Aiming to Refine the Interscalene Block

Another Bullseye or Missing the Mark?

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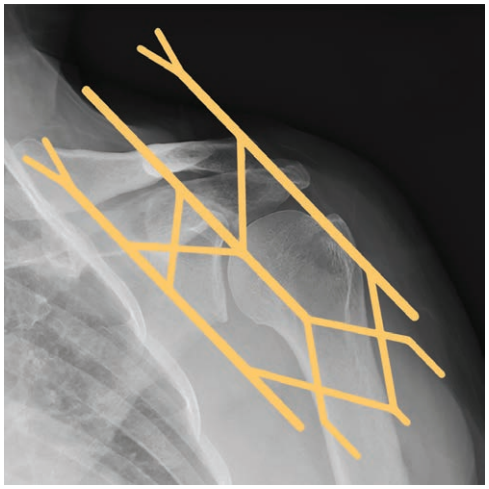
In this issue of Anesthesiology, Kang *et al.*[1] present the results of a randomized clinical trial in arthroscopic shoulder surgery patients which compares interscalene brachial plexus block with a more selective superior trunk block. The authors conclude that a superior trunk block results in noninferior analgesia and a lower risk of hemidiaphragmatic paresis (76%) when compared with interscalene block (98%). According to the authors, the superior trunk block represents "a refinement of the conventional interscalene block technique."[1] This begs the question: Why does the interscalene block need to be refined?



"[D]oes the interscalene block need to be refined?"

One way to address this question is to use a quality improvement model.[2] One such model asks: (1) What are we trying to accomplish?; (2) How will we know that a change is an improvement?; and (3) What change can we make that will result in an improvement? Underlying all improvement models is general acceptance of the following concept: all improvement requires change, but not all change represents improvement.[2]

First, we will determine what the authors are trying to accomplish. The primary concern raised by Kang *et al.* with regard to the interscalene block is the risk of ipsilateral phrenic nerve block and subsequent temporary hemidiaphragmatic paresis. This has been a well-known side effect of interscalene block,[3] and numerous alternative interventions have been proposed to avoid phrenic nerve block (table 1).[4] Although effects on pulmonary function associated with hemidiaphragmatic paresis have been measured and reported by the authors of the current study and others,[4,5] these measurements are typically limited to the immediate periprocedural episode, and data on downstream clinical and healthcare utilization outcomes (*e.g.*, unplanned admissions, emergency department visits) specifically attributable to side effects of regional anesthesia are lacking. In a national database study including more than 15,000 patients who underwent arthroscopic shoulder surgery, the overall readmission rate was approximately 1%, and the primary associated risks were surgical factors and patient comorbidities.[6] A larger study using a New York state database reported the rate of emergency department visits after arthroscopic shoulder surgery to be less than 2%, with pain being the most common reason, and use of regional anesthesia was associated with lower odds of requiring postoperative acute care.[7] In a Veterans Affairs cohort study of ambulatory peripheral nerve block catheter patients, 6 of 185 patients (3%) who received an interscalene perineural catheter reported any subjective respiratory symptoms; 4 sought medical care, and all 6 resolved with discontinuing the local anesthetic infusion.[8] In the study by Kang *et al.*, one patient in each group "developed symptomatic dyspnea without desaturation" and required no interventions.[1] Given these statistics, the risk of temporary asymptomatic hemidiaphragmatic paresis does not appear to be the highest priority problem worth solving in the general population of shoulder surgery patients, although we acknowledge that this side effect may be an important consideration for patients with severe pulmonary disease.

Next, we will assess whether or not the change is an improvement. The rates of complete hemidiaphragmatic paresis reported by Kang *et al.*[1] clearly favor superior trunk block over interscalene block (5% *vs.* 72%, respectively), but the difference in rates of any hemidiaphragmatic paresis is less dramatic (76% *vs.* 98%).[1] The primary outcome of 24-hour pain score at rest was noninferior between groups. All arthroscopic shoulder surgery patients in this study were

Image: J. P. Rathmell.

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Table 1. Alternative Regional Analgesic Techniques to Standard Interscalene Brachial Plexus Block that May Decrease the Incidence of Hemidiaphragmatic Paresis

Interscalene block "light"	• Interscalene block but with lower doses of local anesthetic
Interscalene block catheter	• Continuous interscalene block using lower rates of infusion
Superior trunk block	• Block distal to interscalene location but before branching of suprascapular nerve
Supraclavicular block	• Distal brachial plexus block approximately at the level of divisions • Can perform superior trunk block at this level although suprascapular nerve may be spared
Distal peripheral nerve block(s)	• Isolated suprascapular nerve block • Combined suprascapular and axillary nerve blocks (also known as "shoulder block")

admitted for 3 days after surgery, although they would have been discharged the same day from nearly all facilities in the United States. The multimodal analgesic regimen consisted of scheduled oral acetaminophen, celecoxib, and opioids as well as an IV fentanyl patient-controlled analgesia and as-needed IV boluses of morphine.[1] Not surprisingly, the pain scores in both groups were low and did not differ. What was surprising to us was the average opioid consumption in both groups: 61 IV morphine milligram equivalents for interscalene and 58 IV morphine milligram equivalent for superior trunk block (which convert to 183 and 176 oral morphine milligram equivalent for interscalene block and superior trunk block, respectively)![1] With these doses of opioids and in the context of other analgesic modalities, we would find it difficult to hypothesize a difference between any two regional analgesic interventions for any surgical indication. Based on the outcomes of hemidiaphragmatic paresis and analgesia in 24 h, we cannot definitively conclude that superior trunk block represents a clinically relevant improvement over interscalene block.

Finally, we will explore what kind of change will result in real improvement. When evaluating new techniques, it may be useful to apply pragmatic criteria.[9] We can rate both blocks on the following categories: improving access to regional analgesia for surgery patients, enhancing efficiency, decreasing disparities, and improving outcomes.[9] Because outcomes have been addressed previously, we can focus on access, efficiency, and disparities. All blocks for the study were performed by a single expert regional anesthesiologist; all 40 interscalene block participants received their assigned block, but 2 of the 40 participants assigned to superior trunk block could not receive their assigned procedure.[1] In one participant, the transverse cervical artery prevented access to the superior trunk; in the other, the branching point of the suprascapular nerve could not be identified.[1] Both of these patients received an interscalene block for their surgeries instead. Careful identification of these detailed anatomic findings during superior trunk block will require expert-level ultrasound skills, and perhaps more scanning time. This level of expertise may not be available at the average hospital or surgery center. Therefore, we can safely conclude that superior trunk block may not improve access (experts already doing interscalene block may change to superior trunk block), may decrease efficiency (more scanning time), and may increase disparities (only centers with advanced sonographic expertise may be able to perform superior trunk block).

If changing from interscalene to superior trunk block does not represent meaningful improvement, where else can we improve the clinical practice of regional analgesia for shoulder surgery? Although the development of new advanced techniques in regional anesthesia and analgesia is exciting for experts in the subspecialty, many patients everyday are not receiving any regional anesthesia.[10] Using a nationwide anesthesia database with more than three million outpatient surgical cases that would have been amenable to regional analgesia, Gabriel and Ilfeld[10] found that only 3% of those cases received a block. Looking specifically at arthroscopic shoulder surgery cases, regional analgesia was used in only 41% of them.[10] Increasing patient access to regional anesthesia may represent the most meaningful improvement. A starting point for improvement is establishing a core set of regional anesthesia procedures that every new board-certified anesthesiologist can perform competently and safely for eligible surgical patients. Fellowship-trained regional anesthesiologists and acute pain medicine specialists will serve as the experts in the clinical setting and advocates for system-wide improvements in perioperative pain management, but we will need graduating residents in anesthesiology comfortable with basic regional anesthesia techniques for common surgeries like shoulder arthroscopy to be the frontline agents of change and increase patient access.

Competing Interests

The authors are not supported by, nor maintain any financial interest in, any commercial activity that may be associated with the topic of this article.

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