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## Supraclav Suprascap Interscalene Shoulder Surgery: Comment

To the Editor:

We read with great interest the noninferiority trial by Auyong *et al.*<sup>1</sup> We greatly appreciate the authors for their novel technique, the anterior suprascapular nerve block. They have shown that it provides noninferior

analgesia compared to that of interscalene block, and at the same time preserves vital capacity and has lower incidence of Horner syndrome.

Our question is: when the anterior suprascapular block, which did not target the superior trunk, offers a noninferior analgesia to interscalene (targeting the roots and trunks), how did the supraclavicular block targeting the superior and middle trunk not offer a noninferior analgesia? As per the authors, for supraclavicular block, a large volume of local anesthetic is required as the cross-sectional area of the brachial plexus increases at the supraclavicular level. This could have been a good explanation if the brachial plexus divisions were targeted, but the authors had targeted the superior and middle trunk in the supraclavicular group. When 15 ml volume of local anesthetic was deposited at the suprascapular nerve, laterally away from superior trunk had spread and blocked the axillary and subscapular nerves, arising from the posterior division of superior trunk (in the anterior suprascapular group), how did the same volume of local anesthetic that was deposited directly on the superior trunk (in the supraclavicular group) not block them?

In table 2 of Auyong *et al.* (PACU Pain and Opioid Consumption—Interscalene, Supraclavicular, and Anterior Suprascapular), all values in all the three groups have SD more than the mean. For example, the average postoperative numerical rating scale score at 60 min postsurgery (scored from 0 to 10) in the interscalene group, has mean  $\pm$  SD of  $2.1 \pm 2.6$ , which implies the values ranges from  $-0.5$  to  $4.7$  ( $2.1$  to  $2.6$  is equal to  $-0.5$  to  $2.1 + 2.6 = 4.7$ ). Logically pain score and opioid consumption cannot be represented negatively when the minimum score is zero. When the SD is more than the mean while analyzing data which is nonnegative (pain score, opioid consumption), it implies nonnormal or skewed distribution. The primary outcome of this trial is pain in the postanesthesia care unit and one-way ANOVA has been applied. For the ANOVA to be applied, the data has to be of normal distribution. If data collected is of nonnormal distribution, the recommendation is to use the median as a measure of central tendency and the interquartile range as a measure of dispersion.<sup>2</sup>

We would like to get clarification from the authors as to whether the data collected for pain scores at 60 min postsurgery was of nonnormal distribution and skewed, and whether application of mean as measure of central tendency in such nonnormal distribution has hindered the supraclavicular group to meet the noninferiority criteria in comparison to the interscalene group.

### Competing Interests

The authors declare no competing interests.

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## Supraclav Suprascap Interscalene Shoulder Surgery: Reply

### In Reply:

We thank Dr. Ganesamoorthi *et al.* for their interest in our article<sup>1</sup> and their commentary regarding our research. We would like to address each of their concerns.

First, the primary outcome revealed analgesic non-inferiority of an anterior suprascapular block compared to an interscalene block for rotator cuff shoulder surgery ( $P = 0.012$ ) in the postanesthesia care unit. In contrast, non-inferiority was not shown when comparing supraclavicular to interscalene blocks with the same criteria ( $P = 0.088$ ). The discussion in our initial publication addresses these findings at length along with our best interpretation for the collected data. Indeed, the injection endpoint for the supraclavicular group was at the superior and middle trunks. However, the exact postinjection distribution of the 15 ml of local anesthetic remains unknown. Clinical care of our patients should be based more on clinically relevant outcomes<sup>1,2</sup> rather than

conjecture of how local anesthetic anatomically flows around the brachial plexus at various points of injection.

Second, our pain variables did not exceed the expected skew for the normal distribution (conventionally  $-1$  to  $1$ ), although the means were higher than the medians, reflecting a few subjects with higher pain scores (table 1). While within-subject changes are typically more normally distributed than individual values, analyzing pain in terms of a change from baseline is not typically performed in our field of study and we have been asked to remove these analyses from previous research. Our methods and plan for the analysis of pain was always a comparison of means and we did not feel that there was sufficient reason to deviate from that plan given the realized data.

The final topic addressed is whether mean pain is an appropriate statistic, as the CIs include scores less than 0 and are impossible values. On the numerical rating scale, scores of 2.1 and 2.6 (the mean average pain scores) are also improbable values for individual patients, as patients rarely respond with such precision when asked for a numerical rating scale pain score of 0 to 10. Studies designed using comparisons of means tend to be more powerful than comparisons based on other statistics, and the mean may be a useful measure—at least mathematically—to compare groups.<sup>3–5</sup> However, the mean of the distribution may be less useful for communicating expectations to patients. In this study, half the subjects had scores less than 2 for average pain. While we were pleased with this low pain burden across groups, we agree that it complicates the interpretation of comparisons based on means. When pain score changes are appropriate—for example, the change from 24 to 48 h—the proportion of subjects with reduced pain is a highly useful statistic. Consensus on critical thresholds in the numerical rating scale might allow for comparisons of proportions of subjects with levels of severity of pain. However, the numerical rating pain scale is applied to a wide variety of surgeries and other types of pain, so this consensus may be difficult to reach and is outside the scope of this research. Regardless, these decisions should be made before commencement of the study to be appropriately incorporated into the statistical design.

### Competing Interests

The authors declare no competing interests.

**Table 1.** Numerical Rating Scale Average and Median Postanesthesia Care Unit Pain Scores

Block	Mean	SD	Skewness	25th Percentile	Median	75th Percentile
Interscalene	2.1	2.5	0.6	0	0	4.7
Supraclavicular	2.6	3.0	0.9	0	1.5	4.0
Anterior suprascapular	2.6	2.6	0.5	0	2	4.8