95% CI 1.05–13.03; $p < 0.04$). Also, we used the Fisher exact test to further demonstrate statistical significance, with the probability of complication being 4.88; $p < 0.027$, for the caudal anesthesia group.

Table 1 Other patient characteristics.

	Glanular	Coronal	Subcoronal
Total number (*n*)	71	22	99
Concomitant chordee (*n*)	49	15	74
Meatal stenosis (*n*)	0	0	2
Urethral fistula (*n*)	4	1	6
Age range (months)	4–192	5–145	3–192

Discussion

Hypospadias are common congenital anomalies of the male external genitalia. The incidence ranges from approximately 1 out of 250 to 1 out of 300 live births [13]. Interestingly, an increase in the incidence of this abnormality in the United States and in some European countries has been reported by Paulozzi [14]. Multiple factors have been identified as potential detriments to hypospadias repair success [6,15]. Risk factors for failure include the dexterity of the surgeon, severity of the defect, adequacy of the technique used, the patient's ability to heal, and adequacy of urinary drainage [16,17]. Our overall complication rate (6%) is similar to contemporary series [7–9,18–20]. The most common complications of this procedure in our series were urethrocutaneous fistulas and meatal stenosis. Other complications reported in other series include wound/glans dehiscence, strictures, and balanitis xerotica obliterans [6,21].

Caudal anesthesia is widely used by pediatric anesthesiologists because of its safety, simplicity, and cost-effectiveness [22]. In some centers, it has become almost the standard of care for genital surgery in children [22,23]. Without a doubt, the versatility of caudal blockage in terms of safety and pain control after lower body surgery is