conduction velocity (less than 80%) compared with baseline data obtained in the same individual." However their table 3 summarizes the mean electrophysiologic records for all the patients at the three time-points. Averaging theses values may mask potential electrophysiologic variations, which may occur following nerve injury. We believe the raw electrophysiologic data for each patient both at baseline and at 4 weeks postoperatively should also be reported, as the evolution over time may further inform our understanding of nerve injury. Indeed, the value of electrodiagnostic data at 1 week postoperatively may be questionable, as motor and sensory axons can remain excitable for a period of 7 and 11 days, respectively, following an insult.[3] Nonetheless, the results of Sala-Blanch *et al.*'s study do seem to lend support to the growing body of important literature suggesting that intraneural injection may not always lead to nerve injury, and for this, we are sincerely grateful.

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In Reply:

We thank Swenson, Davis, Albrecht, Riazi, and Brull for their comments on our study, which have given us an opportunity to contribute additional thoughts on this subject.[1]

Swenson and Davis point out that our article does not provide convincing evidence that intraneural injection is safe, specifically citing the small sample size. We agree and also advise against the practice of intraneural injections as unnecessary and potentially hazardous. Several recent studies reported that as little as 1 ml, or 0.1 ml/mm of square surface of the nerve of local anesthetic injected perineurally, is sufficient for timely onset of successful nerve block.[2,3] If so, what can be gained by a targeted intraneural injection, except an unnecessary risk? However, an injection within the epineurium during popliteal sciatic block has been a norm before ultrasound, and should probably continue with ultrasound-guided blocks as well, provided adequate monitoring, as discussed below.[4–7]

We share the concerns of Swenson and Davis that there is a possibility that the title of the article may be misinterpreted by some as a "tacit approval of a practice which may result in disabling complications." The fundamental problem is in the lack of the standardized nomenclature of what constitutes an intraneural *versus* perineural injection. Importantly, for the purpose of our study, "intraneural" was defined as injections that occurred within the epineurium and not within the perineurium.[8] However, the predicated reports on the subject used the term "intraneural" for injections that took place within any connective tissue of the nerves or plexuses.[8] As a result, the peer-review process favored "intraneural" in our title, although a more appropriate title would have been "intraepineural" or "subepineural." In our recent review, however, we attempted to standardize nomenclature of the sites of nerve injection to help reduce the future confusion in the literature.[9] We also agree with Swenson and Davis in that technology is now available to decrease the risk of intraneural injection and needle trauma. There is sufficient evidence suggesting that combination of ultrasound guidance, electrophysiologic monitoring (avoidance of evoked motor response at less than 0.3 mA), and avoidance of resistance to injection (more than 15 psi) may decrease the risk of an intrafascicular injection altogether.[9]

Albrecht *et al.* question whether additional electrophysiologic testing or data analysis would have an impact on the incidence of neurologic outcome of the subepineural injections reported in our study. We do not have a reason to doubt the sensitivity and the timing of the electromyography testing to detect significant subclinical nerve injury in our study. Electromyography is simply the most suitable method currently available to assess postblock nerve injury.[10] The choice of electrophysiologic data presented in our article was collaboratively made with reviewers through the peer-review process. Reporting more data would have unnecessarily cluttered the article since analysis of pre- and postinjection electrophysiologic data at all three data points (baseline, 1 week, and 4 weeks postblock) did not yield a signal prompting further exploration. As opposed to the report by Albrecht *et al.*,[11] none of our patients had symptoms or signs of nerve injury.

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Multiorifice Catheters Are Required to Maximize the Benefits of Intermittent Bolus Continuous Regional Techniques

To the Editor:

In Charous *et al.*'s comparison of continuous *versus* intermittent bolus techniques for continuous femoral nerve block,[1] the authors concluded that "the study did not find evidence to support the hypothesis that varying the method of local anesthetic administration – basal infusion *versus* repeated bolus doses – influences continuous femoral nerve block to a clinically significant degree." However, no mention was made of the study design with respect to the use of an end-hole perineural catheter rather than a multi-orifice design.

The demonstrated benefits of the intermittent bolus technique over the continuous technique (improved analgesia,[2–4] reduced local anesthetic requirement,[2] and perhaps better differential sensory-motor block) are thought to be enhanced by multi-orifice flow;[5,6] and thus, to maximize these benefits, a multi-orifice catheter is required. Flow from a multi-orifice catheter depends on flow rate: below 80 ml/h, multi-orifice catheters function as single-orifice catheters; above 100 ml/h, they progressively function as multi-orifice catheters.[7] Therefore, a continuous-only regimen will likely only deliver single-orifice flow, whereas an intermittent bolus technique will likely deliver multi-orifice flow.[7] Multi-orifice flow results in better local anesthetic spread,[5,6] and it is this better spread that is thought to be responsible for the improved block characteristics with the intermittent bolus technique: improved analgesia and reduced local anesthetic consumption (for a given analgesic effect). Recent evidence also suggests that by enabling a local anesthetic dose reduction through the use of the intermittent bolus technique, a higher sensory-to-motor block ratio can be achieved (less motor block for a given analgesic effect).[8] Although some studies have demonstrated benefits using the intermittent bolus technique with end-hole catheters,[9] the majority have incorporated a multi-orifice design.[2–4,8]

We, therefore, do not believe that the conclusion "it is doubtful that, when using continuous femoral nerve block, varying local anesthetic administration will provide an increased sensory-to-motor block ratio" is yet warranted.

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In Reply:

References 2–6 of our colleagues' letter all involved epidural infusion,[1–5] with references 2–4 suggesting analgesia is improved using repeated bolus doses compared with a simple