Background: Breast augmentation surgery is still 1 of the most popular procedures in plastic surgery. Like other surgical procedures, it has been traditionally handled with nonsteroidal anti-inflammatory drugs and narcotics, which had many adverse effects; therefore, alternatives with the same effectiveness are being researched. The aim of this study was to investigate the efficacy of ropivacaine breast pocket irrigation during primary breast augmentation surgery to control pain during the first postoperative hours.

Methods: A multicenter, prospective, double-blind, randomized trial was performed on 52 primary breast augmentation procedures in which patients served as their own control: One breast received ropivacaine pocket irrigation and the other placebo. All patients received an oral analgesic. Pain was evaluated with a visual analogue scale at 30, 60, 90, and 120 minutes postoperatively.

Results: Pain was significantly less in ropivacaine breast at 90 and 120 minutes postoperatively ($P = 0.027$ and $0.022$, respectively). There was no statistical significance when the type of anesthesia used, general or epidural, was compared ($P = 0.33$ and $P = 0.37$ at 90 and 120 minutes, respectively).

Conclusions: Ropivacaine irrigation in breast pocket is able to diminish early postoperative pain safely, being an alternative to other analgesic methods. (Plast Reconstr Surg Glob Open 2018;6:e1745; doi: 10.1097/GOX.0000000000001745; Published online 2 May 2018.)

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bleeding, oral and pain analgesic intake, and patient satisfaction. Although previous studies exist, they have focused on bupivacaine and lidocaine application through a catheter placed in the pocket after surgery. However, a main disadvantage is the concern about contamination and the potential infection because this catheter allows communication between external and internal media.

The aim of the present study was to investigate locally irrigated ropivacaine efficiency as a safe and long lasting local anesthetic in breast pocket irrigation during breast implant placement, to control pain during the first postoperative hours.

PATIENTS AND METHODS

A multicentric, prospective, double-blind, randomized trial was performed. Eighteen- to 65-year-old female patients, candidates for primary breast augmentation surgery by pocket technique or any kind of incision, under general anesthesia, epidural or subdural blockade, were selected. Patients undergoing other surgical procedures, suffering fibromyalgia or different anesthetic applications or had given narcotics or infusion pump placements were excluded. Fifty-two patients went into primary breast implant from December 2016 to April 2017. Patients themselves were they own control.

Procedure

Randomization in both groups was carried out with “research randomizer” software. The instrumentalist opened an envelope assigning, which breast was to receive analgesia or placebo. In each case, two 5 mL syringes were prepared and given to the surgeon, previous to implant placement; one with 0.75% ropivacaine (75 mg per mL), other with saline solution; the surgeon was not aware of their content, both breast pockets were irrigated and the implant was placed afterward, closing by planes. The instrumentalist registered this on patient’s record.

All patients received paracetamol 1 g intravenous at the end of the surgery. In the recovery room, a nurse or physician, unrelated to the study, evaluated pain with a visual analogue scale (VAS), every 30 minutes during the first 2 postoperative hours. None of the patients received narcotics for pain control.

Statistical Analysis

VAS scores for both irrigation types in correspondent breasts at 30, 60, 90, and 120 minutes postoperatively were statistically analyzed using paired samples Student’s $t$ test. Differences between kinds of anesthetic employed during surgeries in postoperative moments with statistical significance were calculated using $t$ test for independent samples, with $P = 0.05$ and 95% confidence value. Statistical program SPSS (IBM) was used.

Ethical Considerations

The present study was performed according to the Declaration of Helsinki; all participants were advised about the research and signed an informed consent.

RESULTS

Fifty-two patients were included in the trial. All of them underwent a bilateral breast augmentation surgery, performed by 3 certified plastic surgeons living in 3 different cities in México: Monterrey, Mexico City, and Mérida.

Mean age of patients was 33.4 years. Mean implant volume was 312 mL (range, 145–510 mL). Seventy-eight percentage implants were placed through inframammary incision and the remaining through periareolar incision. In 51.9% of the cases, pocket site was dual plane; in 40.3% subglandular, and 4.6% submuscular. Mean surgery length was 81 minutes, 31 of them were done with general and 21 with regional anesthesia. With regard to the pain scale that was evaluated postoperatively, mean was significantly less in ropivacaine irrigated breast in comparison with placebo at 90 and 120 minutes after surgery ($P = 0.027$ and $0.022$, respectively). Within 30 and 60 minutes postoperative, no significant difference was found (Table 1 and Fig. 1).

Secondarily, the patients were divided into 2 groups according to the type of anesthesia used, regional or general, to find out whether this influenced in the VAS score, without finding statistical difference, resulting in a $P$ of 0.33 and $P$ of 0.37 at 90 and 120 minutes, respectively (Table 2).

DISCUSSION

As breast augmentation surgery gains popularity, the need for a reliable method for postoperative pain becomes more important. This surgery is commonly an ambulatory procedure, where pain control requirements are different to hospital stay patients. Ideally, ambulatory patients should arrive in recovery room with no pain and without the need for subsequent narcotics.

Results in the present study suggest that 0.75% ropivacaine irrigation in breast pocket, before implant place-

| Columna 1 | Columna 2 | Columna 3 | Columna 4 | Columna 5 |
|-----------|-----------|-----------|-----------|-----------|
| Time      | Mean      | SD        | Mean      | SD        |
| 30        | 2.5       | 1.40715   | 2.5       | 1.40713   |
| 60        | 3.11      | 1.60692   | 3.2       | 1.6054    |
| 90        | 3.75      | 1.71179   | 3.98      | 1.76301   |
| 120       | 4.33      | 1.64542   | 4.59      | 1.56508   |

VAS; mean punctuations and postoperative time according to infiltration type.
ment, is significantly better than placebo to decrease 90 and 120 minutes postoperative pain. Similar to previous studies by Zhibo and Miaobo,9 which found irrigated lidocaine decreased pain compared with fibrin glue. Moreover, Mahabir et al.10 used bupivacaine for postoperative pain management, reporting it as more efficient than saline solution or ketorolac. Similarly, McCarthy et al.11 compared ketorolac plus bupivacaine in breast pocket versus placebo, revealing that this combination decreased pain significantly, during the first 6 hours after surgery.

As clearly shown, different alternatives to NSAIDs or narcotics to postoperative pain management have been offered; however, ropivacaine is a local anesthetic with a short onset, approximately 15–30 minutes, and duration of 5–8 hours that, when locally administered, few or non-adverse effects were presented, so this makes it an ideal medication for this scenario.

We preferred to use ropivacaine over bupivacaine because it has been documented bupivacaine-induced cardiotoxicity through its cardiodepresant effect12; also ropivacaine offers a more selective neuromotor blockade. Other advantages are a long lasting activity, less painful when irrigated, and decreased bleeding on infiltration site. Evidence of this fact have already been reported in Germany with different facial and neck plastic surgeries.13,14

In terms of costs, both are similar, so the less side effects mentioned above are the main support for our choice.

Even when not evaluated in the present trial, other authors have described the usage of different pain control procedures apart from systemic NSAIDs, revealing a decreased use in narcotics, improving patient’s satisfaction and a shortening recovery time.15

The present study found analgesic effect not significantly different at 30 and 60 minutes postoperatively; this might be explained by general or epidural anesthesia after effects.

Although when statistically examined, no significant difference was found in both type of anesthesia, either general or epidural. This factor did not have an influence on the obtained results; however, for future researches, it is advised to standardize the same kind of anesthesia.

A longer follow-up for patients in this study could answer if ropivacaine is able to decrease pain in subsequent hours and at home, because this is a common complaint in 45% ambulatory surgery patients.16 For example, Mahabir et al. demonstrated less pain in the first 5 days after surgery with local bupivacaine.16 Even though it was mentioned by some patients in our study, this variable was not included due to a possible lack of control when recording data.

Accomplishments of this study include a strict randomness and “double blind” from patients and surgeons on treatment location. When ropivacaine breast was randomly assigned, the risk of systematic differences among patients was reduced to a minimum. When patients, nurses, surgeons, or physicians were blinded it is considered no bias existed on results. Moreover, patients undergoing a concomitant surgical procedure were excluded from the study as they were considered likely to present an increase in postoperative pain.

According to the present results, ropivacaine resulted safe and efficient for early pain relief, so it seems to be a convenient and inexpensive option for plastic surgeons in breast surgery.
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