

- USRA. Regional anesthesia/specific block/axillary block. Available at: <http://www.usra.ca/axianatomy.php>. Accessed April 20, 2016.
- The New York School of Regional Anesthesia. Ultrasound-guided infraclavicular brachial plexus block. Available at: <http://www.nysora.com/techniques/ultrasound-guided-techniques/upper-extremity/3016-ultrasound-guided-infraclavicular-brachial-plexus-block.html>. Accessed April 20, 2016.

Perioperative Management of Patients Receiving Pentosan Polysulfate Sodium (Elmiron)

Accepted for publication: May 12, 2016.

To the Editor:

Pentosan polysulfate sodium (Elmiron) is a plant-derived (Beech tree bark) semisynthetic mucopolysaccharide. It is Food and Drug Administration approved for the treatment of pain and discomfort associated with interstitial cystitis. In addition to its effects on the bladder mucosa, orally administered pentosan polysulfate sodium also exhibits weak anticoagulant activity as a low molecular weight heparin-like compound. Compared with heparin, pentosan polysulfate sodium has approximately 1/15 activity of heparin. Bleeding times and clotting times may be increased, however, and rectal hemorrhage and bleeding have been reported in 6.3% of patients receiving the drug.¹

Pentosan polysulfate sodium inhibits the generation of factor Xa in plasma, inhibits thrombin-induced platelet aggregation, and possesses a fibrinolytic effect.¹ When administered parenterally (parenteral formulation not commercially available in the United States) to a limited number of patients with congenital antithrombin III deficiency, the drug inhibited generation of factor Xa.²

After oral administration of a radio-labeled dose of 300 to 450 mg pentosan polysulfate sodium solution, approximately 6% of the dose was absorbed into the systemic circulation, with peak levels of plasma radioactivity achieved at a median of 2 hours. The mean half-life for plasma radioactivity was 20 to 27 hours.¹ For the treatment of interstitial cystitis, the recommended dose is 100 mg 3 times daily (300 mg/d).

The drug information sheet advises caution in patients who are at an increased risk for bleeding, including those undergoing invasive procedures, with signs and symptoms of coagulopathy, or receiving concomitant drugs that affect hemostasis.

Most clinicians are not familiar with pentosan polysulfate sodium, and the drug can fall under the radar for pain physicians. It was not mentioned in the 2015 ASRA and multisociety pain anticoagulation guidelines.³ Following the same approach considering 5 half-lives, our recommendations for patients undergoing high-risk or intermediate-risk spinal procedures, who are taking pentosan polysulfate sodium, are as follows: withhold the medication for 5 days before the procedure and resume the medication 24 hours after the procedure.

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REFERENCES

- Janssen Pharmaceuticals, Inc. Elmiron (pentosan polysulfate sodium) prescribing information. Titusville, NJ; 2012.
- Fischer AM, Dautzenberg MD, Arousseau MH, et al. Comparison between the effect of pentosan polysulfate heparin and antithrombin III injections in antithrombin III deficient patients. *Thromb Res*. 1985;37:295–307.
- Narouze S, Benzon HT, Provenzano DA, et al. Interventional spine and pain procedures in patients on antiplatelet and anticoagulant medications: guidelines from the American Society of Regional Anesthesia and Pain Medicine, the European Society of Regional Anaesthesia and Pain Therapy, the American Academy of Pain Medicine, the International Neuromodulation Society, the North American Neuromodulation Society, and the World Institute of Pain. *Reg Anesth Pain Med*. 2015;40:182–212.

Ultrasound-Guided Retroclavicular Block (aka Posterior Approach Infraclavicular Block) Anatomical Variation of the Clavicle Limits Block Feasibility

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To the Editor:

We read with great interest the recent article by Charbonneau et al,¹ “The

ultrasound-guided retroclavicular block: a prospective feasibility study.” The block was first described by Hebbard and Royse² in “Ultrasound guided posterior approach to the infraclavicular brachial plexus.” We³ have conducted a case series of 18 patients receiving ultrasound-guided posterior approach to the infraclavicular brachial plexus, with 100% of blocks successful. We also performed a cadaveric dissection with dye injection and found that spread of the dye was comparable in both posterior and lateral (conventional) approach. On the basis of the initial promising results, we used the same methodology and proceeded with a pilot study to compare the posterior and lateral approaches in terms of block success and block performance time. We hypothesized that the posterior approach often produced better needle visualization and this would have faster performance time (ClinicalTrials.gov Identifier: NCT02462408). Imaging time was defined as the time interval between contact of the ultrasound probe with the patient and the acquisition of a satisfactory sonoanatomy (a complete round short-axis view of the axillary artery). Needling time was defined as the time interval between the start of the needle insertion and the end of local anesthetic injection through the needle, and performance time was the sum of imaging and needling times.

Forty-six patients who underwent upper limb surgery (forearm, wrist, or hand) were prospectively recruited and randomized into 2 groups by computer-generated sequence of random number (conventional group, 23 and posterior group, 23). Blocks were performed to provide surgical anesthesia and results were not significantly different: the success rate was comparable, 95.6% for posterior approach versus 91.3% for lateral approach ($P = 0.55$). Success was defined as achievement of surgical anesthesia and the ability to proceed with surgery without the need for intravenous narcotics, general anesthesia, rescue blocks, or local infiltration by the surgeon. One patient from the posterior group required supplemental wrist block plus monitored sedation, whereas 2 from the conventional group required supplemental fentanyl. None were converted to general anesthesia. There were no significant differences in imaging, needling, and performance times found between the 2 groups. We did not publish this study due to its insignificant results, low interest in posterior approach, and small sample size without power analysis with technical limitations encountered. Figure 1, A and B show needling and sono-imaging differences between the 2 approaches and the technical limitation caused us to have variable sources of images.

The technical challenges, as highlighted by Charbonneau et al,¹ were also encountered

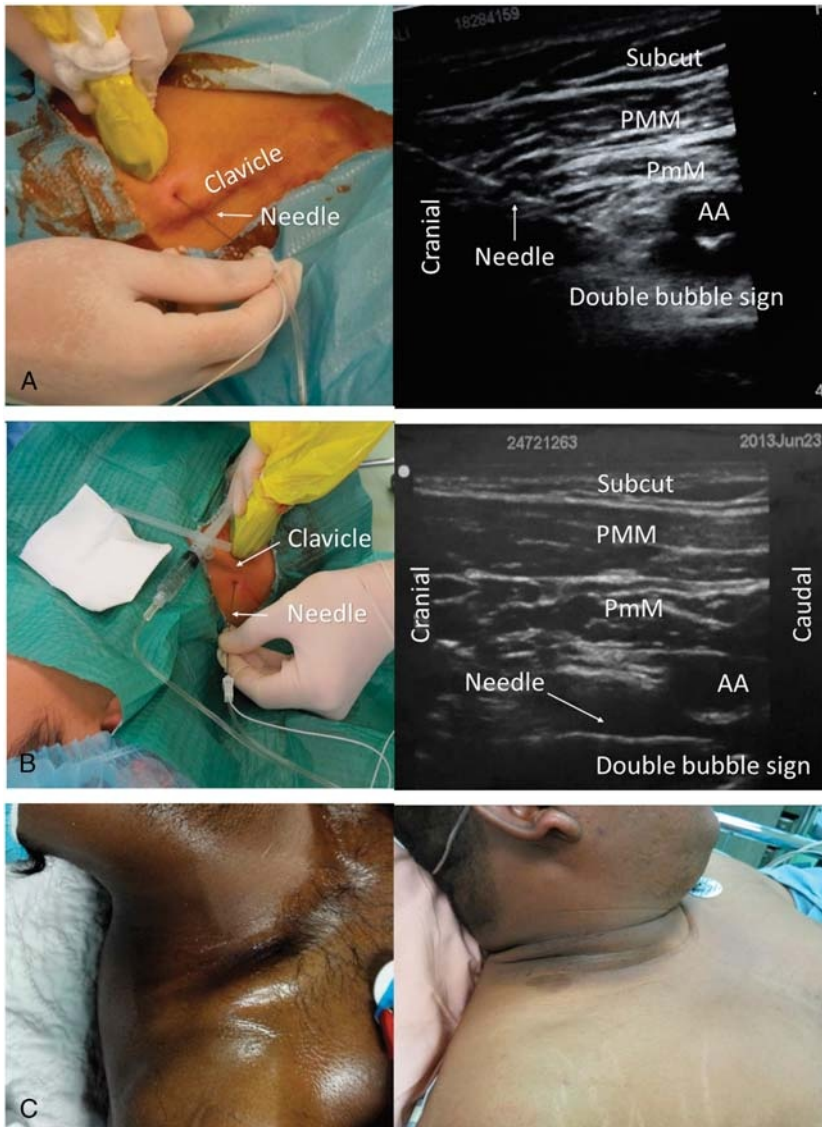


FIGURE 1. A, Conventional—lateral parasagittal in-plane ultrasound-guided infraclavicular brachial plexus block. Needle insertion beneath clavicle and medial to coracoid process. Needle trajectory—oblique, steep. Local anesthetic deposit on posterolateral aspect of axillary artery, creating double bubble sign. B, Posterior parasagittal in-plane ultrasound-guided infraclavicular brachial plexus block. Needle insertion posterior to clavicle. Needle trajectory—horizontal. Local anesthetic deposit on posterolateral aspect of axillary artery, creating double bubble sign. C, Anatomical variation of clavicle—limiting factor in performing posterior approach. The acutely angled clavicle resulted in limited space for needling. The fullness of supraclavicular fossa (clavicle was not visible by clinical palpation) also impair the needling. AA, Axillary artery; PMM, pectoralis major muscle; PmM, pectoralis minor muscle; Subcut, subcutaneous tissue.

in our study. A short neck with fullness of the supraclavicular fossa and acutely angulated clavicle posed needling difficulty. The clavicle has considerable anatomic variability^{4,5} (Fig. 1C), and this was the main limiting factor in inserting the needle from the posterior approach.

In our pilot study, subjects were randomized. Some patients in the posterior group had longer than usual performance times [6–7 minutes; mean (SD) performance time was 5 minutes 31 seconds (1 minute

20 seconds)] despite having good needle visualization. Although we did not use 5-point Likert scale to rate needle visibility, we could say the posterior approach often, but not always, produced good needle visualization. However, a good needle visibility did not translate to faster performance time.

When we analyzed the cases, those patients had acutely angled clavicle (resulted in limited space for needling) or the supraclavicular fossa was full (clavicle was not visible by clinical palpation). During

needling, these patients required more analgesic fentanyl (maximum dose given to patients was 100 µg) due to discomfort during manipulation of needle through a blind window created by the acoustic shadow of the clavicle and its tendency to hit the inferior surface of clavicle while trying to maintain the alignment of the needle trajectory and ultrasound beam. This block is certainly not recommended to inexperienced practitioners.

Overall, the retroclavicular block (aka posterior approach ultrasound-guided infraclavicular brachial plexus block) did not offer significant advantages over the conventional approach. We no longer perform this block in our routine practice since the completion of this study. With recent emerging data on this approach, we would like to share our experience. Kudos to Charbonneau and team on reporting their formal feasibility study.

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REFERENCES

- Charbonneau J, Fréchette Y, Sansoucy Y, Echave P. The ultrasound-guided retroclavicular block: a prospective feasibility study. *Reg Anesth Pain Med.* 2015;40:605–609.
- Hebbard P, Royse C. Ultrasound guided posterior approach to the infraclavicular brachial plexus. *Anaesthesia.* 2007;62:539.
- Beh ZY, Shahnaz Hasan M, Lai HY. Posterior parasagittal in-plane ultrasound guided infraclavicular brachial plexus block—a case series. *BMC Anesthesiol.* 2015;15:105.
- Huang JL, Toogood P, Chen MR, Wilber JH, Cooperman DR. Clavicular anatomy and the applicability of precontoured plates. *J Bone Joint Surg Am.* 2007;89:2260–2265.
- Han JU. The success of periclavicular brachial plexus block. *Korean J Anesthesiol.* 2010;58: 221–222.

Limitations of the Transversus Thoracic Muscle Plane Block

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To the Editor:

We have previously reported on the transversus thoracic muscle plane