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Comparison of immediate postoperative pain in implant-based breast reconstructions

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Summary *Background:* Implant-based techniques represent the most common form of breast reconstruction. However, substantial postoperative pain has been associated with implant-based breast reconstruction.
Objective: The objective of this study is to evaluate immediate postoperative pain in implant-based breast reconstruction.
Methods: We reviewed 378 patients who underwent implant-based reconstruction between January 2004 and December 2012. Each patient's visual analog scale (VAS) score, pain medication, and patient-controlled analgesia (PCA) attempts were used to assess in-hospital postoperative pain. We evaluated timing of reconstruction post mastectomy, tissue expander (TE) designed fill volume, TE initial fill volume, and single-stage immediate implant (II) versus TE reconstruction.
Results: No significant differences in pain parameters were noted between the immediate and delayed postmastectomy reconstruction cohorts. TEs with larger (>300 cc) designed volumes required significantly more narcotic use ($p = 0.02$) and PCA attempts ($p < 0.01$). Narcotic use was higher in the larger (>250-cc) TE initial fill group starting on postoperative day 2, but overall differences in VAS score and PCA attempts were not significant. Morphine equivalence ($p < 0.01$) and non-opioid oral analgesic use (average $p = 0.03$) of the TE cohort were significantly higher than those of the II cohort.
Conclusion: Patients undergoing TE-based implant reconstruction show greater analgesic use than those with single-stage II-based reconstruction. This may indicate a higher immediate postoperative pain in TE procedures than in II procedures. Furthermore, higher initial fill and designed volume of TE require more morphine equivalence postoperatively. These

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findings may warrant further preoperative discussion for better pain management and patient satisfaction.

Background

The number of breast reconstruction cases has increased in the United States from approximately 78,000 cases in the year 2000 to 95,000 cases in 2013.[1] The benefits of breast reconstruction include improved self-esteem, body image, and quality of life.[2–5] It has been shown that breast reconstruction with mastectomy causes more pain than mastectomy alone.[4,6] Furthermore, implant-based breast reconstruction seems to result in more pain than reconstruction without implants.[6] Therefore, it is understandable that women considering reconstruction are concerned about postoperative pain, which is thought to negatively influence patient satisfaction and quality of life.[7,8]

Recently, we demonstrated that implant-based reconstruction elicited significantly higher pain according to the visual analog scale (VAS) and resulted in more postoperative narcotic usage than autologous tissue reconstruction.[9] To our knowledge, postoperative pain and narcotic usage within different subgroups of implant-based reconstruction patients have not been studied.

The purpose of this study was to determine whether operative details such as tissue expander (TE)-based reconstruction, immediate implant (II)-based reconstruction, immediate and delayed implant reconstruction post mastectomy, TE initial fill size, and TE designed volume play a significant role in the patients' postoperative pain for implant-based reconstructions during their hospital course. We used the VAS, a reliable measurement for acuity and modulation of pain demonstrated in past studies, to assess patients' subjective postoperative pain.[10,11] Total intravenous (IV) morphine equivalence and patient-controlled analgesia (PCA) utilization were also analyzed to comprehensively assess the degree of pain in the immediate postoperative period.

Table 1 Baseline characteristics of patients.

Demographics	II Group	TE Group	*p*-value
Patients	27	351	
Immediate reconstruction	26 (96.3%)	312 (88.9%)	0.34[b]
Delayed reconstruction	1 (3.7%)	39 (11.1%)	
Bilateral reconstruction	21 (77.8%)	235 (67.0%)	0.29[b]
Mean age	46.5	48.9	0.29[a]
Comorbidities	2 (7.4%)	55 (15.7%)	0.40[b]
Obesity%	0 (0.0%)	39 (11.1%)	0.09[b]
Mean OR Time	225 min	212 min	0.40[a]
Mean hospital stay	2.0 days	2.2 days	0.49[a]

[a] Two-sample equal variance (homoscedastic) *T*-test.
[b] Fisher's exact test.

Methods

All patients undergoing implant-based reconstruction at University of California Los Angeles (UCLA) between January 2004 and December 2012 were assessed with institutional review board (IRB) approval. Different cohorts compared in this analysis were II versus TE groups, immediate versus delayed postmastectomy reconstruction groups, initial fill amount $\leq$250 cc versus $>$250 cc, $<$60% versus $\geq$60%, and TE designed volume $\leq$300 cc versus $>$300 cc. The threshold between the groups 250 cc and 60% fill were approximations derived from generalized additive mixed models (GAMMs); thus, they are not absolute numbers that dictate the amount of elicited pain. Percent fill was calculated by taking the quotient of the initial fill and the manufacturer-suggested TE capacity. Unilateral and bilateral reconstructions were modeled separately to account for differences in pain from reconstruction laterality.[9] For bilateral TE patients with differing fill amounts in contralateral breasts, the average of the two was used as the representative initial fill amount. Data acquisition was conducted through the electronic medical record system, Essentris (nursing database), and Pharmacy Centricity (oral and intravenous (IV) narcotic use database). Partially handwritten records, missing data entries, and medications with administration less than every 6 h were excluded from analysis.

All operations were performed by the senior authors. Implants were placed subpectorally, and either a TE or an immediate silicone implant was used. Acellular dermal matrix (ADM) use, baseline demographics (Table 1), and length of postoperative hospital stay were evaluated. All analgesics including IV narcotics, PCA, nonsteroidal anti-inflammatory drugs (NSAIDs), oral narcotics, benzodiazepines, and muscle relaxants were prescribed according to the standard guidelines adopted by the hospital. Patients, regardless of reconstruction modality, who received local anesthetics either intraoperatively or postoperatively as local infiltration, infusion catheter (i.e., On-Q pump), or regional blockade were excluded from the study.

Methodologies for procuring VAS scores, morphine equivalence conversion, PCA attempts, and non-opioid oral

Table 2 Acellular dermal matrix use.

Acellular dermal matrix use	Yes	No
Immediate implant	27 (100.0%)	0 (0.0%)
Tissue expander	344 (98.0%)	7 (2.0%)
Total	371 (98.2%)	7 (1.8%)