## Ultrasound-Guided Supraclavicular Nerve Block with Liposomal Bupivacaine for Post-Operative Analgesia in Hand and Upper Extremity Surgery: A Prospective, Randomized Controlled Trial

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INTRODUCTION: Common modalities for postoperative analgesia in upper extremity surgery include surgeon infiltration and ultrasound guided regional nerve blocks. Liposomal bupivacaine (LB) has the potential to prolong ultrasound guided supraclavicular nerve blocks (SCNB). This study examines the effect of SCNB with LB on postoperative pain control.

METHODS: This prospective, randomized, controlled trial conducted from May 2023-March 2024 assessed three cohorts of ultrasound-guided SCNBs: local anesthetic only (Group 1; N=24); local anesthetic mixed with dexamethasone (Group 2; N=25); and local anesthetic mixed with liposomal bupivacaine (Group 3; N=26). Inclusion criteria are patients aged ≥18 years undergoing: ORIF of the finger, hand, wrist, or elbow; thumb interpositional arthroplasties; proximal row carpectomy, scaphoid excision and 4 corner arthrodesis, and Dupuytren's excision. The primary endpoint is subjective block duration(hours). Secondary endpoints include opioid use after surgery, measured as oral morphine equivalents (OME) from the recovery period (PACU phase) through postoperative day (POD)3, as well as Disabilities of the Arm, Shoulder, and Hand (DASH) Scores. For statistical analysis, Chi-squared testing was conducted for nominal variables, ANOVA testing for continuous variables, and Bonferroni for post hoc analysis.

RESULTS: There were no significant differences in gender or ASA score across cohorts; however, patients were younger in Group 3 (51.9yrs.) compared to Group 1 (65.6 yrs.; p=0.009) (Table 1). Group 3 experienced longer block duration (51.5 hrs) when compared to Group 1 (27 hrs; p < 0.001) and Group 2 (28.7 hrs; p = 0.002) (Table 2). Group 3 patients had higher PACU opioid requirements (2.5 OME) than Group 1 (1.0 OME) and Group 2(0.0 OME); however, this was not significant (p=0.138) (Table 2). Both Group 2 (7.8 OME) and Group 3 (8.3 OME) had significantly lower opioid requirements through POD 3 when compared to Group 1 (14.5 OME; p=0.029, p=0.028) (Table 3). Group 3 had similar opioid requirements (8.3 OME) when compared to Group 2 (7.8 OME; p = 0.997) in this same timeframe (Table 3). No differences in post-operative DASH scores were observed (p = 0.296) (Table 2). There were no adverse effects reported in any study arm.

DISCUSSION AND CONCLUSION: SCNB with LB reported longer duration of postoperative analgesia, almost twice that of SCNBs with either local only or local with dexamethasone. Patients in the LB cohort required additional opioid medications in the PACU compared to other cohorts, in line with LB's delayed time to onset. Patients who received SCNB with either local + dexamethasone or LB had lower opioid requirements following discharge through POD 3(at home) when compared to local infiltration only. Additional research is warranted to examine opioid requirements amongst patients receiving SCNB with LB.

Table 1: Descriptive Statistics by Group						Table 2: Analysis of Length of Bloc	Table 2: Analysis of Length of Block and Opioid Requirements by Group					
	All N=75	Group 1	Group 2	Group 3	P		All N=75	Group 1 N=24	Group 2 N=25	Group 3 N=26	P Value	
Age [mean, (SD)]	59.3 (15.7)	65.6 (12.6)	60.9 (12.6)	51.9 (18.3)	0.032	Length of Block, hrs	36.1 (20.3)	27.0 (10.0)	28.7 (9.3)	51.5 (25.7)	< 0.001	
Gender (%)						PACU - OME	1.2 (4.5)	1.0 (3.3)	0 (0.0)	2.5 (6.9)	0.138	
Male	40 (53.3)	15 (62.5)	12 (48.0)	13 (50.0)	0.546	Home - OME	10.1 (12.9)	14.5 (13.6)	7.8 (11.8)	8.3 (12.6)	0.042	
Female	35 (46.7)	9 (37.5)	13 (52.0)	13 (50.0)		Total OME	11.3 (14.8)	15.5 (14.4)	7.8 (11.8)	10.7 (17.0)	0.056	
ASA [mean, (SD)]	2.2 (0.6)	2.3 (0.6)	2.2 (0.5)	2.2 (0.7)	0.625	DASH Score (post-op)	50.8 (28.2)	39.4 (28.5)	61.7 (27.2)	51.1 (28.0)	0.296	

Table 3: Pairwise Comparison by Type of Anesthetic

		P Value
Age		
	Group 1 vs Group 2	0.199
	Group 1 vs Group 3	0.009
	Group 2 vs Group 3	0.180
Length of Block		
	Group 1 vs Group 2	0.346
	Group 1 vs Group 3	< 0.001
	Group 2 vs Group 3	0.002
PACU - OME		
	Group 1 vs Group 2	0.145
	Group 1 vs Group 3	0.680
	Group 2 vs Group 3	0.057
Home - OME		
	Group 1 vs Group 2	0.029
	Group 1 vs Group 3	0.028
	Group 2 vs Group 3	0.997
Total OME		
	Group 1 vs Group 2	0.022
	Group 1 vs Group 3	0.070
	Group 2 vs Group 3	0.612