Large Area Local Anesthesia (LALA) in Submuscular Breast Augmentation

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Background: Large area local anesthesia (LALA) has been recommended for decreasing localized pain and shortening discharge time after breast augmentation surgery. However, quantifiable, objective outcome data for evaluation of the effectiveness of LALA in aesthetic plastic surgery procedures have not yet been reported.

Objective: We conducted a retrospective patient chart review to determine whether irrigation of the submuscular pocket with bupivacaine in retropectoral breast augmentation procedures quantifiably alters the patient’s postoperative course with respect to narcotic requirement, nausea and vomiting, and time to discharge. The findings were evaluated in the context of a critical review of the literature dealing with pain management after breast augmentation, and in particular with the use of LALA.

Methods: All procedures were performed by the senior author in a private surgical facility. All patients received an identical general anesthetic plus local infiltration of incisions with 1% lidocaine with epinephrine. An inframammary approach was used in all cases; retropectoral dissection was performed with electrocautery dissection followed by hemostasis. In one cohort of patients the submuscular pocket was irrigated with 10 mL of 0.125% bupivacaine before dissection of the contralateral side; in a second control cohort it was not. Postoperative care was the same for both groups.

Results: We found a trend toward decreased nausea and vomiting and narcotic use, and a statistically significant decrease in time to discharge, for the cohort that received intraoperative bupivacaine irrigation.

Conclusions: LALA is an effective means to decrease recovery time and possibly postoperative pain, nausea and vomiting, and narcotic requirements. Because evidence-based medicine is the surest basis for clinical decisions, evaluation of LALA as well as other treatment modalities should include quantifiable outcome measures. (Aesthetic Surg J 2004;24:436-441).
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Scientific Forum

Methods

A retrospective patient chart review was conducted to determine whether irrigation of the submuscular pocket with bupivacaine in patients undergoing retropectoral breast augmentation quantifiably alters the patient’s postoperative course with respect to narcotic requirement, nausea and vomiting, and time to discharge. The patients included in the study (n = 116) each underwent retropectoral breast augmentation performed by the senior author (R. C.) in a private surgical facility between 1999 and 2002. All patients were ASA category 1. All were administered a general anesthetic using the same induction regimen and maintenance protocol and in addition had local infiltration of incisions with 1% lidocaine with epinephrine. The technique used in all cases was an inframammary approach; the retropectoral dissection was performed in a standard fashion with electrocautery dissection followed by hemostasis.

The patients were divided into 2 cohorts: a control group and a bupivacaine group, selected by time period. During the first half of the study period, patients did not receive bupivacaine irrigation. This cohort of patients underwent submuscular placement of the prosthetic, closure, and return to the recovery room (control group). During the second half of the study, the second cohort of patients underwent submuscular placement of the prosthesis with pocket irrigated with 10 mL of 0.125% bupivacaine prior to dissection of the contralateral side (bupivacaine group). For irrigation, hemostasis of the retropectoral dissection pocket was achieved with electrocautery followed by infusion of bupivacaine directly into the pocket using a 10-mL syringe. The solution was not injected into the tissues but instead was allowed to passively absorb into the surrounding tissues. After completion of the contralateral dissection and bupivacaine irrigation, the implant was placed on the initial side of dissection, which was then closed. Similarly, the implant was then placed on the contralateral side, followed by closure. This procedure allowed sufficient time for peak activity of bupivacaine to be attained (30-45 minutes) before the patient was returned to the recovery room. In addition, the patient was monitored and ventilated during the period (within minutes after administration) when the main adverse cardiac and respiratory reactions to bupivacaine irrigation might be expected to occur.

Postoperative care did not differ between the groups and no immediate complications were noted in either group. The recovery room nurses who registered instances of nausea and vomiting were blinded to the use of bupivacaine intraoperatively. Antiemetics were administered for patient complaints of nausea or episodes of emesis, and narcotics were administered based on patient reports of pain.

Results

The results and the patient demographics are summarized in the Table. There were no statistically significant differences between the groups with respect to mean age, implant size, or duration of operation, although the group that received bupivacaine had slightly longer...
operative times and larger implant size. Thus, one could not argue that differences in narcotics use, nausea and vomiting, or recovery time could be accounted for by a shorter operative time or smaller implant volumes. There was a trend towards decreased episodes of nausea and vomiting among patients who received bupivacaine during the first postoperative hour, but this trend was not evident during the following 5 hours. Similarly, there was no statistically significant difference in the dose of antinauseant administered between the groups. A trend towards decreased narcotic requirements within the first postoperative hour and subsequent 5 hours was also observed in the bupivacaine group, although this was not statistically significant. There was, however, a statistically significant difference ($P < 0.005$) noted for time to discharge between the groups, with a mean of 234.9 minutes for the control group and 185.0 minutes for the bupivacaine group (Figure). Although not specifically investigated, there appeared to be no observed difference in time to return to normal activity between groups.

**Discussion**

Although patient satisfaction is frequently used as a criterion to assess surgical outcome, it is a gray zone with few objectively quantifiable parameters. However, patient satisfaction has been shown to be influenced by perioperative care, as well as by the final aesthetic result. Postoperative parameters such as nausea and vomiting, pain, and time to discharge are quantifiable and could potentially be used to improve surgical outcome with respect to patient and surgeon satisfaction.

Breast augmentation surgery is a procedure with a high level of patient satisfaction. It has been estimated that 249,641 patients in the United States underwent breast augmentation in 2002. Tebbetts highlighted the benefits of evaluating and modifying surgical technique and patient care to improve outcomes with respect to breast augmentation. His was the first study in two decades to document methods to decrease perioperative morbidity and time to recovery following such procedures. The purpose of his study was to develop techniques to predictably return patients to normal activities within 24 hours of surgery. He used the theory of motion and time principles to refine operative technique, including anesthetic and surgical parameters.

Tebbetts investigated retropectoral augmentation patients retrospectively, identified factors contributing to outcome, and then applied time and motion principles to a prospective cohort of patients. He found a 96% return to normal activity within 24 hours and concluded that decreasing operating room time and anesthetic time (and therefore drugs), as well as decreasing tissue trauma, bleeding, and inflammation by meticulous operative technique resulted in decreased postoperative pain and complications, a faster recovery, and a shorter time to resumption of normal activity.

The methodology and results of Tebbetts’ study have aroused considerable discussion in the medical literature. Brar argued that the improved outcome was attributed to decreased implant size, although Tebbetts claims to have similar results in large implant groups. Spear alluded to the fact that this was a multivariate assessment

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Control</th>
<th>Bupivacaine</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. (cohort size)</td>
<td>116</td>
<td>55</td>
<td>61</td>
<td>—</td>
</tr>
<tr>
<td>Mean age (y)</td>
<td>32</td>
<td>30.6</td>
<td>33</td>
<td>0.04</td>
</tr>
<tr>
<td>Mean implant size (cc)</td>
<td>305</td>
<td>290.5</td>
<td>317.6</td>
<td>0.03</td>
</tr>
<tr>
<td>Mean operating room time (min)</td>
<td>88</td>
<td>75.9</td>
<td>98.6</td>
<td>0.03</td>
</tr>
<tr>
<td>Mean episodes N/V (1st hour)</td>
<td>0.14</td>
<td>0.16</td>
<td>0.11</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Mean episodes N/V (hours 2-6)</td>
<td>0.3</td>
<td>0.22</td>
<td>0.38</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Mean anti-emetic requirement (total)</td>
<td>0.16</td>
<td>0.13</td>
<td>0.18</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Mean narcotic requirement (1st hour)</td>
<td>0.57</td>
<td>0.63</td>
<td>0.51</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Mean narcotic requirement (hours 2-6)</td>
<td>0.56</td>
<td>0.59</td>
<td>0.53</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Mean narcotic requirement (total)</td>
<td>1.12</td>
<td>1.2</td>
<td>1.04</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>

N/V, nausea and vomiting.
and consequently it is uncertain which modified variable or variables accounts for the improved outcome. Tebbetts\textsuperscript{10} himself agreed that ideally each factor should be isolated as an independent variable and studies should be repeated to determine specifically which ones contribute to outcome.\textsuperscript{9}

In his article, Tebbetts illustrated a schematic chain of events, which was used to analyze current practices, and then attempted to identify essential elements that affect surgical outcome.\textsuperscript{2} It appears more intuitive to use this list retrospectively to identify potential outcome modifiers, form hypotheses and test them in an independent prospective manner. Despite these limitations, Tebbetts has demonstrated that altering standard operative practices can impact surgical outcome. Moreover, the need for evidence-based medicine and statistical analysis was highlighted.

The lack of quantifiable outcome data in postaugmentation mammoplasty is evident. Apart from Tebbetts’ analysis, literature regarding postoperative pain and recovery in these patients is scarce. In 1990, Nesmith et al\textsuperscript{11} reported on the use of epidural anesthesia in 20 augmentation patients. This was a nonrandomized study without a control group. Although results were presented as “extremely satisfactory,” 2 of the 20 patients had episodes of hypotension requiring administration of ephedrine. Similarly, Lai et al\textsuperscript{12} evaluated use of continuous thoracic epidural anesthesia in 30 consecutive cases of retropectoral breast augmentation. This was reported as a “feasible, effective” anesthetic technique, despite one patient requiring ephedrine for hypotension and a 13% incidence of shortness of breath. Again, although lacking both a control group and objective, measurable parameters of pain control, this approach was suggested to be “even better than conventional alternative anesthetic techniques for breast augmentation.”

Another report described the use of methocarbamol intraoperatively and postoperatively in 62 patients who underwent retropectoral augmentation.\textsuperscript{13} Results were based on a subjective, nonquantifiable patient questionnaire, without a control group to compare outcomes. Methocarbamol was said to cause a “dramatic” improvement of immediate postoperative pain.

The first report on the use of local irrigation of the submuscular pocket combined with general anesthetic in retropectoral augmentation was published in 2000. Papanastasiou and Evans\textsuperscript{14} reported on the use of 0.5% bupivacaine infusion through closed suction drain ports before the drains were clamped.\textsuperscript{15} Clamps were removed after 5 to 10 minutes, when the patient reached the recovery room. The authors argued that field blocks provided inadequate analgesia and introduced the risk of pneumothorax and noted the potential serious complications of epidural anesthesia. “Adequate pain relief” was reported in more than 80 patients using this technique. As mentioned earlier, such anecdotal reports are an inadequate basis for making clinical decisions concerning changes in surgical practice. It is unclear from the paper whether these drains were placed submuscularly or subglandularly when a retropectoral approach was used for implant placement. In cases involving subglandular placement of implants, the likelihood of improved pain management using the described technique is questionable. Moreover, the clamping of drains for 5 to 10 minutes seems inadequate, given that the time required for the onset of action of bupivacaine is much longer.\textsuperscript{15}

Two similar anecdotal reports were published in 2002; both described tumescent techniques for retropectoral augmentation. The first reported the use of bupivacaine and epinephrine tumescent solution.\textsuperscript{16} However, the procedure appears to have been carried out by packing the dissected pocket with sponges soaked in the solution, which does not imply tumescence. It was suggested that the “patient awakens in the recovery room virtually pain free.” In the second report, Peled\textsuperscript{17} described infiltration with local anesthesia and epinephrine for 10 minutes at a volume per volume for the chosen implant size. He reported that his results were “so dramatic” that he stopped a prospective trial of randomizing each side to a different treatment regime. In addition, he claimed that this infiltration technique eliminated any need for hemostasis.

The deficiencies found in these papers limit their usefulness for other practitioners and researchers. Neither describes their technique in any detailed, reproducible form. No control groups were utilized to make objective comparisons, and no measurable outcome data were collected. The authors’ conclusions are based on a subjective impression of their own technique. The benefit of continuing a prospective trial, such as the one Peled\textsuperscript{17} began but later abandoned, would be precisely to provide data to colleagues which could be used as the basis for educated and evidence-based decisions regarding their surgical practices.

In their attempt to provide some guidelines regarding management of postoperative pain in ambulatory aesthetic surgery, Casas and Jewell\textsuperscript{3} made recommendations that included the use of COX-2 inhibitors, oral opioid combi-
nations, LALA, or continuous infusion of local anesthetics for acute pain relief. Although they distinguished between LALA and continuous infusion of local anesthesia, the literature from other subspecialties is not as precise. LALA should be distinguished from tumescent anesthesia, which implies large volume-pressurized infiltration of local anesthesia and epinephrine. The benefit of this tumescent technique for ease of dissection and hemostasis is well accepted; however, its effects on postoperative pain levels have not been clearly elucidated. It has been reported that tumescent injection in breast augmentation and abdominoplasty results in reduced postoperative narcotic requirements and decreased nausea and vomiting, although quantifiable data to support this claim were not available.

Such distinctions do not account for the observed inconsistency in outcome with respect to the use of LALA for control of postoperative pain in other surgical specialties. Some benefit of this technique was reported post-caesarean section. Decreased narcotic use by the treatment group was documented, despite no difference in reported pain, based on visual analog scales. A prospective, randomized, double-blind study of patients undergoing arthroscopic knee surgery reported decreased postoperative pain and analgesia required with LALA; however, the procedures performed were not consistent among the treatment groups. Fredman et al investigated LALA post-caesarean section and noted no difference between treatment groups. The treatment group used significantly less rescue morphine and had decreased activity related to pain scores. This group also investigated the benefit of LALA after total abdominal hysterectomy, bilateral salpingo-oophrectomy, and major abdominal surgery, with similar results.

Other studies have identified no measurable benefit of LALA. A randomized study involving bupivacaine infiltration into the groins after uncomplicated bilateral saphenofemoral vein ligation showed no significant difference in pain experienced. A randomized, prospective, double-blind trial comparing irrigation of the operative field with saline versus ropivacaine for partial mastectomy and axillary node dissection failed to show benefit. No difference with respect to postoperative nausea and vomiting, pain, antiemetic, or narcotic requirements were observed between treatment groups.

The lack of evidence-based medicine concerning postoperative pain in aesthetic breast surgery, the appreciation that well-directed changes can influence patient outcome in breast augmentation, and the controversy surrounding LALA, taken together, led to our investigation. Our findings concerning the use of bupivacaine irrigation into the submuscular pocket during retropectoral breast augmentation suggest its potential benefit. Our results suggest a trend toward decreased postoperative narcotic requirements and a statistically significant difference in time to discharge.

This study is not without its own limitations. It was conducted in a retrospective manner and pain was only reflected by narcotic administration. Ideally, symptoms of both pain and nausea would be evaluated, using visual analog scales in a randomized, double-blind, prospective trial. The additional cost of bupivacaine was $6.00 Canadian per patient, resulting in approximately a one-hour-earlier time to discharge. These results suggest that LALA is a rapid and easy tool for decreasing recovery time and possibly postoperative pain, nausea, vomiting, and narcotic requirements in retropectoral breast augmentation.

Improvement in patient outcome demands a continual reevaluation of standard surgical practices. However, it is imperative that outcomes be quantifiable in order to warrant changes in technique or patient care. Continued evaluation of trends such as LALA is necessary to justify their incorporation as a standard of practice. This evaluation should include quantifiable outcome measures and Bayesian probabilities, which form the backbone of evidence-based medicine. Based on these parameters, we should continue to reevaluate our practices and make only those changes that are justified by their benefit to both the patient and surgeon.

References

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