Single Shot Interscalene Block with Liposomal Bupivacaine versus Bupivacaine in Shoulder Arthroplasty

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INTRODUCTION: Regional anesthesia is a valuable component of multimodal pain control in total shoulder arthroplasty (TSA), and multiple interscalene block anesthetic options exist, including single-shot non-liposomal bupivacaine (NLIB) and single-shot liposomal bupivacaine (LBIB). The purpose of the current study was to compare pain control and opioid consumption in those undergoing TSA with either LBIB or NLIB.

METHODS: This was a retrospective cohort study at a single academic medical center including consecutive patients undergoing primary anatomic or reverse TSA from 2016 to 2020 who received either LBIB or a NLIB for perioperative pain control. Perioperative patient outcomes were collected including pain levels and opioid usage, as well as 30- and 90-day ED visits or readmissions. The primary outcome was postoperative pain control, whereas the secondary outcome was healthcare utilization.

RESULTS:

Overall, 541 patients were included in this study (344 LBIB and 197 NLIB). There was no statistically significant difference in postoperative pain scores at 3, 6, 12, and 48 hours postoperatively ($p>0.05$ for all). However, the LBIB group had improved pain scores at 0, 24, and 36 hours postoperative ($p<0.05$ for all). Additionally, fewer patients in the LBIB group reported severe pain at any time, defined as a 9 or 10 on the NRS-11 score (18% vs. 26%, $p=0.027$). Overall, in the LBIB group 31% of patients did not require any postoperative opioids compared with 21% in the NLIB cohort ($p=0.017$). There was no statistically significant difference in postoperative total morphine equivalents consumed or mean daily morphine equivalents between the groups ($p>0.05$ for both). Finally, there was no significant difference in 30- and 90-day ED visits and readmission rates ($p>0.05$ for all).

DISCUSSION AND CONCLUSION: LBIB and NLIB showed similar patient reported pain scores postoperatively. LBIB patients were more likely to be opioid free postoperatively compared to NLIB however there was no statistically significant difference in total morphine equivalents consumed, daily mean morphine equivalents, or in 30- and 90-day ED visits and readmission rates.

Table 1 Patient Demographic Characteristics

	Liposomal Bupivacaine (n=344)	Bupivacaine (n=197)	p Value
Age, yr	68.2 ± 10.4	68.2 ± 10.8	0.975
Female sex, n (%)	195 (55%)	120 (61%)	0.337
Race, n (%)			0.012
White	302 (88%)	154 (78%)	
African American/Black	35 (10%)	37 (19%)	
Other	7 (2%)	6 (3%)	
ASA score	2.5 ± 1.8	2.1 ± 1.5	0.369
History of Opioid use, n (%)	216 of 317 (68%)	97 of 176 (55%)	0.004
Length of stay, d	2.3 ± 1.8	2.1 ± 1.5	0.394
Operative time, h	3.1 ± 0.7	3.0 ± 0.8	0.653
Preoperative pain score (n=423)	4.1 ± 3.0	2.2 ± 3.1	<0.001

Table 2 Comparison of Post-Operative Pain in Liposomal Bupivacaine and Bupivacaine Groups

	Liposomal Bupivacaine (n = 344)	Bupivacaine (n=197)	*P* value
Post-Operative Pain			
Initial pain score	1.7 ± 2.9	1.1 ± 2.4	0.018
Pain Score at 3 hr (n=541)	2.1 ± 3.1	1.7 ± 2.8	0.681
Pain Score at 6 hr (n=128)	1.4 ± 2.3	1.7 ± 2.8	0.338
Pain Score at 12 hr (n=499)	2.1 ± 2.7	2.5 ± 3.0	0.151
Pain Score at 24 hr (n=482)	2.3 ± 2.8	3.3 ± 3.0	<0.001
Pain Score at 36 hr (n=425)	2.4 ± 2.9	3.3 ± 3.1	0.007
Pain Score at 48 hr (n=252)	2.9 ± 2.9	2.8 ± 2.9	0.736
Severe Pain (Score 9 or 10), n (%)	63 (18%)	52 (26%)	0.027
Post-Operative Opioids and Pain Control			
Opioid Free, n (%)	104 (30%)	41 (21%)	0.017
Total Morphine Equivalents	88 ± 155	142 ± 569	0.106
Mean Daily Morphine Milligram Equivalents	54 ± 88	74 ± 189	0.089
Escalation to PCA, n (%)	7 (2%)	10 (5%)	0.051
Requirement for Naloxone, n (%)	1 (<1%)	2 (<1%)	0.275
Escalation to Ketamine, n (%)	2 (<1%)	1 (<1%)	0.911