

Caudal anesthesia with sedation for laparoscopic inguinal hernia repair in infants – a case series

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Introduction

Inguinal hernia repair (IHR) is one of the most common procedures performed in infants¹. Laparoscopic inguinal hernia repair is gaining in popularity due to multiple advantages over open repair². Traditionally, this has been performed under general endotracheal anesthesia. Concerns regarding adverse effects of general anesthesia and hazards of endotracheal intubation in this population have prompted use of caudal anesthesia with sedation for open inguinal hernia repairs in infants³. This anesthetic technique has not been described for transumbilical laparoscopic repairs.

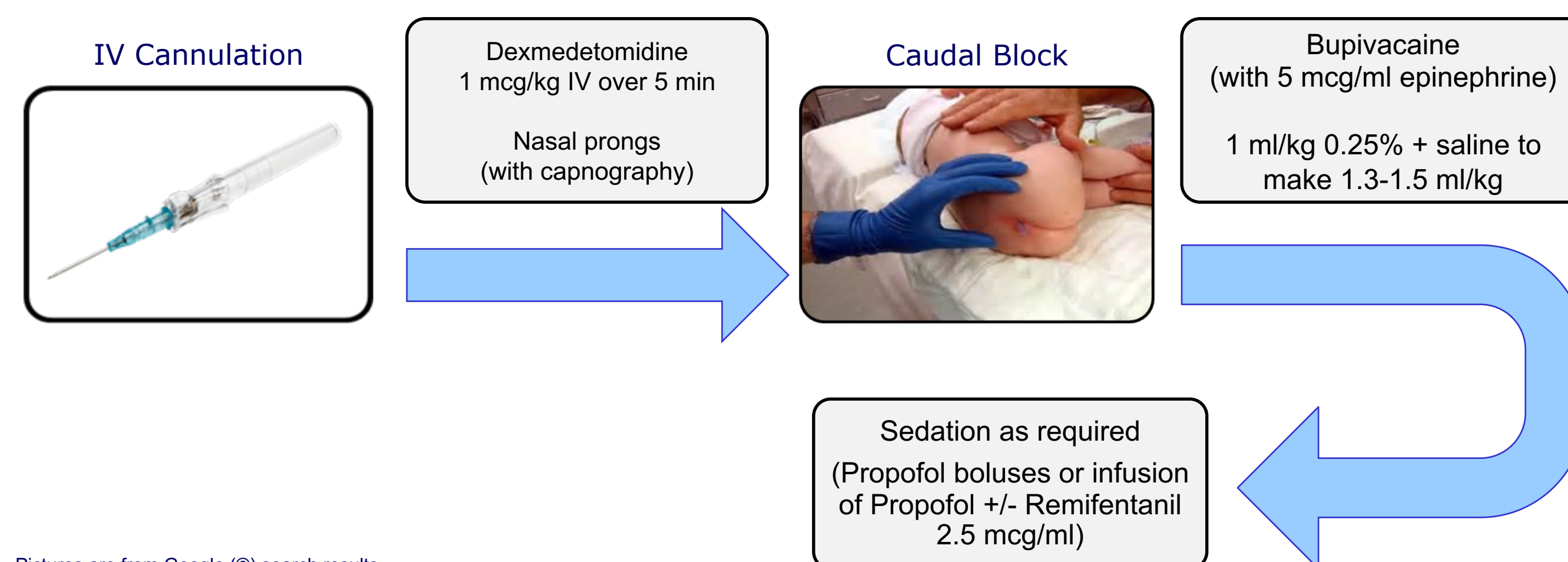
Objectives

We report a retrospective case series looking at the use of caudal anesthesia and sedation without airway instrumentation for trans-umbilical laparoscopic inguinal hernia repair in infants. We aim to describe the technique, its success rate and associated major perioperative complications.

Methods

- Retrospective chart review between July 2016 and February 2019
- Inclusion criteria: Infants having elective laparoscopic inguinal hernia repair who received caudal anesthesia and sedation without airway instrumentation.

Anesthesia Technique – an example



Outcomes Measured

Outcome Measures - Primary

- Success rate of the technique - completion of laparoscopic surgical repair without airway instrumentation.

Outcome Measures - Secondary

- Desaturation- SpO₂ < 90 for >15 seconds (up to 24 hours post-anesthesia)
- Apnea- no spontaneous respiratory effort for >10 seconds, up to 24 hours post-anesthesia.
- OR utilization- Times required for the anesthetic induction, surgical procedure and total time in OR.
- Post-operative disposition, unplanned ICU admissions

Results

Table 1: Demographics, Primary Outcome

Total number of patients	18
Success rate (ie % of cases not needing airway instrumentation)	100%
Male	18
Preterm (mean, SD of gestational age at birth in weeks)	16 (31.2, 4.6)
Gestational age at birth for all patients (mean, SD)	32.2 (5.1)
CGA for all patients in weeks – mean (SD)	44.6 (5.8)
Weight in kg on day of surgery – mean (SD)	4.5 (1.6)
Comorbidities encountered	Patent foramen ovale, Patent ductus arteriosus, Chronic lung disease, Intraventricular hemorrhage, Hypertension, Metabolic bone disease, Retinopathy of prematurity

IQR – Interquartile range, SD – Standard deviation, CGA – corrected gestational age

Table 2: Perioperative times in minutes – mean (SD)

Anesthesia preparation time	22.8 (5.7)
Procedure time	39 (9.9)
Time for leaving OR after closure	11.6 (5.9)
Total time in OR	73.4 (13.2)
Time in PACU	99.4 (44.1)

IQR – Interquartile range, SD – Standard deviation

Table 3: Anesthetic data

Number of patients who received Propofol: infusion only, infusion+boluses, boluses only	7, 6, 5
Propofol infusion rate in mcg/kg/min – median (IQR)	135 (100-170)
Remifentanyl infusion rate in mcg/kg/min – median (IQR)	0.037 (0.02-0.05)
Dexmedetomidine dose in mcg/kg: median (IQR)	1.1 (0.9-1.1)
Caudal – bupivacaine dose in mg/kg – median (IQR)	2.5 (2.4-2.5)
Caudal – volume in ml/kg – median (IQR)	1.4 (1.3-1.7)

IQR – Interquartile range

Table 4: Surgical data

Left hernia – intraoperative (preoperative)	5 (6)
Right hernia – intraoperative (preoperative)	5 (6)
Bilateral hernia – intraoperative (preoperative)	8 (6)
Incarceration – intraoperative	4
Pneumoperitoneum pressure used (mmHg)	8-12
Conversion to open procedure	0
Intraoperative major complications	0
Postoperative apneas documented	2

Discussion

Open IHR performed under caudal/ spinal anesthesia with sedation and without airway instrumentation has been described³. The presented case series is the first description of the use of this technique for trans-umbilical laparoscopic IHR, to the best of our knowledge.

Laparoscopic IHR has several purported advantages over open IHR including allowing visualisation and repair of the contralateral side, lower postoperative complications, better cosmesis and shorter time for bilateral repair². The intra-abdominal pressures during laparoscopy was limited to 8 to 12 mmHg to minimise discomfort and reduce the impact on respiratory mechanics. Laparoscopic repair was successfully completed in all 18 cases without perioperative clinical complications.

Dexmedetomidine has multiple beneficial effects⁴ including providing sedation with minimal effects on cardiorespiratory function and prolonging the duration of caudal anesthesia⁵. It also reduces the requirement of other sedative drugs.

We believe that the surgical advantages of laparoscopic approach combined with the anesthetic advantage of avoiding airway instrumentation under a general anesthetic and the associated risks, especially in high risk preterm neonates and infants, makes this technique a desirable approach for management of inguinal hernias in infants and neonates

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Acknowledgements

The authors would like to acknowledge Andrew K Poznikoff for his contributions to study coordination, protocol development, and technical editing of the manuscript.



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