Ultrasound-Guided Penile Nerve Block for Circumcision: A New, Modified Technique

M-Irfan Suleman, MD
Assistant Professor of Anesthesiology
Director of Pediatric Regional Anesthesia
Department of Anesthesiology
Arkansas Children’s Hospital and University of Arkansas for Medical Sciences
Little Rock, Arkansas

I describe here a new, modified, ultrasound-guided penile block for male pediatric patients undergoing circumcision. The technique uses portable ultrasound with a linear probe and real-time scan at the base of the penis to identify vessels and fascia layers, which allows safe advancement of the needle and injection of local anesthesia bilaterally. The technique allows the practitioner to see local anesthetic distribution under the deep fascia of the penis. The procedure produces a subcutaneous wheal along the anterior side of the base of the penis or penoscrotal junction to achieve a complete penile block (Figure 1).

Circumcision is one of the most frequent surgical procedures for pediatric males. In an effort to relieve postoperative pain, several anesthetic approaches, all with varying efficacies, have been used, including topical analgesics such as lidocaine and lidocaine-prilocaine, ring...
A study by Weksler et al found that children treated with caudal block had an increased incidence of tachycardia, motor block, and vomiting compared with those treated with penile block, without a significant difference in pain severity between the groups. The ring block procedure includes an 8% failure rate, bleeding, and edema, although complications have not been reported with this technique.

Recently, interest has focused on using ultrasound to direct bilateral injections into the subpubic space, thus allowing clearer identification of both the subpubic space and penile structure, although some researchers remain unconvinced of this procedure’s benefits. Blind landmark-based needle placement, described by Maxwell et al, has been a standard method to block the dorsal penile nerve.

Ultrasound scanning verifies the distribution of the anesthetic in real time. In addition, ultrasound has lowered postoperative pain scores and shortened recovery time. Identification of better techniques could make ultrasound-guided regional anesthesia a standard of care for this application. With this technology, patient discomfort is relieved and better pain control is achieved as part of perioperative care for circumcision.

**Methods**

I describe a new, modified, ultrasound-guided penile block for male children undergoing circumcision. After administering general anesthesia to the patient, the penis and surrounding area, including the scrotum, are prepared with 0.5% chlorhexidine in 70% alcohol. Sterilized gel was used at the site and the ultrasound probe was covered to ensure sterility. We used a 4-inch sterile occlusive dressing, which is easier to apply and less costly than commercial probe covers (Figure 2).

Holding the ultrasound probe while positioning the needle against the probe can be problematic, but I found that the 27-gauge, 1.5-inch regular needle is comfortable to use and easily visible on the ultrasound monitor because the nerve is close to the skin. Sandeman and Dilley recognized that observing the tissue movement as the needle advances and checking for the black hypoechoic region on the ultrasound monitor indicate both the needle tip position...
and placement of the anesthetic; I found this to be accurate as well, but prefer an in-plane technique to see needle advancement to avoid any surrounding structures.

A linear ultrasound probe with a frequency range of 5 to 10 MHz was used; for optimal viewing on the monitor, the musculoskeletal setting was used. The probe was placed transversely along the base of the penis, for which gentle traction was used. The corpora cavernosa, dorsal arteries, dorsal veins, and superficial and deep penile Buck’s fascia were identified. The needle was moved forward using the in-plane technique under real-time ultrasound guidance and continued to advance until the practitioner felt a loss of resistance as the needle passed through the hyperechoic superficial lining of Buck’s fascia. Immediately after passing through this superficial layer, the needle tip, located lateral to the dorsal artery, was advanced deep into Buck’s fascia. After negative aspiration, I injected 1 to 2 mL of local anesthetic under direct vision, while being careful to prevent neurovascular injury or intravascular injection (Figures 3 and 4).

Figure 3. Ultrasound-guided landmarks for dorsal penile nerve block via the Suleman approach.
Plain 0.25% bupivacaine was used, and the maximum dose was 3 mL. The local anesthetic was evident on ultrasound as a black hypoechoic area, and the same procedure was performed on the other side. Finally, I placed a small ventral bleb with local anesthetic at the penoscrotal junction to block the scrotal branches of the pudendal nerve, as recommended by Sandeman and Dilley.\textsuperscript{15}

**Discussion**

Dorsal penile nerve block (DPNB), a procedure first described in the mid-1970s,\textsuperscript{21} requires a local anesthetic injection close to the dorsal nerve of the penis. The American Academy of Pediatrics approves the use of DPNB.\textsuperscript{2} Reports of minor complications include swelling,\textsuperscript{22} hematoma or edema,\textsuperscript{23} and bruising at the injection site.\textsuperscript{24} Other safe approaches using DPNB in infants and children have been described.\textsuperscript{13,25}

Ultrasound imaging in regional anesthesia is a leading advancement in pediatric regional anesthesia.\textsuperscript{26} The technology allows the practitioner to visualize the target nerve directly, maneuver the needle under real-time observation, precisely navigate away from complex or sensitive anatomy, and manage and administer the distribution of local analgesics.

For those who believe that DPNB is an uncomplicated procedure that does not require routine ultrasound,\textsuperscript{16} I argue that ultrasound allows the two-dimensional anatomy of the subpubic space and penile structures to be clearly recognized, allowing needle placement directly into the subpubic space, thus avoiding the penile structures and problems that could occur.

Several studies have concluded that when needles are placed close to the nerves, the frequency of adverse events declines.\textsuperscript{15,18,27} In-plane needle placement technique seems to be reliable and minimizes adverse events, its use is supported by existing studies and it is not
complicated to learn. I recommend this ultrasound technique to improve clinical care for patients undergoing circumcision.

References


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Corresponding author: M-Irfan Suleman, M.D.; msuleman@uams.edu

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