SCIENTIFIC ARTICLE

A Prospective Randomized Study Comparing Marcaine Versus Exparel for Pain Management After Distal Radius Fracture Repair Surgery

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Purpose To compare pain experience and opioid use after distal radius fracture repair surgery performed with perioperative infiltration of the local anesthesia Marcaine or Exparel.

Methods We conducted a prospective comparison of consecutive patients scheduled to undergo distal radius fracture repair surgery. Patients were randomized to either Marcaine or Exparel. Patients in the Marcaine group received 20 mL 0.5% bupivacaine without epinephrine into the incision and surgical site before incision. Patients in the Exparel group first received 10 mL 0.5% Marcaine with no epinephrine into the incision and surgical site before incision; then, upon completion of the surgery and wound closure, they also received 10 mL Exparel into the same site that had been preinjected with Marcaine. All operations were performed with the same surgical technique. Daily opioid pill consumption, pain levels, and any adverse reactions were recorded from postoperative days 0 to 5.

Results On the day of surgery, patients in the Exparel group reported significantly lower pain levels (3.9 vs 5.8) and consumed significantly fewer prescribed opioid pills (1.2 vs 2.0) compared with patients in the Marcaine group. However, there were no other significant differences between the Exparel and Marcaine groups on any subsequent days or in the total number of pills consumed at the end of the study period (7.5 vs 8.9 pills, respectively). No major adverse reactions were noted in either group.

Conclusions Exparel use was found to result in decreased pain and opioid consumption only on the day of surgery and not thereafter. *(J Hand Surg Am. 2017;■(■):■−■.* *Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Therapeutic II.

Key words Exparel, Marcaine, distal radius.

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EXPAREL (PACIRA, PARSIPPANY, NJ), or bupivacaine liposome injectable suspension, is an extended-release form of bupivacaine that has received growing interest in recent years for its reported ability to provide longer-lasting local analgesia than other local anesthetics, such as standard Marcaine (bupivacaine hydrochloride) injection.[1−7] Exparel's mechanism of action is similar to Marcaine and other local anesthetics, but its pharmacokinetic profile is unique from other local anesthetics.

Exparel is a multivesicular formulation with multiple aqueous chambers; it is injected locally to allow for rapid absorption and prolonged release of bupivacaine.[6,7] After injection at the surgical site, bupivacaine slowly diffuses out of the chambers to produce long-lasting effects.[7,8] It has been shown to have a bimodal pharmacokinetic profile, with an initial peak in plasma concentration within the first hour after injection and a second peak 12 to 36 hours later.[9] Recent studies demonstrated that Exparel has safety and side effect profiles similar to standard Marcaine.[7,10]

Advocates for Exparel use claim that it is more effective in reducing pain than Marcaine because it can provide analgesia for up to 72 hours,[1–7] can lead to improved patient satisfaction compared with Marcaine,[1,2] and is safer than Marcaine, because its longer effect time can lead to a delayed and/or lesser consumption of opioids after surgery.[11] Another purported possible benefit of using Exparel rather than Marcaine is financial, because it can potentially lead to shorter hospitalization time.[12] However, the wholesale cost of Exparel can be up to 100 times more than that of standard bupivacaine, which has proven to be the main deterrent to its use.[13]

The purpose of this study was to perform an analysis of postoperative pain experience after distal radius fracture (DRF) repair surgery by comparing incision site and surgical site infiltration of local anesthesia in the form of Marcaine versus Exparel. The hypothesis was that surgeries performed with Exparel would result in longer-lasting analgesic effects resulting in lower pain scores as well as decreased opioid consumption compared with surgeries performed with Marcaine.

MATERIALS AND METHODS

With institutional review board approval, we invited consecutive patients who were scheduled to undergo DRF repair surgery to participate in this study. All procedures were performed by 1 of 2 orthopedic surgery board-certified, fellowship-trained hand surgeons. Inclusion criteria were age greater than 18 years and an indication for outpatient DRF repair surgery using volar locked plate fixation. Exclusion criteria included inpatient surgery, any reconstructive surgery or osteotomy, and the need for additional or concomitant procedures beyond volar plate fixation of the DRF. Patients with chronic use of opioids before the DRF was incurred were excluded. Finally, patients with a known allergy to Marcaine or Exparel were also excluded.

Patients were randomized to either Marcaine or Exparel by date of birth. Patients were blinded to the anesthetic delivered, but surgeons were not blinded to the study protocol because they placed the injection. Patients in the Marcaine group received 20 mL 0.5% bupivacaine without epinephrine into the incision site before exsanguination, tourniquet inflation, and incision. Patients in the Exparel group first received 10 mL 0.5% Marcaine with no epinephrine into the incision site before exsanguination, tourniquet inflation, and incision. Then, upon completion of the surgery and wound closure, 10 mL Exparel was injected into the same surgical site that had been preinjected with Marcaine. This manner of injecting Exparel is based on the manufacturer's recommendation to preinject with Marcaine followed by reinjection into the same region later with Exparel, because there is a delayed action of Exparel versus plain Marcaine. The ultimate bupivacaine volume (20 mL) was equivalent in each group.

All cases were performed under general anesthesia alone without concomitant proximal regional anesthesia. All cases were performed through a standard trans–flexor carpi radialis volar approach to the distal radius followed by volar locked plate fixation of the distal radius.[14] After surgery, all patients were placed in a soft, bulky dressing without orthoses, which was worn continuously until the first postoperative visit in the office approximately 10 to 14 days later. After surgery, all patients were given a standardized prescription for 20 pills of an opioid of their choice (5 mg oxycodone and 325 mg acetaminophen; 5 mg hydrocodone bitartrate and 300 mg acetaminophen; or acetaminophen and codeine). For study purposes, using previously employed methodologies, all 3 prescribed opioids were considered equivalent and compared by pill count alone.[15]

On postoperative day 5, all patients received a standardized survey by e-mail in which their pain variables were recorded. Patients input their daily opioid pill consumption, their pain levels using a numerical scale of 0 to 10, and any adverse reactions experienced, such as dry mouth, nausea, vomiting, drowsiness, trouble sleeping, feeling bloated, constipation, trouble urinating, itching, dizziness, sweating, coughing, or lack of energy.

We used analysis of variance to detect significant differences between groups, and performed subsequent pairwise comparisons. Study arms were compared using Kruskal–Wallis or analysis of variance for continuous variables, depending on parametric fit of the data. For continuous data, study arms were directly compared with each other with

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