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A Proposed Multimodal Pain Control Regimen for Patients Undergoing Post Mastectomy with Reconstruction and Its Effect on Minimizing Narcotic Use and Hospital Length of Stay

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Abstract

Background: There are few studies outlining an adoptable enhanced recovery pathway after mastectomy and reconstruction. This study analyzed a constructed and employed multimodal pain control regimen and the data extrapolated demonstrates how it may influence narcotic use and length of stay in the hospital.

Methods: A retrospective electronic medical record review from 2016 to 2016 under the care of two surgeons from a community hospital included 47 patients.

Results: After implementation of the regimen, average length of stay in the hospital decreased by nearly 10 hours with about 1/3 of the patients having a completely narcotic free hospitalization.

Conclusion: By employing these techniques, adequate pain control is possible, patient satisfaction would increase and length of hospital stay would decrease. Encouraging results of this study propose a regimen that could easily and

and type 2 or paravertebral block); and intraoperative dexamethasone and ondansetron. is study compared 96 patients who were in the ERAS pathway to a retrospective cohort of 276 patients treated traditionally. Patients in the ERAS group had signi cantly lower total perioperative opioid consumption compared to the traditional group

Statistics

Data were reported as mean (standard deviation) for normally distributed continuous variables and as count (percentage) for binary variables as show in (Tables 1 and 2). e Cochrane Armitage trend test was used to assess the changes in post-operative length of stay and proportion of patients who had narcotic free hospital stays. A stepwise logistic regression model with backward selection using the Akaike information criterion was used to identify independent predictors of narcotic free hospital stays amongst patients as shown in Table 3. Associations between variables and narcotic free hospital stays were reported using the beta estimate and standard error. Statistical signi cance was de ned as $p < 0.05$ and all analyses were performed using the Statistical Analysis System (SAS) statistical so ware package, version 11.1.3 (SAS Institute Inc; Cary NC, USA).

Results

A total of 47 patients were included in the study. All 47 patients underwent surgery during the implementation of the pain control protocol that was adopted. e demographic information of the patients included age, BMI, race and comorbid conditions were included in the model as shown in (Table 1) and there were no statistically signi cant di erences amongst patients in the group. From the population in question, the surgeon performed 87 mastectomies (7 unilateral, 40 bilateral); 34 mastectomy cases underwent immediate single-stage reconstruction with permanent silicone implant and placement of

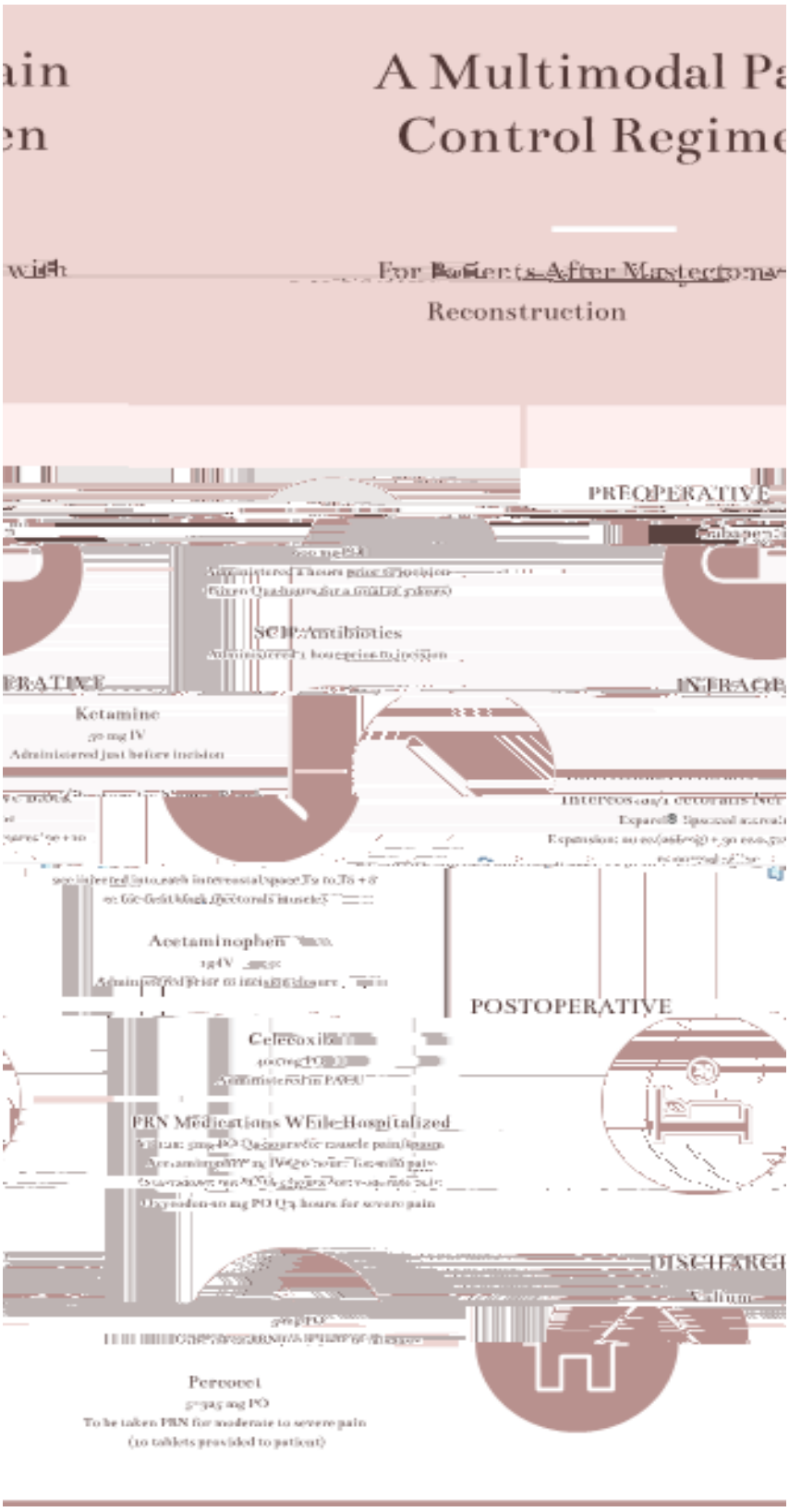

Figure 1: Schematic representation of pain regimen/protocol.

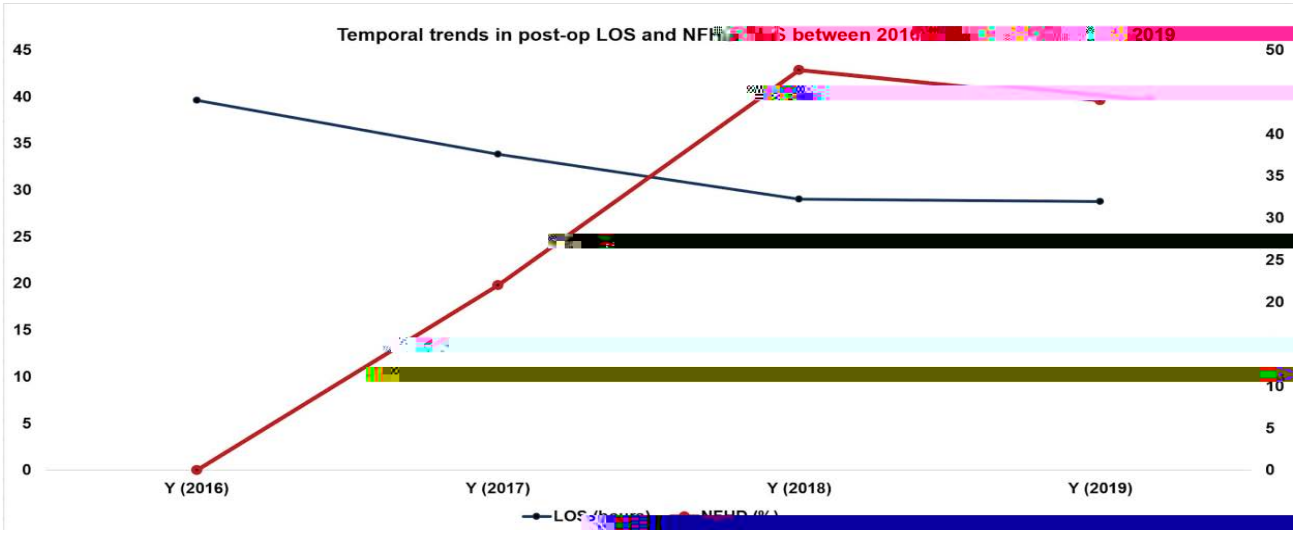

Figure 2: Temporal trends in length of stay and narcotic free hospitalizations.

Discussion

A multimodal pain control regimen for patients undergoing mastectomy with immediate reconstruction was designed and implemented in a community hospital in New Jersey with only two surgeons, and the results across the years were astonishing. From 2016 to 2019, there were dramatic improvements in postoperative analgesia, the possibility of a narcotic-free hospital stays, and shorter length of stay in the hospital. Having reviewed the literature, this particular regimen is similar to other protocols developed for postoperative analgesia a er breast or plastic surgery, but what makes this particular ERAS regimen unique is the incorporation of local anesthetic blocks as part of the regimen. Once adopted, this approach could be easily replicated in practice. e authors of this study recognize that it is not scienti cally sound to say that the implemented protocol is what led to decreased length of stays in the hospital as well as the possibility of narcotic free stays, but the experience is certainly worth sharing.

Systemic medication administered preoperatively included gabapentin. Gabapentin has speci cally been shown to provide e ective postoperative analgesia and decrease narcotic consumption post-operatively by binding to the voltage dependent calcium channels. Such interaction blocks the neuronal calcium in ux, which decreases excitatory amino acid (glutamate) release [6]. is allows the anti-hyperalgesic actions pre-operatively and decreases postoperative opioid use [7]. Rai et al performed a systematic revision and meta-analysis of randomized controlled trials to evaluate the e ects of gabapentin and pregabalin on postoperative pain among patients undergoing breast cancer surgery. ey reviewed twelve studies enrolling adult patients undergoing breast cancer surgery who were randomly assigned to preoperative gabapentin or pregabalin versus placebo or active control and assessed acute (≤24 hours) or chronic (≥2 months) pain. ey found that gabapentin (mean di erence [MD] -1.68 on a 0-10 Numeric Rating Scale (NRS), 95% CI -2.59 to -0.77; minimally important di erence is 1 point; relative risk [RR] for mild pain (<4/10) 1.71, 95% CI 1.33-2.02; moderate QoE) and pregabalin (MD -6.71 mg, 95% CI -10.73 to -2.70; low QoE) seemed to reduce opioid consumption in the recovery room and gabapentin (MD -0.52, 95% CI -1.02 to -0.01; RR for mild pain 1.07, 95% CI 1.00-1.13; very low QoE), but not pregabalin (MD -0.38, 95%, CI -0.96 to 0.21; moderate QoE), reduced pain at 24 hours a er breast cancer surgery [8].

O rmev is used for its analgesic and antipyretic properties and has been proven e ective to control post-operative pain and reduce opioid consumption. Celecoxib is a highly selective reversible inhibitor of COX-2 and inhibits the transformation of arachidonic acid to prostaglandin precursors. is creates an analgesic and anti-in ammatory e ect.

Ketamine has become part of multimodal postoperative analgesia regimens because of its potential to reduce opioid consumption in postoperative patients. Administration of 50 mg Ketamine, informally termed the “ni y y,” before surgical incision blocks the NMDA receptors in the midbrain and prevents transmission of impulses to the cortex for interpretation, thus avoiding the “wind- up” phenomenon associated with the pain response cascade [9]. is plays an important role in the development of chronic pain. It also interacts as an agonist at opioid receptors. is allows the medication to be used to control pain, reduce opioid use, nausea, and vomiting a er surgery. In 2018, consensus guidelines on the use of intravenous ketamine for acute pain were published from the American Society of Regional Anesthesia and Pain Medicine, the American Academy of Pain Medicine, and the American Society of Anesthesiologists. ese guidelines are based on consensus of experts and o er reasonable guidance, with the proviso that this is an area of great interest and emerging experience [10]. A systematic review and meta-analysis of trials of perioperative IV ketamine in 2011 showed a reduction in total opioid consumption and an increase in the time to rst analgesic. Patients having the most painful surgical procedures, including thoracic, upper abdominal, and major orthopedic operations, had improvement in pain scores despite a decrease in opioid consumption [11].

ere exists a multitude of non narcotic pain medications and various nerve blocks that can help reduce narcotic use in postsurgical patients. ey include local anesthetic in ltration, regional nerve blocks and systemic medications. Local anesthetics can provide immediate postoperative pain control that lasts several hours and-if appropriately administered-can provide excellent pain control to patients. Regional nerve blocks can include the paravertebral nerve block and the pectoral nerve block. e pectoral nerve block aims to block the pectoral

nerves; the intercostobrachial nerve, intercostal nerves III, IV, V and VI as well as the long thoracic nerves [12]. e pectoral nerve block and intercostal nerve blocks have shown to result in decreased pain scores within the perioperative period when compared directly to paravertebral blocs [13]. Our study is unique in that intercostal as well as pectoral blocks were performed. Dissection of the pectoralis muscle and the subsequent stretch placed upon the muscle by implant placement o en results in muscle spasm with associated post-reconstruction discomfort. ese blocks prove to be imperative as part of a multimodal pain control regimen. Hospital length of stay was noted to decrease dramatically a er incorporating the multimodal pain regimen into practice. Although most research evaluates ERAS protocols typically a er procedures with longer hospitalizations, the value of implementing our protocol in the limited stay setting lies in improved quality of care and patient experience by reducing narcotic use and maximizing the patient's chance of successful discharge home. In light of the current opioid epidemic, it is imperative that we continue to embrace narcotic-sparing practices, particularly if patient outcomes are similar or improved in the acute postoperative setting.

Limitations

Various limitations were noted while conducting this study, including a limited sample size, the potential for unknown, confounding individual patient variables, variations in intraoperative anesthesia techniques, uniform administration of intercostal nerve blocks, and varying approaches to postoperative care from ancillary sta uneducated about alternative modes of pain management.

e purpose of the study was to focus on how patient outcomes in a speci c patient population operated upon by a speci c breast surgeon and a speci c plastic surgeon have changed over several years. e breast surgeon involved in the study initiated practice in 2015, therefore there were no patients to consider for a traditional pregroup or comparison group, unless other breast surgeons were incorporated into the study.

is study included a small sample size of 47 patients, at a single institution, under the exclusive care of the aforementioned two surgeons. To alleviate this, a retrospective study of patient outcomes, involving several institutions whom also utilize multimodal pain regimens could be performed.

In order to optimize the study, patients with a known history of substance abuse, a diagnosis of chronic pain, or patients actively taking prescription opioids were excluded. Unless identi ed pre-operatively during routine history-taking, the physicians involved made no speci c attempts to obtain information about all patients' previous opioid history, particularly regarding naive status versus chronic usage. Knowing this information may have added power to the study. Although the risk of reporting bias and recall bias exists with patient reported information, perhaps a screening questionnaire or greater detailed patient history could have been obtained to add power to this portion of the study.

Intraoperative medications via direct administration from the anesthesia care provider was not studied. It is understood that anesthesia technique can be variable and in turn in uence postoperative pain experience. Intercostal nerve blocks were performed in the same fashion on all patients in the study. A comparison between patients who received the block and who did not would aid in the validity of the study, however this did not occur within our patient population. A prospective trial focusing on intercostal nerve blocks alone as a factor in postoperative pain control, may provide insight to the benefits of nerve blocks in mastectomy patients undergoing reconstruction.

As surgeons, changes to improve patient care should always be on the forefront of our minds and the driving force behind the care we render. Since the implementation of the protocol, there were additions to the postoperative medications prescribed and changes to the medications utilized. e authors and clinicians involved with this paper recognize that e ective management of acute pain requires habitual exploration, education and safe utilization of current evidence-based practices. Research is currently underway determining the e ects of the individual medications on the patient's postoperative analgesia within our practice. Information on postoperative nausea and vomiting will be collected and studied, as this is an element of the postoperative patient experience that has historically been impacted by opioid use. Additionally, we plan to shi focus onto quality of care metrics, such as patient satisfaction, quality of life measures, post-discharge opioid consumption and instance of development of chronic post-surgical pain.

As we transition to focus on quality care metrics, it is vital that postoperative nursing care is involved in executing techniques to minimize the use of narcotics. With strong reliance on the patient pain scale, it is imperative to provide appropriate education on the multimodal approach to pain management to those rendering postoperative care to this patient population. Alternative pain management options must be

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