Ultrasound Guided, Retrograde, Sacral Interspinous Approach to Continuous Caudal Block: A Novel Approach to Preoperative Caudal Block Catheter Placement in Pediatric Patients

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Introduction
- Analgesia for surgery of the genitalia, perineum, anus, rectum, and lower abdomen is frequently achieved via caudal single shot block, or continuous caudal block.1-3
- The entry point of caudal block catheters at the sacral hiatus can be within the operative field. Even if the sacral hiatus is excluded, proximity to the operative field can result in contamination of a preoperatively placed block.
- Meticulous technique and careful dressing does not alleviate risk even for blocks placed postoperatively. Proximity to the operative field and anus remains a source of contamination for the duration of the block. There is a very low threshold for removal of a catheter with even the suggestion of contamination.
- In an attempt to address the issues of contamination and the relative contraindication to preoperative placement, we describe caudal catheter placement under ultrasound guidance, via a caudally directed needle, inserted through the interspinous spaces of the sacrum.

Procedure
- Patients with known or suspected caudal abnormality were excluded. Informed consent including risks and benefits of the procedure was obtained in each case. Blocks were placed under general anesthesia, or monitored anesthesia care. Standard sterile precautions were used.
- The sacral hiatus, caudal space, and dural sac were visualized by ultrasound. Under ultrasound guidance, a standard 5 cm 18 gauge Touhy epidural needle, with bevel facing the probe, was advanced between the spinous processes of the S2-3 or S3-4 vertebrae, into the caudal space. The needle tip was directed caudally (Image 1).
- Sterile saline was instilled through the Touhy needle and distention of the caudal/epidural space was visualized.
- A 21 gauge epidural catheter was advanced under ultrasound guidance 2-3 cm beyond the tip of the needle into the caudal space (Image 2). Saline was again instilled, this time through the epidural catheter. A similar pattern of caudal/epidural spread, as in the prior injection through the Touhy needle, was visualized.
- The epidural needle was withdrawn over the catheter and ultrasound was used to ensure that the catheter had not shifted or pulled back. A test dose was administered. The catheter was secured with topical skin adhesive, adhesive strips, and transparent film dressing.
- One catheter was tunneled subcutaneously to a point cephalad and lateral to the original insertion.

Results
- Patient characteristics, procedures, block duration, and infusions are summarized in table 1a.
- Patients were ASA 2 or 3, ranged from 3 weeks to 2 years old, and 5.57 kg to 13.6 kg in weight (Table 1a).
- Patient pain scores and opioid consumption were minimal while nerve block catheters were in place (Table 1b, Table 1c).
- Each block required one attempt. All blocks were placed by the same pediatric anesthesiology fellow. No complications were noted during placement.
- Two catheters were removed prior to completion of therapy. Leakage at catheter entry site in patient C on postoperative day (POD) 2 prompted removal secondary to contamination risk. Staining on the block dressing of patient E was noted on POD 4, catheter was removed.

Discussion
Feasibility and outcomes of an interspinous approach to the caudal space have been described as safe and easily performed in both pediatric and adult patients1-3. As with other studies detailing an interspinous approach we did not observe dural puncture or injury to spinal structures, however authors of other studies discussed those events as potential outcomes1-3.

Our approach differs in both the trajectory of the needle through the interspinous space and the use of ultrasound. In our method, ultrasound visualization and distention of the caudal/epidural space, with fluid through the catheter, clarifies catheter location. As we utilize this new approach we intend to continue to track pain scores, duration of therapy, and adverse events. We also intend to record distance from sacral hiatus to block insertion point in an attempt to determine far from the operative area we are able to move block insertion.

Our approach enables caudal catheter placement a significant distance from the surgical field and anus. This allows for preoperative placement and intraoperative use of a caudal block catheter in procedures of the genitalia, perineum, anus, rectum, and lower abdomen. Furthermore, the increased distance of block insertion from the anus and surgical site may decrease chances of postoperative contamination and subsequent early withdrawal of therapy.

Author Notes
All blocks conducted at Children's Hospital of Pittsburgh of UPMC

Table 1: Patient characteristics (a), pain scores (b), and opioid consumption (c)

Table 1a: Patient characteristics, block duration, and block infusion

Table 1b: Pain scores

Table 1c: Total daily opioid consumption (mg/kg)

References