Liposomal Bupivacaine + Bupivacaine Versus Bupivacaine Interscalene Nerve Block Effect on Pain After Rotator Cuff Repair: A Randomized Control Trial

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Background: Interscalene nerve blocks (ISB) are commonly used for perioperative pain control after shoulder arthroscopy. Bupivacaine has historically been the primary medication used in ISBs. In 2018, liposomal bupivacaine was approved by the FDA for use in interscalene nerve blocks. This formulation allows for a potentially longer duration of analgesic effect as the bupivacaine is stored in liposomes, which allows for slow release over time. This study aims to identify the effect of ISBs using Bupivacaine alone (B) versus liposomal Bupivacaine+Bupivicaine (LBB) on postoperative pain control after rotator cuff repair.

Methods: A prospective, double-blinded randomized controlled trial was conducted from January 2020—April 2024. One hundred and twenty-eight patients opiate naïve patients were randomized into the B only group (25cc of 0.5% Bupivacaine) versus the LBB group (133 mg (10 mL) of liposomal bupivacaine + 15cc 0.5% bupivacaine). Inclusion criteria included patients over 18 years of age undergoing a rotator cuff repair. Exclusion criteria included: pre-existing liver disease, allergies to either drug, or preoperative narcotic use. Demographics, comorbidities, daily morphine milligram equivalents (MME) consumed, and daily visual analog scale (VAS) scores for 14 days were collected. Data analysis included chi-square, T-tests, and Mann-Whitney U test. P value < 0.05 threshold was used to detect statistical significance. A statistical power analysis was performed to determine the number of enrolled subjects needed to detect a statistically significant difference. A minimum of 64 subjects per group was derived to detect a minimum difference of 5 prescription narcotic pills prescribed between the groups with a p-value of 0.05, a standard deviation of 10 pills, and 80% power. Similarly, a minimum of 64 patients was needed to detect a 2.5-point difference in the VAS score with a p-value of 0.05, a standard deviation of 5 points, and 80% power.

Results: The final analysis included 128 patients, with 64 patients randomized to the liposomal bupivacaine and standard bupivacaine groups. No significant differences were noted between sex, ASA scores, and comorbidities between groups. When analyzing our primary outcome, no statistically significant differences were found between groups on individual daily MMEs consumed at any time point aside from postoperative day 2. On postoperative day 2, the LBB consumed a lower median (IQR) MMEs of 0.00 (0.00, 0.75) compared to the B group of 0.00 (0.00, 15.00) reaching statistical significance (p=0.038). In addition, no statistically significant difference was found in the mean total MME administered intraoperatively (p=0.147) or in PACU (p=0.620) between the groups. Patients receiving liposomal bupivacaine did not demonstrate statistically significant improvement in VAS scores on postoperative days 1 through 14 aside from postoperative day 2. On postoperative day 2, the LBB group had a lower mean (Std) VAS score of 4.79 (2.97) compared to the B group of 5.95 (2.76) reaching statistical significance (p=0.026). During the 14 day postoperative period, the LBB group consumed a median (IQR) total pill count of 5 (0, 12.25) compared to the B group of 5 (1, 12). On average, the B group consumed 7.08 (range: 0-39) and LBB consumed 8.54 (range: 0-49) total pills demonstrating no statistical significance (p=0.762).

Conclusion: The use of liposomal bupivacaine in ISBs does not lead to a significant difference in opioid consumption and VAS scores compared to standard bupivacaine during the first 14 days following arthroscopic rotator cuff repair. However, LBB patients had lower VAS scores and less narcotic consumption on POD 2, suggesting that LBB could mitigate the rebound pain that patients with standalone bupivacaine ISB experience. In addition, both groups consumed on average less than 8 (avg 7.78, range: 0-49) oxycodone 5mg pills reflecting the effectiveness of ISBs on postoperative pain control following arthroscopic rotator cuff repair. Surgeons should consider the low number of narcotic pills utilized when writing their postoperative prescriptions. Future research

should be performed to determine the cost effectiveness of LBB in ISBs on postoperative pain control considering the only difference was found on POD 2.