Liposomal Bupivacaine Interscalene Nerve Block Offers No Advantage Compared to Standard Bupivacaine in the Management of Pain Following Arthroscopic Rotator Cuff Repair

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Objectives: The use of interscalene nerve blocks (ISNB) significantly reduces postoperative pain and opioid requirement.[2] The FDA has recently approved liposomal bupivacaine (LB) for ISNB[1], which is reported to have a longer duration of action compared to standard bupivacaine. The purpose of this study was to determine whether the use of a liposomal ISNB could confer additional benefits over standard bupivacaine ISNB in patients undergoing arthroscopic rotator cuff repair (ARCR). The hypothesis was there would be no difference in postoperative pain or narcotic requirement between the two types of ISNB.

Methods: This multicenter, randomized-controlled clinical trial enrolled 52 patients with full-thickness rotator cuff tears undergoing primary ARCR surgery. Patients were randomized to receive an interscalene block with either standard bupivacaine or LB. In addition, as part of a multimodal approach to pain, patients received oral pain medications preoperatively and postoperatively (Table 1). Following surgery, patients were given postoperative ‘‘pain journals’’ to document visual analog scale (VAS) pain scores and to track their daily opioid consumption for the first 14 postoperative days.

Results: LB and control groups did not differ with respect to demographics and rotator cuff tear (Tables 2-3). There was no difference in postoperative pain scores or opioid intake, either cumulatively or on any individual day, between the LB and control groups (Tables 4-6). Furthermore, the comparison of pain scores between groups failed to ever reach a minimal clinically important difference of 1.4. Twenty-five percent of patients in the LB group and twenty-three of participants in the control group consumed zero opioids ($p = 0.869$).

Conclusion: When used as part of a multimodal approach to pain, liposomal bupivacaine used in ISNB offers no added benefit over standard bupivacaine with respect to pain or opioid consumption in the first 2 weeks following ARCR.. The large number of participants requiring zero opiates following surgery may indicate that the current analgesic regimen is sufficient to reveal patient expectation and education as the major determinants of the outcomes measured in this study. Additional studies in different populations may provide further insight into the efficacy of liposomal bupivacaine nerve blocks.

References

1. Gabriel RA, Ilfeld BM. An Updated Review on Liposome Bupivacaine. Current Anesthesiology Reports 2019:1-5

2. Singelyn FJ, Lhotel L, Fabre B. Pain relief after arthroscopic shoulder surgery: a comparison of intraarticular analgesia, suprascapular nerve block, and interscalene brachial plexus block. Anesth Analg 2004;99:589-592, table of contents. 10.1213/01.Ane.0000125112.83117.49

Table 1. Suggested Multimodal Analgesic Protocol for Rotator Cuff Repair. Patients were randomized into receiving either a 25cc interscalene block with 0.5% bupivacaine (control) or one consisting of 10cc liposomal bupivacaine and 15cc or 0.5% bupivacaine (LB).

Suggested Multimodal Anesthetic Protocol for Rotator Cuff Repair	
Preoperatively:	gabapentin 600mg
	celebrex 400mg
	acetaminophen 1000mg PO
	25cc interscalene nerve block with IV decadron 10mg
Postoperatively:	acetaminophen 1000mg Q8 x 72hrs, then PRN
	gabapentin 300mg PO QHS x 5 nights
	ibuprofen 600mg Q8 x 72hrs
	15-25 oxycodone 5mg (as needed)

Table 2. Recorded Demographics for the Study Population. P-values were obtained from 2x2 chi-squared tests comparing each individual categorical variable.

	Summary Demographics		
	Control	Case	p-value*
Age *(mean)*	*55.8*	*59.5*	***0.229***
Sex *Female (Male)*	*13 (15)*	*14 (10)*	***0.392***
Laterality *Left (Right)*	*12 (16)*	*16 (14)*	***0.931***
Tear Size *Mean*	*0.89cm*	*1.27cm*	***0.143***
# of Anchors *Mean*	*1.96*	*2.67*	***0.081***

Table 3. Concomitant Surgeries Observed in the Study Population. P-value was obtained using a 5x5 chi-squared test comparing all surgery conditions.

	Concomitant Surgeries		
	Control	Case	p-value**
Acromioplasty & Biceps Tenodesis	*14*	*12*	
Biceps Tenodesis	*2*	*1*	
Acromipolasty	*9*	*7*	
RCR Alone	*2*	*1*	
Other	*1*	*3*	
Total	**28**	**24**	***0.777***

Table 4. Average Daily Postsurgical Pain following Post-Rotator Cuff Repair. Pain scores were recording using Visual Analog Scale (VAS).

	Average Daily VAS Pain Score by Group Post-Op Day							
Group	***0***	***1***	***2***	***3***	***4***	***5***	***7***	***14***
Control (mean)	1.04	2.79	2.87	2.53	2.47	1.95	1.76	1.45
LB	0.71	2.31	2.44	2.52	1.97	2.33	1.87	1.57
Difference	-0.33	-0.48	-0.43	0.00	-0.50	0.37	0.11	0.12
%Difference	-38.2%	-18.6%	-16.1%	-0.2%	-22.5%	17.4%	6.1%	8.0%
T.Test p-value	**0.445**	**0.468**	**0.492**	**0.995**	**0.395**	**0.554**	**0.824**	**0.835**

Table 5. Average Daily Opioid Intake for Postoperative Days 0-5, 7, 14 Following Rotator Cuff Repair. Values reported in Oral Morphine Equivalents (OMEs)

	Average Daily Opioid Consumption (OMEs) by Group Post-Op Day							
Group	***0***	***1***	***2***	***3***	***4***	***5***	***7***	***14***
Control (mean)	4.35	10.38	8.21	7.50	5.30	5.75	3.80	1.90
LB	3.61	6.83	4.98	7.93	4.86	6.37	3.17	0.91
Difference	-0.75	-3.55	-3.23	0.43	-0.44	0.61	-0.62	-0.98
%Difference	-18.8%	-41.3%	-49.0%	5.6%	-8.7%	10.1%	-17.9%	-70.0%
T.Test p-value	**0.622**	**0.143**	**0.167**	**0.872**	**0.851**	**0.826**	**0.711**	**0.404**

Table 6. Summary Pain Scores and Opiate Consumption Over 14 Postoperative Days After Rotator Cuff Repair. Pain scores were recorded using a Visual Analog Scale (VAS). Opioid consumption was measured in both Oral Morphine Equivalents (OMEs) and number of pills (note: one 5mg oxycodone pill = 7.5 OMEs).

Group	Total OME	Avg. Daily Opioid Use (OMEs)	Avg. Daily Opioid Use (pills)	Total VAS	Avg. VAS
Control (mean)	47.18	6.74	0.90	16.10	2.01
LB	38.65	5.52	0.74	14.24	1.78
Difference	-8.53	-1.22	-0.16	-1.86	-0.23
%Difference	-19.9%	-19.9%	-19.9%	-12.3%	-12.3%
T.Test p-value	0.513	0.513	0.513	0.628	0.628

Figure 1. Average Daily Postsurgical Pain Visual Analog Scale (VAS) Ratings for Postoperative Days 0-5, 7, 14 Following Rotator Cuff Repair

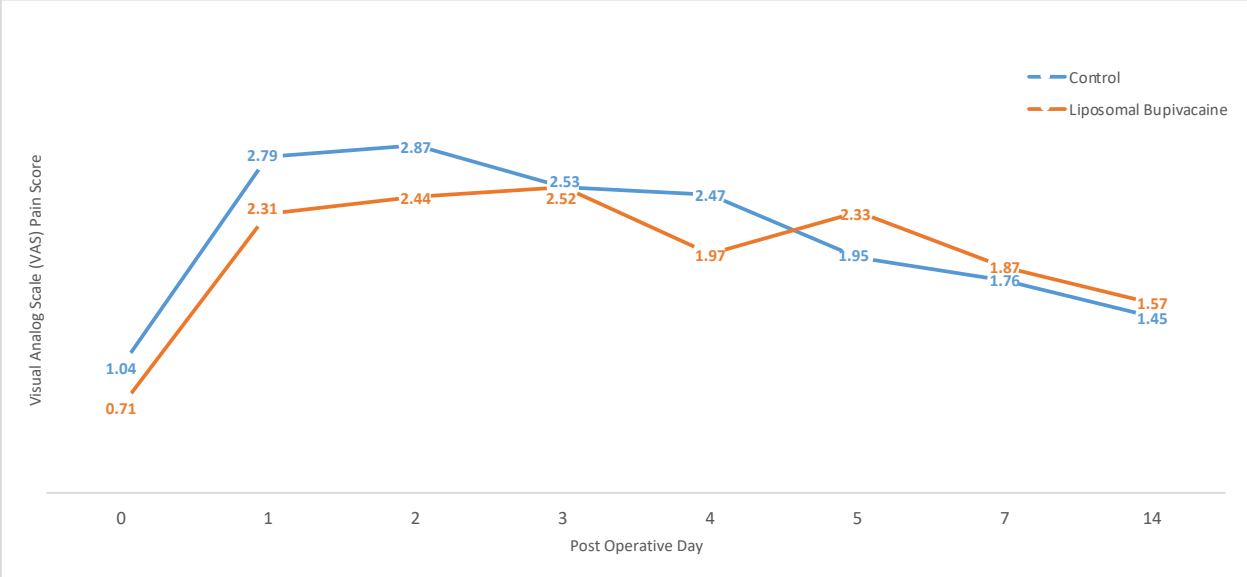

Figure 2. Average Daily Opioid Intake in for Postoperative Days 0-5, 7, 14 Following Rotator Cuff Repair, Measured in Oral Morphine Equivalents (OMEs)

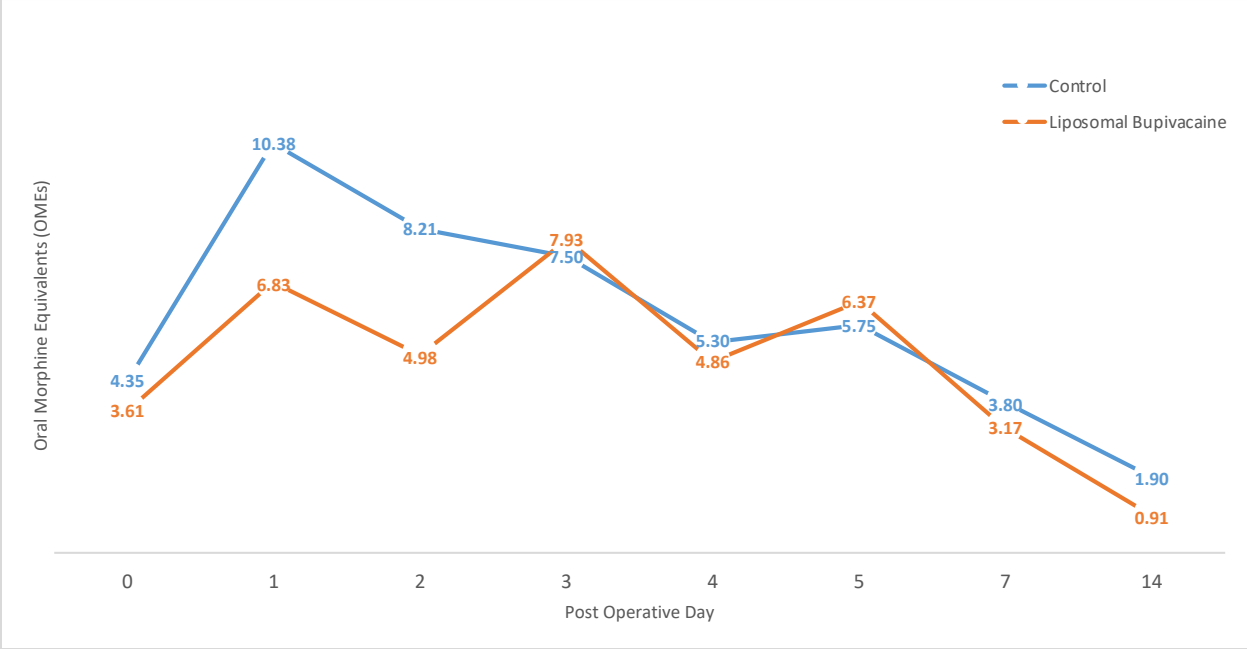

Figure 3. Distribution of Average Cumulative Narcotic Consumption During 14 Days Following Rotator Cuff Repair by Group, measured in Oral Morphine Equivalents (OMEs)