Case Report

Identification of perineural cysts during ultrasound-guided caudal anaesthesia

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Summary

An 8-year-old boy was scheduled for urethral fistula correction under general anaesthesia with an ultrasound-guided caudal block. During scanning of the caudal area, we noticed two cystic structures in the caudal space in the region of the intended needle endpoint so we decided against performing the caudal block. Surgery was conducted uneventfully and a penile block was administered as an alternative for analgesia postoperatively. Radiological evaluation of the child 3 weeks later revealed the presence of perineural cysts in the sacral region. Routine use of ultrasound for caudal anaesthesia procedures may reveal unexpected anomalies in the sacral area, which could have implications for optimal patient management.

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Introduction

The caudal block is among the most common regional anaesthesia techniques used in paediatrics [1]. It is an easily performed and effective method of analgesia for children undergoing a variety of abdominal, urogenital and lower limb surgeries; the landmark-based technique is popular and commonly employed. Ultrasonography has had a considerable impact on regional anaesthesia but its application for neuraxial procedures such as the caudal block might be underutilised. Safety of the caudal block in children is well-established. It has been suggested that current evidence is not enough to support the superiority of ultrasound guidance for its performance and that future research is needed in this regard [2].

This case report describes how the routine use of ultrasound for caudal anaesthesia resulted in the identification of perineural cysts and a subsequent change in the analgesic management.

Report

An 8-year-old boy weighing 19 kg, with previously operated hypospadias was scheduled for urethral fistula correction. A routine pre-operative anaesthetic assessment was done in the presence of his parents. The child had previously undergone a similar corrective procedure when he was 3 years old, with suboptimal surgical results. He was otherwise well and his parents consented to a general anaesthetic with a caudal block for postoperative analgesia.

On the day of surgery, anaesthesia was induced intravenously with midazolam 0.5 mg, fentanyl 40 µ and propofol 30 mg, and atracurium 10 mg as administered for neuromuscular blockade. A size 2 Ambu® Aura40™ laryngeal mask (Ambu A/S, Ballerup, Denmark) was inserted. General anaesthesia was maintained with sevoflurane in an air/oxygen mixture. The patient was then turned to a left lateral position with the hips slightly flexed for an ultrasound-guided caudal block.

A pre-procedural scan was not done as we expected this to be a routine and uncomplicated procedure. This skin over the surface was unremarkable. The caudal area was disinfected with 10% povidone iodine solution and the transducer was draped with a sterile shield. We used a GE Logiq e ultrasound machine (Wauwatosa, WI, USA) with a 5-13 Mhz linear ultrasound probe (GE 12L RS) set to scan at 13 Mhz with optimised settings. We had intended to inject 10 ml of bupivacaine 0.25% with 600 µg of preservative-free morphine (approximately 30 µg.kg⁻¹) into the caudal space.

We initiated the procedure with a transverse scan at the level of the sacral cornua to locate the sacral hiatus. Both the sacral cornua and the sacrococcygeal ligament were easily identified. We then noticed two anechoic structures in the caudal space. This was confirmed by turning the probe longitudinally and imaging in the sagittal plane. Since the fluid-filled structures lay directly in the intended path of the needle, we decided against performing a caudal block. A penile block was performed by the surgeon after the surgical procedure was completed and the child was discharged home on the second postoperative day.

We explained our findings to the patient's parents and they consented to magnetic resonance imaging (MRI) after recovery from the surgical procedure. Our initial suspicion at this point was that these represented perineural cysts (Tarlov's Cyst or Sacral Root Cyst), which was confirmed by MRI. The MRI demonstrated two cystic lesions with cerebrospinal fluid in the sacral spinal canal posterior to the S3 vertebral body. The lesion on the right side measured 4.5 × 9.8 × 17.3 mm and the lesion on the left measured 4.4 × 8.8 × 12.5 mm. The radiological diagnosis was that of perineural cysts (Fig. 1).

Discussion

Perineural cysts are meningeal dilations that usually affect the sacral root sheath. These cysts were first described by Tarlov in 1938 during the dissection of cadavers [3]. Historically, perineural cysts have been estimated to occur in 1-5% of patients [4]. A recent observational epidemiological study assessing 1100 consecutive MRI studies, found their prevalence to be as high as 13.2%. However, no cysts were found in children or adolescents [5].

The symptoms produced by these cysts are variable, with only about 1% being symptomatic; symptoms depend on proximity to nerve roots. Sensory and motor deficits, low backache, as well as bowel and bladder disturbances are the usual presenting symptoms [6]. These cysts may remain asymptomatic, particularly in children.

Perineural cysts may communicate with the subarachnoid space through a ball-valve mechanism. This causes the cyst to swell with cerebrospinal fluid especially on coughing, standing or changing position. Variation in the size of the cyst imparts pressure on the adjoining nerves, resulting in symptoms [7]. Cysts have been mentioned in the anaesthetic literature as a probable cause of failed spinal anaesthesia [8]. Not all cysts communicate with the subarachnoid space, but the ones that do

Figure 1 (a) Transverse ultrasound scan at the level of the sacral cornua showing two anechoic structures (arrow) under the sacrococcygeal ligament in the caudal space. (b) Sagittal ultrasound scan showing one of the cystic lesions with a well-defined wall. (c) MRI T2-weighted transverse image showing dual cysts. (d) MRI sagittal image showing the cystic lesion at the S3 vertebral level.

may have important implications for anaesthetists. For example, Revuelta et al. described accidental puncture of a perineural cyst despite an initial negative aspiration during a caudal epidural steroid injection in an adult patient [9]. Diagnosis of these cysts is made by imaging modalities such as computed tomography (CT) or MRI, usually after a patient has presented with symptoms. Ponde and Bedekar reported a similar finding to ours on a child with discoloration and a dimple over the sacral area [10]. In their report, they proceeded with the caudal block, carefully avoiding the cyst under real-time ultrasound guidance. In our patient, there were no external stigmata suggestive of spinal abnormality.

As we routinely use ultrasound to perform caudal blocks in children, we were able to identify a significant anomaly in the caudal region. One can only speculate what may have happened if a landmark approach was used in this patient. It is quite likely that we may have repeatedly aspirated cerebrospinal fluid or possibly faced disastrous consequences if local anaesthetic with opioid had been injected into the perineural cyst, should it have been of the communicating variety. We felt it important to establish a formal diagnosis of what we saw on ultrasound by using conventionally accepted imaging for this pathology. We were unsuccessful in getting the anaesthetic details of this patient's first surgery and his parents did not know if a caudal block was administered. We advised them that, given the presence of these cysts, caudal injections should be avoided in future. The routine use of ultrasound for caudal anaesthesia may help to identify unexpected structures and anomalies, however rare.

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