

Adductor Canal Block Is Useful but Does Not Achieve a Complete Block of the Knee

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To the Editor:

We congratulate Kwofie et al¹ on their thorough study on the motor effects after adductor canal block (ACB).

The authors found no motor weakness after ACB in healthy volunteers using a relatively high volume of local anesthetic. The injection was made at a point considered distal to the motor supply to the quadriceps femoris muscle. However, the motor branch to the vastus medialis muscle continues within the adductor canal and is therefore likely to be affected, particularly when high volumes are used (Fig. 1). Although no clinical effect may be apparent in healthy volunteers, in patients undergoing knee arthroplasty with well-recognized reduced quadriceps function, it is possible this effect will become more significant, thus requiring further study. In our own practice, we use 5 mL of 0.5% levobupivacaine to perform an ACB as part of a motor-sparing knee block.² Some patients indeed demonstrate a degree of quadriceps weakness postoperatively not fully explained by bandaging, pain, or swelling.

A number of studies have been published on the use of ACB for knee arthroplasty surgery.^{3,4} The authors state that a more complete knee block may be achieved with a midhigh approach to the adductor canal to more reliably block the infrapatellar nerve (IPN). We agree

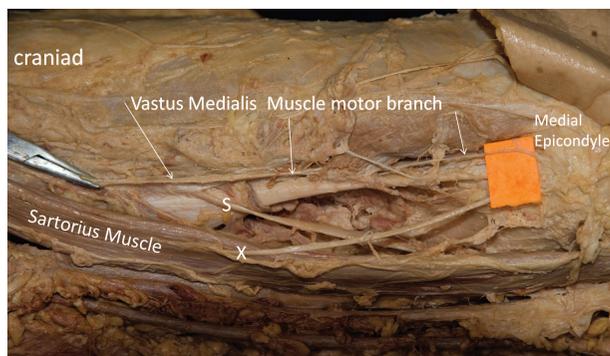


FIGURE 1. Medial aspect of thigh dissection showing motor branch to vastus medialis muscle and its continuation to the knee capsule at the medial epicondyle, IPN (x) in a variation of penetrating sartorius muscle, separate from the saphenous nerve at midhigh level.

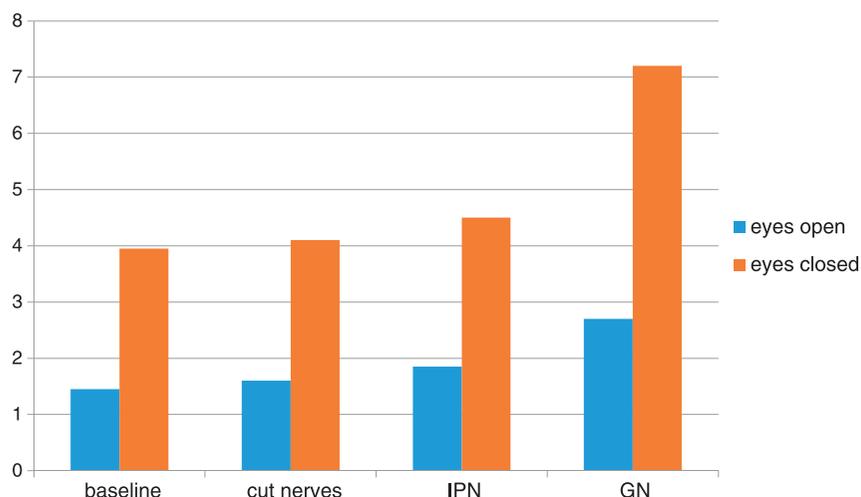


FIGURE 2. Area95 sway during Romberg test with sequential blocks of cutaneous, IPN, and GNs. Average of 2 tests per sequence.

with this observation based on the published variability of the IPN⁵ and our own cadaveric work, where we also found the IPN to be completely separate from the saphenous nerve or inferior femoral nerve. The midhigh approach to the ACB, as stated, also blocks the obturator branches traversing the distal part of the adductor canal to go on and supply the posteromedial aspect of the knee. Not mentioned in the article is the motor branch to the vastus medialis muscle, which continues to supply the medial knee capsule (Fig. 1) and, therefore, is desirable to block.

As the aforementioned nerves supply only a small aspect of the knee joint, complete blockade of the knee joint requires that the genicular nerves (GNs) be blocked. These arise posteriorly from the tibial and common fibular nerve, forming a network with femoral and obturator nerve

fibers and are located at the 4 corners of the knee and medially at the joint level accompanying the arterial supply to the knee.⁶ Genicular nerve block can be performed using our recently described technique.² This still leaves the posterior capsule unaffected, which can be blocked by placing local anesthetic deep to the popliteal artery or as a postbifurcation tibial nerve block (this however causes motor weakness of the lower leg). Finally, the lateral cutaneous nerve of the thigh (LCNT) and intermediate cutaneous nerve of thigh (IMCNT) need to be blocked to cover the knee incision. The LCNT can be blocked at the border between the sartorius and tensor fascia lata muscles, the IMCNT more medially as it passes over the sartorius muscle.

In a pilot study, we measured the motor and proprioceptive effects of the nerves supplying the knee by blocking them sequentially on separate occasions. Blocks of the cutaneous nerves (LCNT and IMCNT), the IPN within ACB, and the GNs were performed using 5 mL of 0.5% levobupivacaine each. Balance was tested using an AccuSway board (AMTI Inc, USA). We found no change from baseline Romberg test with cutaneous nerve blockade or after IPN blockade. An increase in overall sway movements was measured following GN blockade indicating a loss of proprioception (Fig. 2). No motor weakness was detected with any of these nerve blocks.

In summary, it is our opinion that although the ACB is beneficial for surgery on the knee, it is only one aspect of the complex sensory nerve supply to the knee,

suggesting that for complete knee block, preserving protective motor function, a multi-injection technique is required.

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The authors declare no conflict of interest.

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Reply to Drs Egeler, Jayakumar, and Ford

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To the Editor:

We thank Dr Egeler and colleagues for their interest in our study¹ and for their thoughtful comments regarding the nerve supply to the knee.²

We agree that the deposition of local anesthetic within the adductor canal (AC) is likely to result in blockade of the nerve to vastus medialis, since it has been demonstrated to reliably lie within this space. However, we were not able to demonstrate

weakness or impaired balance using sensitive quantitative and qualitative assessments (maximal voluntary isometric contraction and the Berg Balance Scale). The explanation for this is not clear, but we have hypothesized that either clinically significant blockade of the nerve does not, in fact, take place (a somewhat unlikely explanation) or the contribution of the vastus medialis to knee extension power and balance is not substantial. This remains to be clarified in a formal study. Although some have challenged the relatively proximal injection site chosen in our study (midhigh), we have found it a convenient one clinically, as it is associated with well-defined sonoanatomical landmarks and it allows for postoperative blockade even in the presence of bulky knee dressings.

As the authors point out, postoperative quadriceps dysfunction is a well-recognized, multifactorial problem. We are intrigued by the implication that there is a quantifiable amount of weakness that is attributable to any one of these factors such as bandaging, pain, or weakness. In any case, this is precisely why we chose a volunteer model to study the relative motor impairment associated with ACB, thereby reducing the contribution from these confounding factors.

We also agree that the ACB does not provide a complete block of the knee. Our study did not focus on efficacy for any particular surgical procedure, but had a very simple clinical question: does ACB performed with 15 mL of local anesthetic lead to significant impairment of balance or weakness? The answer that we found was no. A multi-injection technique, such as the one suggested by the authors, may in fact provide more complete analgesia for total knee arthroplasty. However, it is difficult to interpret the data provided without a more detailed explanation of their methodology and statistical treatment; we look forward to reading the complete study upon publication.

We are encouraged by the authors' enthusiasm for providing quality analgesia after joint replacement surgery, and we are sure that Dr Egeler and colleagues would agree that the optimal postoperative regional anesthetic technique providing long-acting analgesia while preserving motor function and balance is currently elusive.

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Aberrant Vein Within Common Connective Tissue Sheath of the Sciatic Nerve at the Popliteal Fossa

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To the Editor:

In a recent article, Perlas et al¹ suggest ultrasound-guided popliteal sciatic nerve block (PSB) within a common tissue sheath. The combination of a relatively high volume of local anesthetic required for the PSB and proximity of the injection site to the popliteal vessels mandates precautions to reduce the risk of an inadvertent intravascular injection.² During ultrasound-guided PSB, the popliteal artery and vein are typically visualized; however, the pressure commonly applied by the ultrasound transducer to obtain adequate images can obliterate the lumen and obscure the view of the large veins of the popliteal fossa. We present a clinical scenario in which ultrasound guidance during PSB in a 62-year-old male patient scheduled for left lateral foot ulcer surgery readily identified the popliteal artery and vein. However, a more detailed scan of the fossa unexpectedly revealed a large aberrant vein within the common connective tissue sheath of the sciatic nerve in close vicinity to where the needle is typically placed (Fig. 1).³ Importantly, the vein was almost completely obliterated by even a slight pressure of the ultrasound transducer and, therefore, could be easily missed, with a possible resultant risk of intravascular injection.

Identification of veins in the popliteal fossa may prove difficult as there are many anatomical variations.⁴ Typically, tributaries to the popliteal vein converge below the sciatic nerve bifurcation, such as anterior and