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Reply to Dr Price

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Authors
Ilfeld, Brian M
Madison, Sarah J

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30 minutes after injection, which seems to provide the same information that our colleagues believe would have been "more appropriate."

Finally, we *do* agree with our colleagues' conclusion that, "this [study's] negative result is very interesting because it confirms that the interscalene block should not be used as a first indication for hand and forearm surgery…"

Brian M. Ilfeld, MD, MS
Sarah J. Madison, MD
Department of Anesthesiology
University of California, San Diego
San Diego, CA

The authors declare no conflict of interest.

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Toward a Better Understanding of Brachial Plexus Anatomy for Shoulder, Forearm, and Hand Anesthesia

Accepted for Publication: July 23, 2013.

To the Editor:

I read with great interest the article by Madison et al[1] regarding ultrasound-guided injection of the most distal visible neural elements during interscalene block (ISB). I would like some clarification, however, on 2 issues.

The first regards a detail of brachial plexus anatomy used throughout the study. The authors pair the C7 nerve root with the inferior trunk, implying that it is a continuation of C7[1] when in fact it is formed by C8 and T1.[2] The correct description would pair C7 with the middle trunk.[2]

The second concerns the use of axillary nerve function as an accurate predictor of adequacy of surgical anesthesia after ISB. Loss of shoulder abduction was reported in 100% of cases, but 16% failed to exhibit surgical anesthesia. Contribution to the innervation of the shoulder joint and associated structures via the suprascapular nerve has been reported to approach 70%.[3] In contrast, the axillary nerve is responsible for supplying a much smaller proportion, along with relatively minor contributions from the lateral cutaneous, musculocutaneous, and subscapular nerves.[4] Did the authors consider using assessment of suprascapular nerve function (ie, loss of external rotation) as a potentially more accurate assessment of the density of ISB anesthesia?

Darcy J. Price, FANZCA
Department of Anaesthesia and Perioperative Medicine
North Shore Hospital
Auckland, New Zealand

The author declares no conflict of interest.

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Reply to Dr Price

Accepted for Publication: August 23, 2013

To the Editor:

We would like to thank Dr Price for his thoughtful letter raising important questions regarding our prospective clinical trial.[1]

Regarding Dr Price's first issue, he is correct in that the deepest nerve root is T1. However, it was not our intention to "pair"—or make equivalent in any way—the C7 nerve root and the inferior trunk. Rather, each of these structures is the deepest visualized of their respective brachial plexus locations. The inferior trunk and C7 nerve root were correctly included in the caption of Figure 1, in which 3 neural elements were imaged. Because it is difficult to conclusively determine if these neural elements were nerve roots or trunks—and in the figure, we highlighted and then referred to the "deepest-visualized neural element"[1]—we labeled this neural element either the inferior trunk (deepest trunk) or the C7 root (third deepest nerve root).

To address Dr Price's second issue, we did not "consider using assessment of suprascapular nerve function (ie, loss of external rotation) as a potentially more accurate assessment of the density of ISB." Although assessment of suprascapular function could have been used as an end point for a successful surgical block (and the suprascapular nerve is certainly involved in postoperative shoulder pain), we felt that the more distal departure of the axillary nerve off the brachial plexus would allow it to better represent the brachial plexus aggregate. Therefore, surgical anesthesia of the shoulder, defined as "the inability to abduct at the shoulder joint within 30 minutes of local anesthetic deposition,"[1] was ensured to be a result of brachial plexus anesthesia rather than suprascapular anesthesia. As Dr Price noted, in 100% of cases, there was a loss of shoulder abduction indicating a 100% success rate for accurate deposition of the local anesthetic bolus (as defined by our protocol).

In regard to Dr Price's concern that although loss of shoulder abduction was found in 100% of cases but 16% of the subjects failed to achieve tolerance to 50 mA of current delivered cutaneously over the inferior deltoid muscle,

we addressed this issue in the Discussion section of the manuscript: "Our study technique resulted in a 100% success rate in inhibiting shoulder abduction, and although there was a 16% failure rate in providing surgical anesthesia over the shoulder (presumably from supraclavicular nerves and a failure of the second 10 mL injection to spread to the superficial cervical plexus), all subjects exhibited an increase in tolerance to cutaneous current, suggesting the sensory fibers of the axillary nerve were affected."[1]

Brian M. Ilfeld, MD, MS
Sarah J. Madison, MRCS
Department of Anesthesiology
University of California, San Diego
San Diego, CA

The authors declare no conflict of interest.

REFERENCE

1. Madison SJ, Humsi J, Loland VJ, et al. Ultrasound-guided root/trunk (interscalene) block for hand and forearm anesthesia. *Reg Anesth Pain Med*. 2013;38:226–232.

Distal Injection Site May Explain Lack of Analgesia From Fascia Iliaca Block for Total Hip

Accepted for Publication: July 31, 2013.

To the Editor:

We read with great interest the recent study, "Fascia iliaca block for analgesia after hip arthroplasty."[1] As there have been numerous variations on the fascia iliaca (FI) block described in the literature,[2–5] we applaud the authors' work to help bring clarity as to what method, if any, may be effective for patients undergoing total hip arthroplasty (THA).

We agree with the authors' discussion comment that "technical aspects and pharmacologic choice" are responsible for the inadequate analgesia seen in the study and that "inserting the needle more proximally, using larger volumes of LA (local anesthetic), and/or various digital pressure maneuvers distal to the injection site could impact the spread of LA and efficacy of the block." The most important factor may be block location.[2–5] Our experience suggests that the more distal the technique used for an FI block, the less effective it is likely to be. This is because both the lateral femoral cutaneous and obturator nerves are physically further apart from the femoral nerve at distal locations.[6] In addition, both the lateral femoral cutaneous and obturator nerves may have already exited from under the FI when compared with a more proximal injection site making spread to these nerves unlikely.[6] We have found that at distal injection sites, like the one in the study, an FI block performs essentially like a femoral nerve block. To achieve analgesia more consistently in all 3 nerve territories, we perform FI blocks with a more proximal technique (see Fig. 1). Injection at this level is more likely to spread to all 3 nerves, as they are likely to be located closer together at this level. In addition, more proximal injection allows for significantly easier cephalad spread of local anesthetic into the pelvis as compared with distal injection, which tends to cause local anesthetic to remain in the leg.

A second factor contributing to the lack of effectiveness in the study may be the volume of local anesthetic used. Our experience is that 30 mL of local anesthetic is insufficient volume to allow spread to all 3 nerves.[2,3,5] Thus, we routinely use 50 to 70 mL (depending on patient size) of more dilute local anesthetic to achieve the hydrodissection necessary for local anesthetic to spread to all 3 nerves.

A third factor not noted in the study may contribute to the difference in effectiveness. At our hospital, most THAs are performed using the anterior approach. It may be that an FI block provides better analgesia for the anterior approach than other approaches to the total hip.

Our group performed 641 FI blocks in 2012, with more than 80% performed on patients undergoing THA. Although recognizing that direct comparison is difficult due to different potential operative and technical aspects, our current average length of stay for total hip patients is less than 2 days and pain control achieved on the total joint floor as measured by the Hospital Consumer Assessment of Healthcare Providers and Systems, exceeds the 99th percentile nationally.

Given the different techniques described for FI blocks, we urge caution in concluding that FI blocks are ineffective for postoperative pain control for THA based on this study with a distal injection site. Although the FI block was ineffective in this study, it may be that other methods of performing FI blocks can be effective. We agree with the authors that future prospective studies of these other methods are needed to define an effective technique for FI blocks.

Brian Vaughan, MD
Mark Manley, MD
Doug Stewart, MD
Co-Directors, Acute Pain Service
Anesthesia Associates of Cincinnati
The Christ Hospital
Cincinnati, OH
Vivek Iyer, MD
Chronic Pain Service
Anesthesia Associates of Cincinnati
The Christ Hospital
Cincinnati, OH

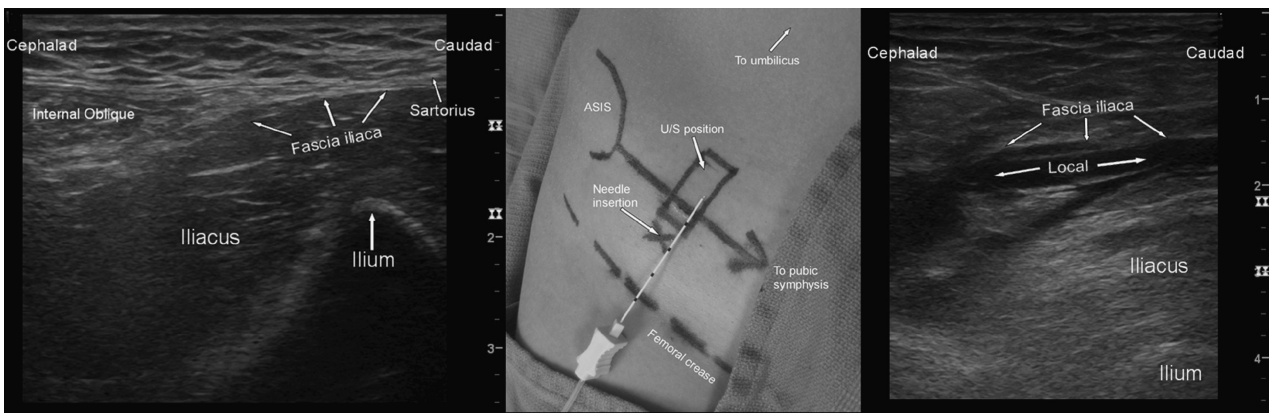

FIGURE 1. Ultrasound-guided FI block (left to right), Ultrasound anatomy before block, surface landmarks, and ultrasound anatomy after block.