

Effect on the C4 Dermatome of Interscalene and supraclavicular Block

Yue Qiu MD†, Chelsea Cady MD†, Bedda L. Rosario BS, MPH, PhD *, and Steven Orebaugh MD†

† Department of Anesthesiology and Perioperative Medicine, University of Pittsburgh Medical Center, Pittsburgh, PA

* Department of Epidemiology, University of Pittsburgh, Pittsburgh, PA



INTRODUCTION

Anesthesia of the C4 dermatome is important for shoulder surgery, especially arthroscopic. The presumption that C4 is “covered” with interscalene block (ISB) dates back to the original description [1]. The use of ultrasound as a standard of care for performing peripheral nerve blocks has led to lower volumes of injectate with a more reliable effect. Furthermore, a number of studies reflect that supraclavicular block can be utilized for shoulder surgery with less effect on the diaphragm [2]. The actual effect of lower-volume ISB and of the SCB on the C4 dermatome has not been reported.

This prospective, single-center study examined the effects of ultrasound-guided interscalene block (ISB) and supraclavicular block (SCB) on the C4 sensory dermatome in patients undergoing shoulder, hand, or wrist surgery.

METHODS

Patients undergoing outpatient shoulder, hand, or wrist surgeries received ultrasound-guided ISB (for shoulder surgeries) with 12–15 ml of 0.5% bupivacaine or ultrasound-guided SCB (for hand and wrist surgeries) 20-24 ml of 0.5% bupivacaine. We assess the effect of these nerve blocks by using a “sensory score,” which reflects overall sensation, with 0-2 points each awarded for cold and 0-2 points for sharp sensation, a overall score less than 2 reflects successful sensory block while as score of 2 or 3 reflect partial block. A baseline sensory score establishes that the patient has normal perception before block and the evaluation is repeated at 20 minutes after block is completed.

Outcome

The primary objective was to investigate the sensory effect on the C4 dermatome after ISB and SCB. The secondary outcomes included the sensory effect on the C5 dermatome after performing ISB and SCB, pain scores upon arrival at the post-anesthesia care unit (PACU), and the incidence of adverse effects. We hypothesize that 80% of patients after ISB and 40% of patients after SCB will experience a sensory score <2 at the C4 dermatome.

RESULTS

Table 1: Patient characteristics

Characteristic	ISB (n=30)	SCB (n=31)	p-value
Age, yrs, mean (SD)	50 (15)	49 (17)	0.79
Female (%)	12 (40)	14 (45)	0.68
BMI, mean (SD)	31 (10)	27 (5)	0.19
NRS Baseline Pain Score, median (IQR)	0 (0, 3)	0 (0, 0)	0.11
Left Laterality (%)	19 (63)	15 (48)	0.24
ASA PS (%)			0.87
Score 1	7 (23)	9 (29)	
Score 2	13 (43)	13 (42)	
Score 3	10 (33)	9 (29)	

SD=standard deviation; IQR = interquartile range (Q1=first quartile, Q3=third quartile)

Table 2: Success rates of the sensory blocks

	ISB (n=30)	SCB (n=31)	Difference in Proportions (95% CI)	p-value*
C4 Dermatome Sensory Block Success Rate	16 (53%)	9 (29%)	24% (0%, 48%)	0.0268
C5 Dermatome Sensory Block Success Rate	29 (97%)	21 (68%)	29% (10%, 49%)	0.0034

*Chi-square test for C4; Fisher’s exact test for C5

Figure 1. Distribution of C4 Post Block Cumulative

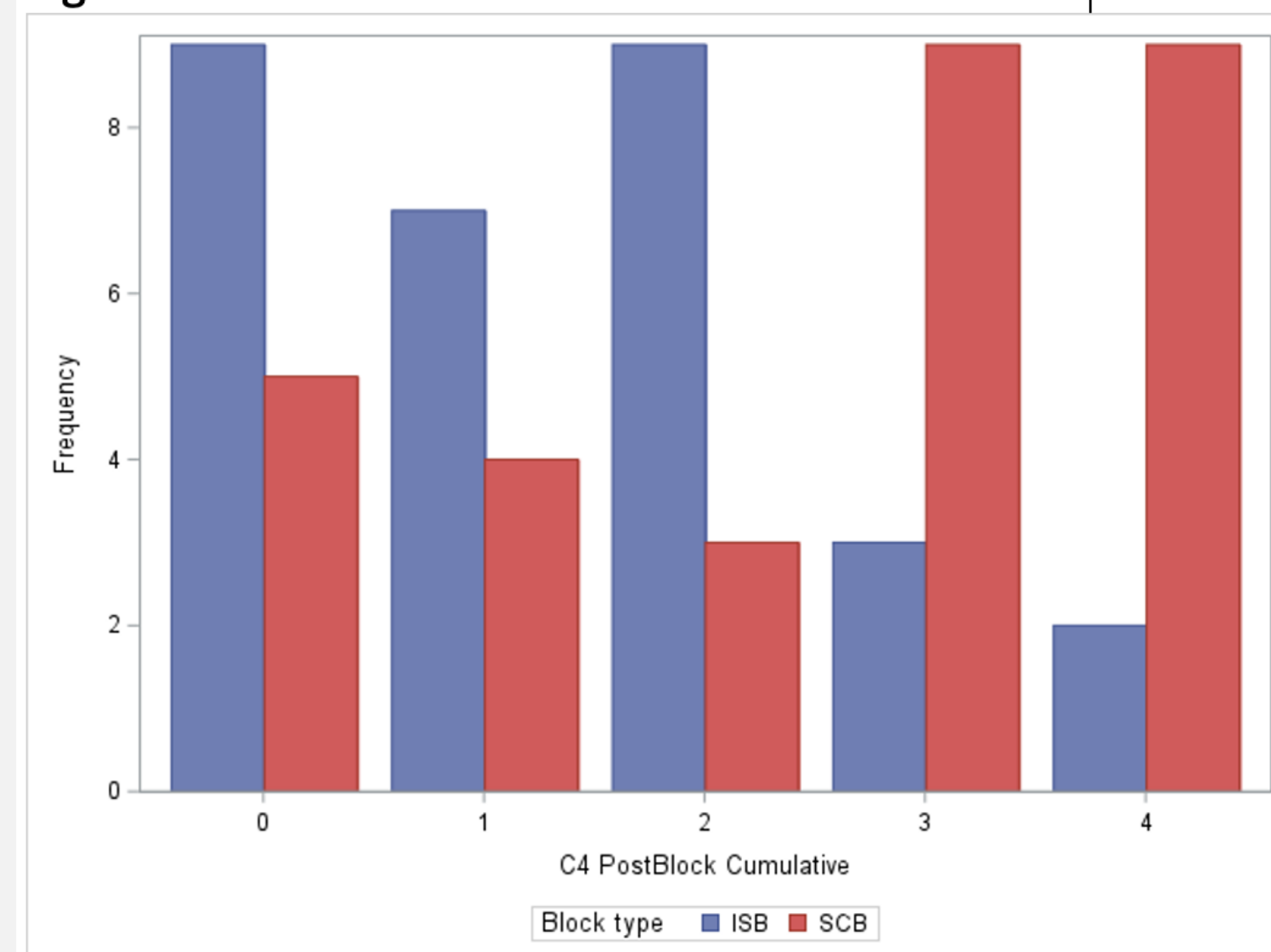
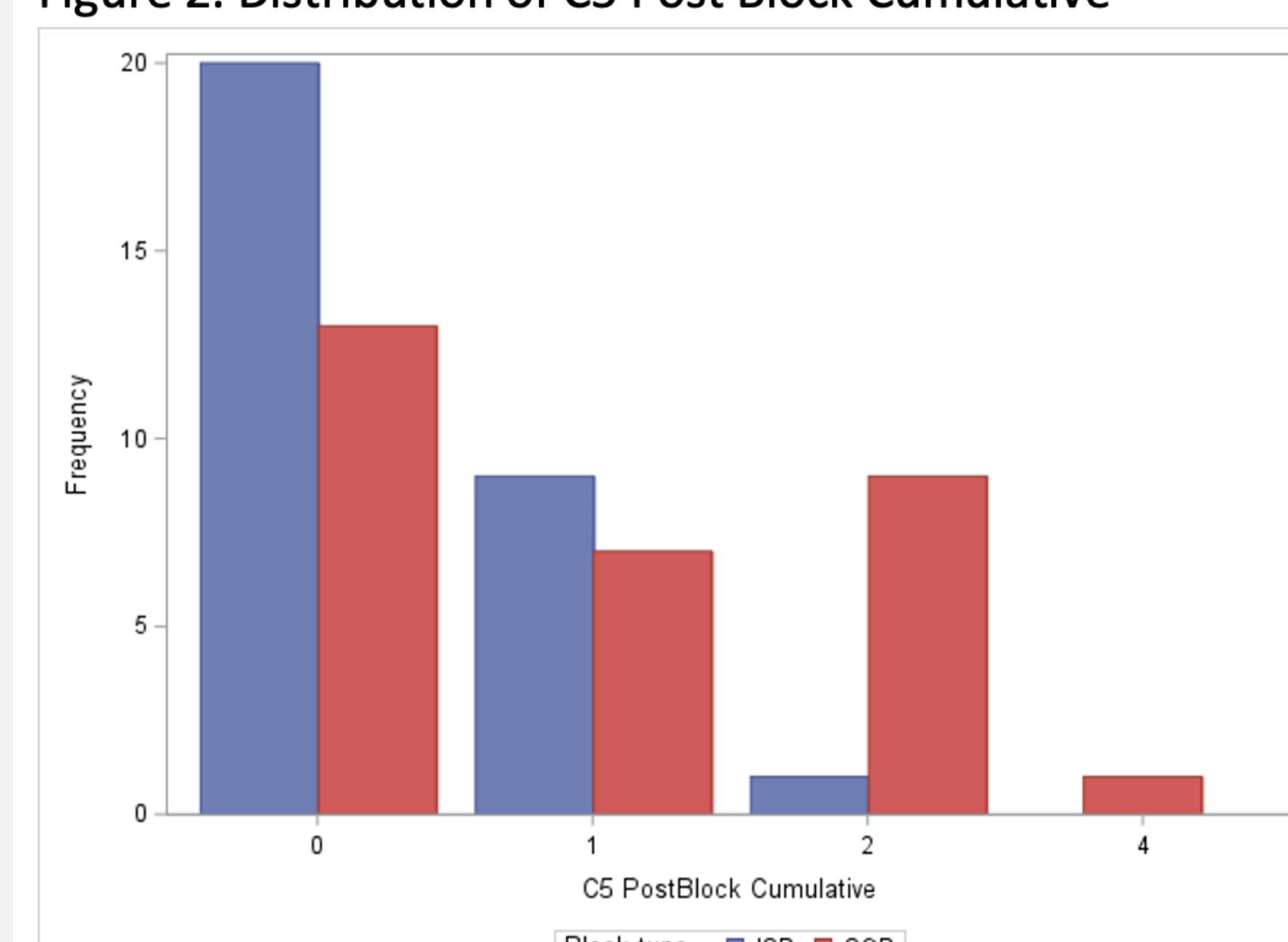


Figure 2. Distribution of C5 Post Block Cumulative



SUMMARY

Regional anesthesia is considered as the most effective analgesic for out-patient shoulder surgery. Interscalene brachial plexus block is the most widely used regional technique[3]. The introduction of ultrasound-guided techniques has allowed for additional refinements and improved block consistency with reduced local anesthetic volume, local anesthetic dose may be reduced from 20 ml to 40 ml historically administered[4]. The actual effect of lower-volume ISB and of the SCB on the C4 dermatome has not been reported.

Based on our results, ultrasound-guided low-volume ISB achieved C4 coverage in 53% of cases, whereas ultrasound-guided SCB achieved C4 coverage in 29% of cases. Ultrasound-guided low-volume ISB achieved C5 coverage in 97% of cases, whereas ultrasound-guided SCB achieved C5 coverage in 68% of cases. Not surprisingly, this suggests that ISB provides superior anesthetic coverage at those sites. The results were also notable for a moderate relationship between C4 sensory score and the initial VRS pain score after surgery, suggesting that anesthesia of the C4 dermatome provides a clinically meaningful contribution to postoperative pain relief, and deliberate injection of local anesthetic to ensure C4 coverage following the ISB will yield enhanced postoperative pain relief.

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