Penile Blocks

32

Heather Yizhen Z. Ting, Peter D. Metcalfe,
and Ban C.H. Tsui

Contents

H.Y.Z. Ting, MD, FRCPC (✉)
Department of Anesthesiology and Pain Medicine,
University of Alberta Hospital, 8440-112 St NW, 2-150 Clinical
Sciences Building, Edmonton, AB, Canada
e-mail: yizhenhe@ualberta.ca

P.D. Metcalfe, MD, MSc, FRCSC
Division of Pediatric Surgery, Division of Urology,
Department of Surgery, Stollery Children's Hospital,
University of Alberta Hospital, Edmonton, AB, Canada
e-mail: pmetcalf@ualberta.ca

B.C.H. Tsui, Dip Eng, BSc (Math), B Pharm, MSc, MD, FRCPC
Department of Anesthesiology and Pain Medicine,
Stollery Children's Hospital/University of Alberta Hospital,
2-150 Clinical Sciences Building, Edmonton,
AB T6G 2G3, Canada
e-mail: btsui@ualberta.ca

B.C.H. Tsui, S. Suresh (eds.), *Pediatric Atlas of Ultrasound- and Nerve Stimulation-Guided Regional Anesthesia*,
DOI 10.1007/978-0-387-79964-3_32

32.1 Clinical Anatomy

- The penis is supplied mainly by the two dorsal nerves of the penis, although there is some contribution to the base of the penis from the perineal, genitofemoral, and ilioinguinal nerves.
- The pudendal nerves (S2-S4) originate from the sacral plexus (Figure 12.1). At the distal pudendal canal where they run into ischial fossa, the pudendal nerves give off the inferior hemorrhoidal nerve and then divide into two terminal branches: (1) the perineal nerve which supplies the perineal muscles and scrotum, and (2) the dorsal nerve of the penis.
- The dorsal nerves (terminal branches of pudendal nerve; S2-S4) enter the subpubic space, pass under the pubic bone, and then lie deep in the suspensory ligament of the penis. The dorsal nerves then accompany the dorsal arteries of the penis bilaterally, in contact with the corpus cavernosum, encased by Buck's fascia (Figs. 32.1 and 32.2).
- From the base of the penis, the dorsal nerves divide several times and encircle the shaft of the penis before reaching the glans penis.
- The two dorsal nerves are usually blocked separately due to an often present anteroposterior septum (fundiform ligament) at the level of the suspensory ligament of the penis, which divides the subpubic space into two compartments.
- Two fascia envelop the penis; the superficial fascia of the penis, a continuation from the superficial fascia of the abdomen, and the deep layer (Buck's fascia), surrounding all three cavernous bodies, and which is continuous with Scarpa's fascia.
- The subpubic space is bordered anteriorly by the skin, subcutaneous tissue, the superficial fascia, and deep (Scarpa's) fascia of the abdomen. It is also bounded cranially by the pubis and caudally by the crura of corpora cavernosa.

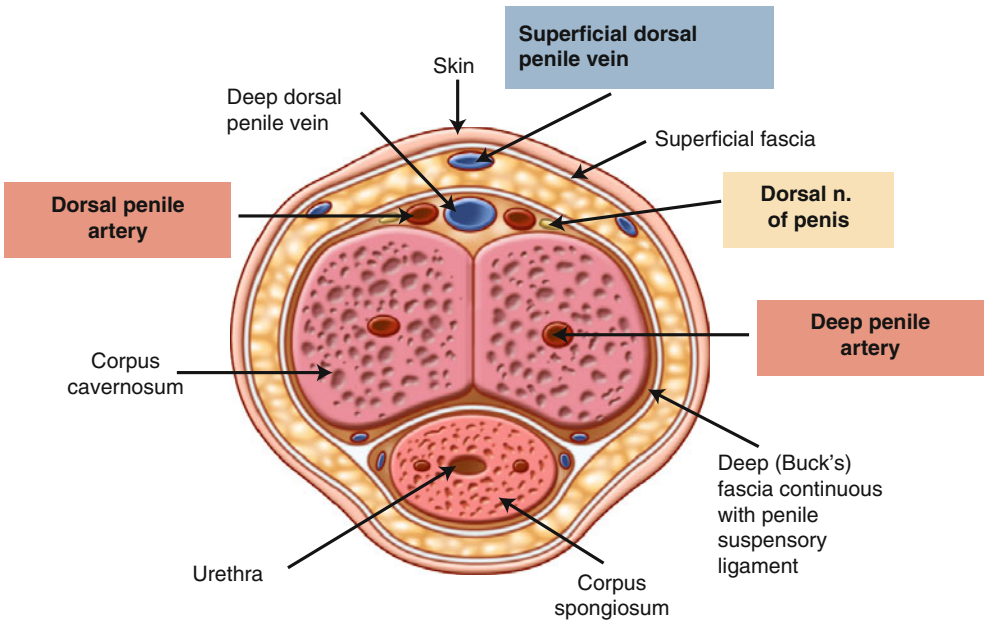

Fig. 32.1 Transverse section of penis

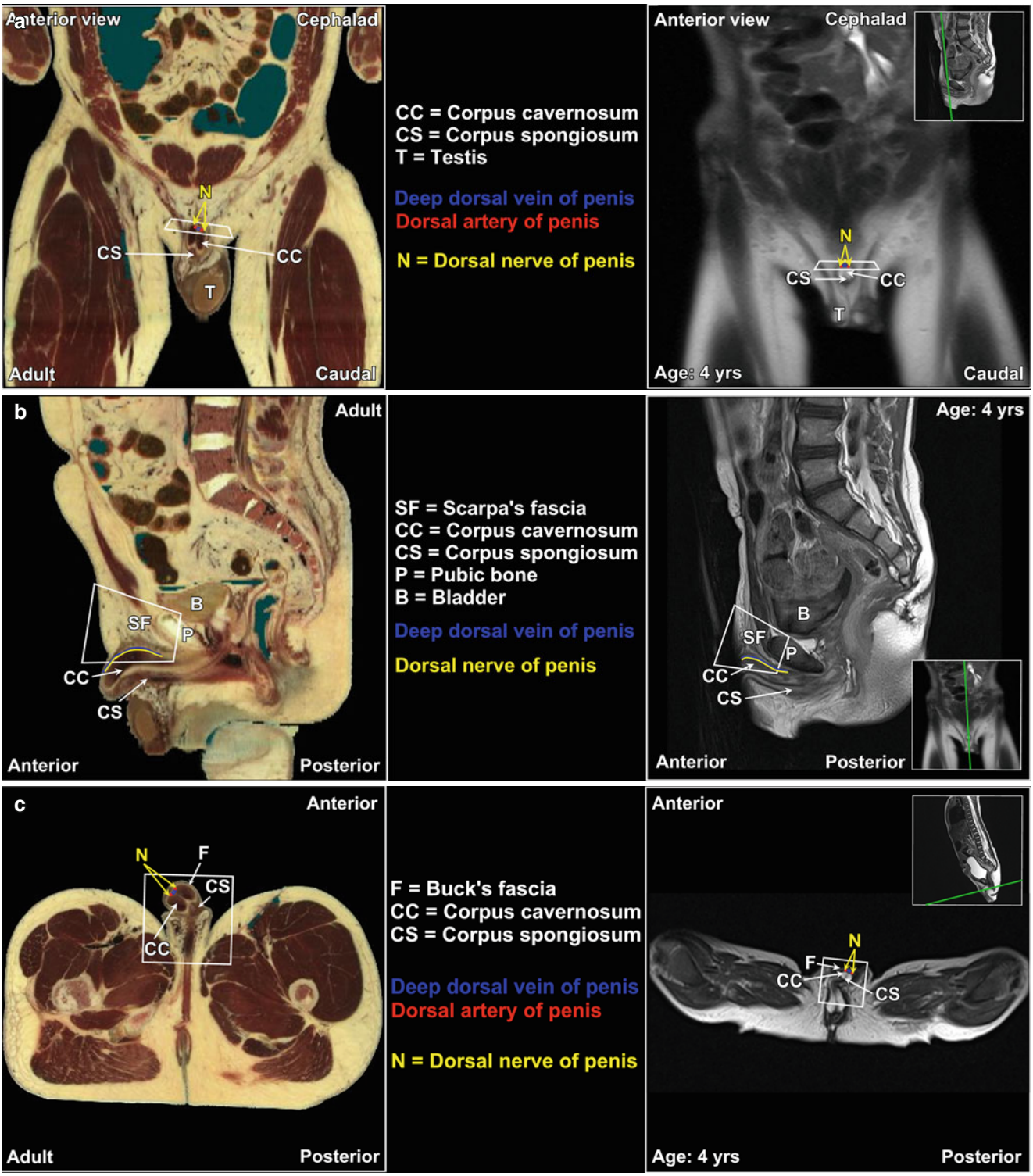

Fig. 32.2 VHVS and MRI images of anatomical structures surrounding the dorsal nerve of the penis; (**a**) anterior view, (**b**) sagittal view, (**c**) transverse view

32.2 Landmark-Based Technique (Subpubic Approach)

32.2.1 Patient Positioning

- The patient lies in the supine position.

32.2.2 Landmarks and Surface Anatomy

- Pubic symphysis
- Inferior border of the pubic rami

32.2.3 Needle Insertion

- Two marks are made on the lateral side of the pubic symphysis, just below each pubic ramus (0.5 cm for babies and 1 cm for older boys).
- With the penis held downward, the needle is inserted at the puncture site in a slight medial and caudal direction (10–15° to the vertical axis in both directions).
- A "pop" is felt as the needle penetrates Scarpa's fascia, approximately 8–30 mm below the skin (depth does not correlate with patient age or weight). A "pop" may also be felt as the needle passes through the superficial fascia (Fig. 32.3).
- Short-beveled 23G needles, 30 mm in length, are generally used for penile block.
- The dorsal penile block provides good analgesia, but may not block the ventral penis sufficiently, especially the frenulum. A ring block around the base of the penis [1] can ensure more effective coverage, especially when used in combination with the dorsal penile block. Ring block has been shown to be more effective than dorsal penile block or topical anesthetic for circumcision in neonates [2].
- The ring block can be performed with the same cutaneous puncture site as the dorsal block. The needle can be fanned out subcutaneously to the 3 and 9 o'clock position and then repositioned to these positions to administer subcutaneous local anesthetic through the 6 o'clock/scrotal area (see Fig. 32.4).
  - The ring block may interfere with hypospadias surgery or circumcision if done preoperatively; therefore, communication with the urologist is important to ensure that the tissue planes are not disrupted.

32.2.4 Local Anesthetic Application

- Bupivacaine 0.25–0.5 % is the local anesthetic of choice for penile block, although lidocaine is also effective. For each side, 0.1 mL/kg is injected up to a maximum of 5 mL per side. Blocks will last, on average, 5–12 h.
- Epinephrine is absolutely contraindicated since the dorsal arteries of the penis are terminal arteries.

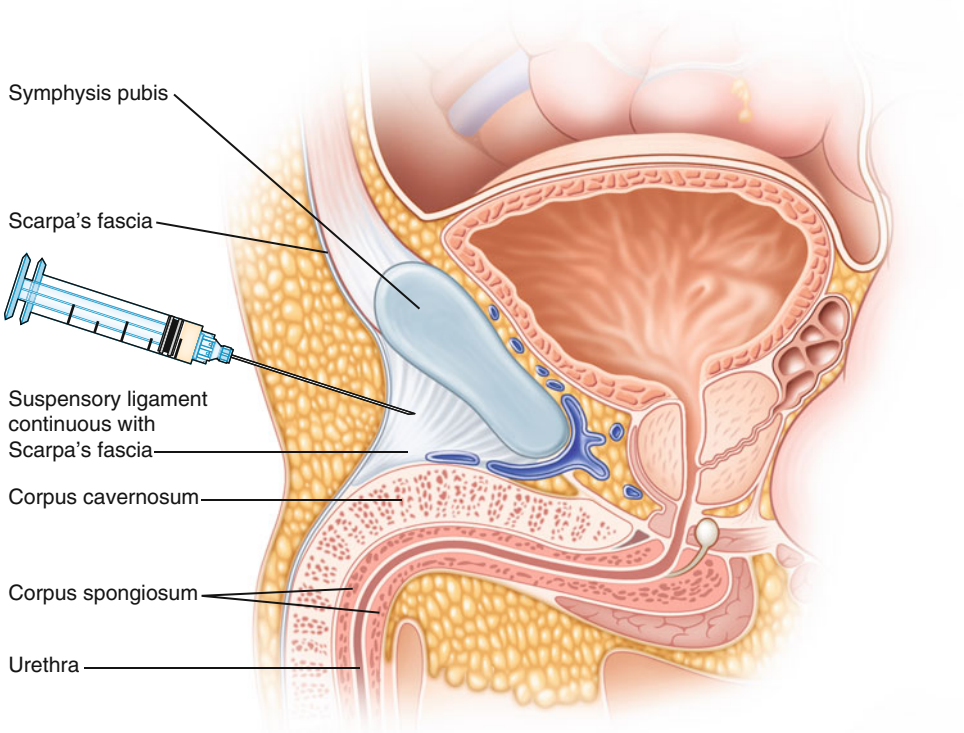

Fig. 32.3 Needle insertion through Scarpa's fascia into the subpubic space

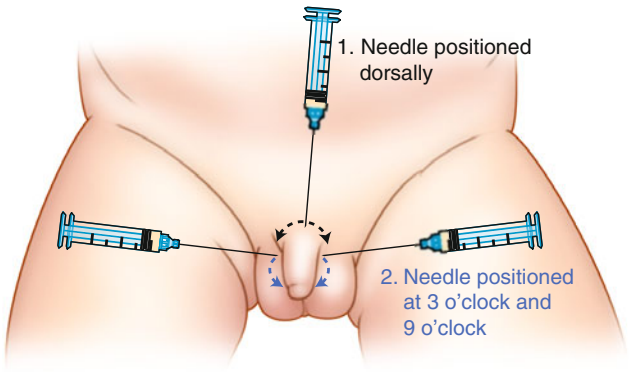

Fig. 32.4 Ring block of the penis. The needle is initially positioned dorsally and fanned out to the 3 o'clock and 9 o'clock positions while injecting local anesthetic. The needle is then repositioned to the 3 o'clock and 9 o'clock positions to ensure local anesthetic spread to the 6 o'clock/scrotal area

32.3 Ultrasound-Guided Technique

32.3.1 Scanning Technique

- A linear probe may be placed sagittally along the shaft of the penis, which will allow visualization of the subpubic space.

32.3.2 Ultrasonographic Appearance (Fig. 32.5)

- The subpubic space is identified as a triangle bordered by: Buck's fascia covering the corpora cavernosa and neurovascular bundle inferiorly; pubic symphysis superiorly; and by Scarpa's fascia anteriorly.
- The fundiform ligament, which forms a midline septum within the deep fascia of the penis, appears fan-shaped under ultrasound.
- Injection deep to Scarpa's fascia can be visualized with ultrasound; this will help to confirm the spread of local anesthetic.

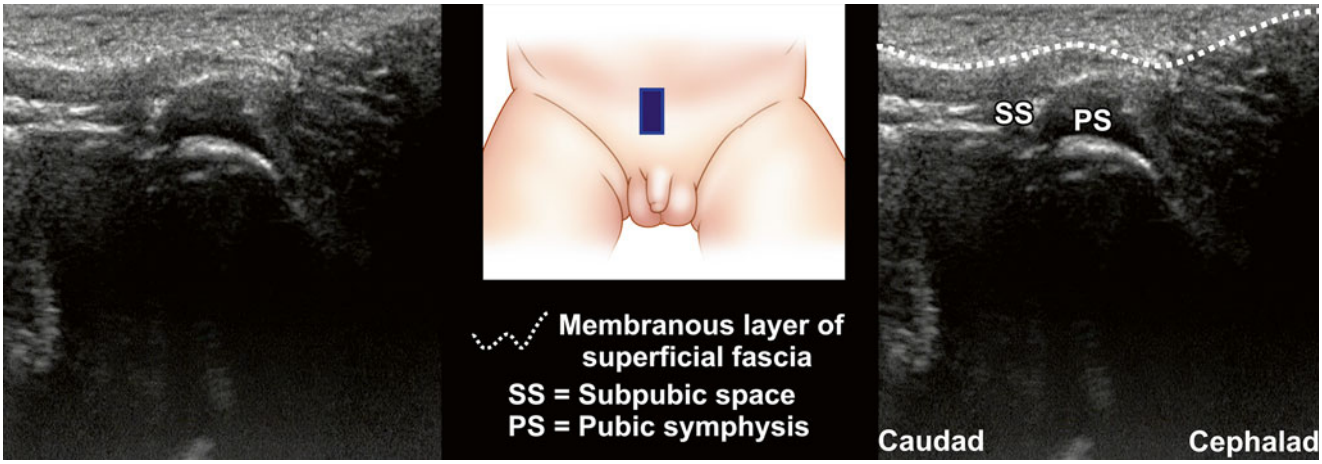

Fig. 32.5 Ultrasound image of the subpubic space for dorsal penile block

32.3.3 Needle Insertion

- As described above, the needle is inserted once on either side of the fundiform ligament (i.e., once on each side of the probe) to the depth of the subpubic space, deep to Scarpa's fascia. Ultrasound imaging will reveal the spread of local anesthetic in the subpubic space as a hypoechoic triangular area.

32.3.4 Local Anesthetic Application

- As described above, 0.1 mL/kg bupivacaine 0.25–0.5 % on each side is sufficient to provide adequate surgical anesthesia and postoperative analgesia.

32.4 Current Literature in Ultrasound-Guided Approaches

Sandeman and Dilley were the first to describe ultrasound-guided dorsal penile nerve block [3]. It was later shown that ultrasound-guided penile nerve block improved block efficacy compared to the traditional landmark-based technique with respect to postoperative pain during the first postoperative hour and the time to the first requirement for postoperative analgesia [4]. However, a later study by Sandeman et al. [5] demonstrated the advantages of ultrasound-guided dorsal penile nerve block compared to the landmark method and caudal epidural analgesia for circumcisions on boys aged 5 months to 15 years. The ultrasound and caudal epidural groups required significantly less morphine postoperatively and had shorter stays on the post-op ward compared to patients in the landmark-guided group. Furthermore, the ultrasound and landmark groups had significantly lower times to first analgesia administration compared to the caudal epidural group. Patients receiving ultrasound-guided blocks also required less intraoperative opiates than patients receiving landmark-guided blocks.

32.5 Case Study

Since the injection site for penile block is required to be close to the surgical field, many surgeons prefer to perform the block themselves during the procedure. An example is shown in Fig. 32.6. The patient received a landmark-guided dorsal penile nerve block for circumcision. After palpating the anterior edge of the symphysis pubis, a 23G pediatric needle was inserted slightly medially and cephalad until Buck's fascia was penetrated. Local anesthetic was injected at this location. Following caudal redirection of the needle, the remainder of the local anesthetic was injected in a subcutaneous wheal across the ventral surface of the midline of the penis. Pain control was excellent with no complications.

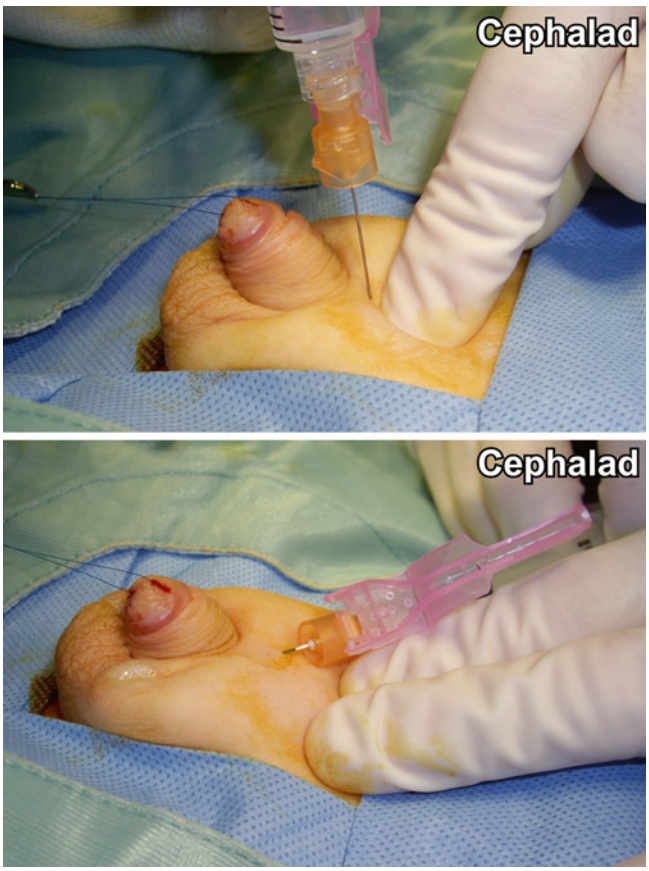

Fig. 32.6 Landmark-guided penile block performed by the surgeon, showing initial needle position (*top*) and needle position after redirection (*bottom*) (See Case Study for details)

References

1. Broadman LM, Hannallah RS, Belman AB, Elder PT, Ruttimann U, Epstein BS. Post-circumcision analgesia—a prospective evaluation of subcutaneous ring block of the penis. Anesthesiology. 1987;67: 399–402.
2. Lander J, Brady-Fryer B, Metcalfe JB, Nazarali S, Muttitt S. Comparison of ring block, dorsal penile nerve block, and topical anesthesia for neonatal circumcision: a randomized controlled trial. JAMA. 1997;278:2157–62.
3. Sandeman DJ, Dilley AV. Ultrasound guided dorsal penile nerve block in children. Anaesth Intensive Care. 2007;35:266–9.
4. Faraoni D, Gilbeau A, Lingier P, Barvais L, Engelman E, Hennart D. Does ultrasound guidance improve the efficacy of dorsal penile nerve block in children? Pediatr Anesth. 2010; 20:931–6.
5. Sandeman DJ, Reiner D, Dilley AV, Bennett MH, Kelly KJ. A retrospective audit of three different regional anaesthetic techniques for circumcision in children. Anaesth Intensive Care. 2010;38:519–24.

Suggested Reading

Dalens BJ. Blocks of nerves of the trunk. In: Dalens BJ, editor. Pediatric regional anesthesia. Boca Raton: CRC Press; 1990. p. 457–64.

Peutrell JM. Penile block. In: Peutrell JM, Mather SJ, editors. Regional anaesthesia for babies and children. Oxford: Oxford University Press; 1997. p. 130–40.

Suresh S, Polaner DM, Cote CJ. Regional Anesthesia. In: Cote CJ, Lerman J, Anderson BJ, Eds. 5th ed. Philadelphia: WB Saunders; 2013. p. 835–79.