CORRESPONDENCE

Ultrasound-guided peripheral nerve blocks for total knee arthroplasty in the context of severe aortic stenosis: avoiding the general anesthetic

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To the Editor,

Aortic stenosis (AS), the most common major valvular lesion,¹ is one of the more challenging cardiovascular comorbidities for anesthesiologists to manage.² The optimal anesthetic technique in these patients is not known, although general anesthesia is often selected due to concerns of significant hypotension from the sympathectomy accompanying neuraxial techniques. In the setting of severe AS, this hypotension can quickly lead to decreased coronary perfusion and ventricular decompensation.³ Peripheral regional anesthesia avoids the bilateral sympathectomy inherent with neuraxial techniques and simultaneously avoids depressant effects of the volatile agents. The feasibility of peripheral regional anesthesia for patients undergoing total knee arthroplasty (TKA) has been described,⁴ but reports are lacking in patients with AS despite the advantages it can offer in this population. We report the case of a patient with severe AS undergoing TKA with peripheral nerve blocks as the primary anesthetic technique. The patient provided written informed consent.

An 83-yr-old female with severe AS presented for left TKA. Echocardiography documented an aortic valve area

of 0.8 cm² with mean and peak gradients of 31 and 64 mmHg, respectively, and an ejection fraction of 65%. The initial anesthetic plan was general anesthesia with peripheral regional blocks and intravenous patient-controlled analgesia (PCA) intended for postoperative analgesia.

While in a designated regional anesthesia room, a femoral nerve block was accomplished with 0.5% ropivacaine 30 mL using an in-plane lateral-to-medial approach under ultrasound guidance (12 MHz linear probe, GE Logiq E; Wauwatosa WI, USA). A subgluteal sciatic nerve block was then performed using combined neurostimulation and ultrasound guidance. Using an out-of-plane approach, the needle was advanced towards the nerve until ankle dorsiflexion occurred. The motor response disappeared at 0.7 mA and 0.25% ropivacaine 20 mL was incrementally injected around the nerve. At this point, as the patient reported difficulty extending her knee and thigh numbness was already developing, we decided to proceed with the TKA using only the peripheral nerve blocks.

As the obturator nerve can contribute to knee innervation,⁵ we also performed an obturator nerve block to allow for complete surgical anesthesia. Using ultrasound guidance, an 8-cm 22G EchoStim[®] needle (Benlan Inc., Oakville, ON, Canada) was introduced via an in-plane approach medial to the femoral vessels, and 2% lidocaine 5 mL was then injected in the fascial planes between the adductor longus and brevis muscles as well as between the adductor brevis and magnus muscles.

Thirty minutes following completion of the nerve blocks, a sensory exam revealed that the patient was insensate to pinprick and temperature on the anterior, posterior, and medial aspects of the knee and the posterior aspect of the thigh. Sedation with propofol 30

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$\mu\text{g}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ was provided, and the TKA was completed uneventfully.

Hemodynamic parameters remained stable throughout the procedure with only phenylephrine 200 μg (in divided doses) required to maintain the mean arterial pressure ≥ 70 mmHg. Total fluid administered was 1,200 mL of crystalloid with intraoperative diuresis of 500 mL and an estimated blood loss of 100 mL.

The patient's postoperative course was uneventful. Her pain was managed with hydromorphone intravenous PCA (1.8 mg/24 hr), which was discontinued 28 hr postoperatively. Neurological assessment at 24 hr postoperatively revealed normal sensation and motor function in the lower extremities, and physiotherapy was subsequently initiated. The patient was discharged home on postoperative day 3 with satisfactory pain control (Hydromorph Contin[®] 3 mg *po bid* plus short-acting hydromorphone 2–4 mg *po q4h prn*).

This case report suggests the feasibility, safety, and effectiveness of ultrasound-guided distal peripheral nerve blocks as the sole anesthetic modality for TKA in a patient with severe AS. We hope this report will encourage others to consider this anesthetic modality in patients with comorbidities where general and neuraxial anesthesia may carry increased risks.

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Conflicts of interest None declared.

References

1. Zigelman CZ, Edelstein PM. Aortic valve stenosis. *Anesthesiol Clin*. 2009; 27: 519–32.
2. Yarmush L. Noncardiac surgery in the patient with valvular heart disease. *Anesthesiol Clin North America* 1997; 15: 69–91.
3. Lopez MM, Guasch E, Schiraldi R, Maggi G, Alonso E, Gilsanz F. Continuous spinal anaesthesia with minimally invasive haemodynamic monitoring for surgical hip repair in two patients with severe aortic stenosis. *Rev Bras Anestesiol* 2013; DOI:10.1016/j.bjane.2013.03.010.
4. Akkaya A, Tekelioglu UY, Demirhan A, et al. Ultrasound-guided femoral and sciatic nerve blocks combined with sedoanalgesia versus spinal anesthesia in total knee arthroplasty. *Korean J Anesthesiol* 2014; 67: 90–5.
5. Head SJ, Leung RC, Hackman GP, Seib R, Rondi K, Schwarz SK. Ultrasound-guided saphenous nerve block - within versus distal to the adductor canal: a proof-of-principle randomized trial. *Can J Anesth* 2014; . DOI:10.1007/s12630-014-0255-1.