

Collaborative Quality Improvement Reduces Regional Anesthesia Complications Following Shoulder Surgery

Benjamin J. Catoe, MD¹; Adam Lutz, PT, DPT, PhD, MBA²; Charles A. Thigpen, PhD, PT, ATC²; Ellen Shanley, PhD, PT, OCS²; Thomas Brinkley, MD³; Stephan G. Pill, MD, MSPT¹; Michael J. Kissenberth, MD¹

¹Prisma Health, Steadman Hawkins Clinic of the Carolinas, Greenville, SC, USA; ²ATI Physical Therapy, Greenville, SC, USA; ³Prisma Health, Greenville, SC, USA

Background: The preferred regional anesthesia for shoulder surgery remains unclear based on mixed literature on efficacy and risk. Following a previous study at our institution, we began a coordinated effort between shoulder surgeons and anesthesiologists to reduce the complication rates of regional anesthesia for shoulder surgeries. The purpose of the study was to evaluate the efficacy and complication rates between single-shot interscalene blocks (SSIB) and continuous interscalene nerve blocks with a catheter (CIB) in patients undergoing arthroscopic and reconstructive shoulder surgery utilizing newly established patient selection protocols and reduced medication dosages.

Methods: Consecutive patients (n = 2280) who underwent anatomic total shoulder arthroplasty (aTSA), reverse total shoulder arthroplasty (rTSA), or arthroscopic shoulder surgery and had either SSIB (n=962) or CIB (n=1318) were included. The decision for SSIB or CIB was selected based on patient risk factors and surgeon preference. Based on our previous published study, patients with pulmonary disease were selected to receive SSIB. Medication dosage for SSIB was decreased to 10-20 ml of 0.25-0.5% ropivacaine (previously 20-30 ml). Patients received phone calls on postoperative days 1, 2, 7, and 14 to assess pain and complications. A Fisher's Exact Test was used to evaluate the statistical differences of frequencies between regional anesthesia cohorts. Chi-square tests compared the frequency of surgery type by anesthesia type. T-tests compared patient report of pain according to the visual analog scale (VAS). Significance was determined a priori at $\alpha=0.05$.

Results: There were 1525 patients who had arthroscopy, 402 patients who had rTSA, and 353 patients who had aTSA in the study. Mean age of the entire cohort was 56.7 ± 16.1 years. Anesthesia was provided via CIB in 1318 (58%) patients and SSIB in 962 (42%) patients. Table 1 provides a comparison of baseline factors between CIB and SSIB cohorts. CIB was used significantly more ($p<0.001$) for aTSA procedures (83%) than rTSAs (61%) and arthroscopies (51%). There were five complications across the entire sample (0.2%), all in the CIB group (0.4%). All complications were neurologic and resolved early in the postoperative period except for one patient. Due to the low frequency of complications, there was no statistical difference between groups ($p=0.08$). Pain was different between cohorts ($p<0.001$) for the 60% of patients that responded to the day 1 phone call follow-up. Patients that received CIB (n=540) reported significantly lower pain (VAS 3.9 ± 2.3) than those that responded following SSIB (n=836; VAS 5.3 ± 2.4). No patients required emergency department (ED) visits secondary to block complications.

Conclusion: Through appropriate patient selection and medication dosing, the complication rates associated with SSIB and CIB can be significantly decreased without compromising efficacy. Through a coordinated effort between shoulder surgeons and the anesthesia team, the present study demonstrates the effectiveness of pre-operative risk stratification to mitigate post-operative complications associated with interscalene regional anesthesia.

Table 1. Description of Patients by Anesthesia Type

Patient Information	All & by Anesthesia Type			p-value
	All	CIB [#]	SSIB [¥]	
Count	2280	1318 (58%)	962 (46%)	<0.001
Procedure Type:				<0.001
Arthroscopy	1525	779 (51%)	746 (49%)	
Anatomic TSA	353	294 (83%)	59 (17%)	
Reverse TSA	402	245 (61%)	157 (39%)	
Sex = Female	1053 (46%)	606 (46%)	447 (46%)	0.851
Age	56.7±16.1	56.4±16.7	57.0±15.1	0.362
Smoking Status = Not Current	19 (5%)	320 (9%)	136 (11%)	0.245

#CIB = Continuous Interscalene Nerve Block

¥SSIB = Single Shot Interscalene Block

Table 2. Comparison of complications from previous work to current

Complications	2018-2020 Cohort		2021- 2024 Cohort	
	CIB Complications (n = 1728)	SSIB Complications (n = 160)	CIB Complications (n = 1318)	SSIB Complications (n = 962)
Pulmonary Complications	135	2	0	0
Numbness	30	1	5	
Ringing in Ears	0	0	0	0
Facial Drooping	3	0	0	0
Weakness	2	0	0	0
Nausea	1	0	0	0
Hoarseness	1	0	0	0
Blurred Vision	0	0	0	0
Dizziness	0	0	0	0
Slurred Speech	0	0	0	0
Total	172	3	5	0