Reducing Opioid Utilization With Liposomal Bupivacaine in Postoperative Lumbar Spine Procedures

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ABSTRACT

Introduction: After lumber spine procedures, most patients require some form of opioid medication for pain control. Liposomal bupivacaine is a local anesthetic that has been found to last up to 72 hours post-injection. Its use has proven to be efficacious in reducing postoperative pain and opioid utilization in several surgical settings, but its utility in spine procedures has yet to be established. Based upon these findings and promising results from an observational study, our goal is to determine the efficacy of liposomal bupivacaine in lumbar spine surgery in reducing opioid utilization.

Methods: Patients were recruited based upon inclusion criteria of undergoing isolated lumbar spine procedures using a posterior approach. 34 patients were randomized to either liposomal bupivacaine or saline placebo injection. Injections were given at the end of the procedure following fascial closure, but prior to superficial closure. Following surgery, patients recorded pain levels and medications taken up until their two week follow up. Pain levels were reported using visual analog pain scales (VAS). Opioid use was quantified by post-op day and converted to standard morphine milligram equivalents (MME) for comparison. Based upon distributions, either T-tests or Wilcoxon rank sum tests were conducted, and statistical significance was defined by two-sided $\alpha<0.05$.

Results: A total of 17 patients (50%) were treated with liposomal bupivacaine (LB). There were no statistically significant differences between the control and LB treated groups for length of hospitalization, average milligrams morphine equivalent (MME) use during the 0-24, 24-28-, and 48-72-hours postoperative period, or MME use at 2 weeks postop. Pain scores at 6- and 10-hours postoperative were found to be statistically lower in those treated with liposomal bupivacaine compared to the control.

Discussion: Our study did not find a statistically significant reduction in opioid use after the administration of liposomal bupivacaine in postoperative spine patients.

Significance/Clinical Relevance: Lumbar spine surgeries utilizing a posterior approach can be associated with significant postoperative pain that can be challenging to control, detrimental to the patient's physical and psychological health, and hinder functional recovery. Most patients following surgery will require opioids to help manage their pain, but their use has limitations and harmful side effects. These include nausea, vomiting, ileus along with central nervous system depression, respiratory depression, dependence, and death at higher opioid concentrations. Studies show that patients who take opioids for acute pain have a greater likelihood of long-term opioid use, abuse, and overdose. The literature currently shows mixed findings on the efficacy of liposomal bupivacaine. We studied its use in lumbar spine procedures with the goal of determining its effectiveness in reducing postoperative opioid consumption. Our study did not find a statistically significant reduction in opioid use after the administration of liposomal bupivacaine in postoperative spine patients.

Images and Tables:

Table 1: Comparison of Visual Analog Scale (VAS) Pain Levels between Liposomal Bupivacaine (LB) and Control Group

Post-Operative Pain Score (VAS)	Control		LB		p-value
	Mean ± Std	Median	Mean ± Std	Median	
2 hours	4.60 ± 3.42	5.00	3.35 ± 2.32	4.00	0.2646*
4 hours	4.77 ± 3.32	5.00	4.60 ± 2.99	4.50	0.8992
6 hours	**6.25 ± 2.25**	**7.00**	**4.00 ± 1.87**	**4.00**	**0.0434**
10 hours	**5.57 ± 2.24**	**6.00**	**3.27 ± 2.34**	**3.00**	**0.0117**
0- 24 hours	4.45 ± 1.67	4.67	3.50 ± 1.29	3.57	0.0753
24- 48 hours	5.26 ± 2.45	6.00	3.99 ± 1.24	4.17	0.1436
48-72 hours	5.94 ± 2.32	6.00	5.56 ± 2.34	6.00	0.667
2 Weeks	4.8 ± 1.92	5.00	4.05 ± 1.74	4.05	0.2652
VAS Reduction	-0.33 ± 1.23	0.00	-0.69 ± 1.78	-1.00	0.5228

*p-value used Wilcoxon rank sum test; others used t-test

Table 2: Comparison of Length of Hospital Stay (LOS), Average Morphine Milligram Equivalent (MME) Use, and MME reduction between liposomal bupivacaine and control groups.

Measure	Control		LB		p-value
	Mean ± Std	Median	Mean ± Std	Median	
LOS (in hours)	42.69 ± 40.62	33.82	29.51 ± 19.32	26.37	0.3797*
Average MME Use 0-24 Hours Post-Operative	34.78 ± 19.15	30.00	32.05 ± 15.67	30.05	0.6587
Average MME Use 24-48 Hours Post-Operative	34.63 ± 23.35	37.50	27.62 ± 20.84	22.50	0.3801
Average MME Use 48-72 Hours Post-Operative	33.21 ± 28.68	30.00	17.50 ± 13.56	15.00	0.2202*
MME Use at 2 Weeks Post-Op	7.50 ± 0.00	7.50	8.75 ± 1.77	8.75	0.6171*

*p-value used Wilcoxon rank sum test; others used t-test