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Review

Effect of wound infiltration with ropivacaine or bupivacaine analgesia in breast cancer surgery: A meta-analysis of randomized controlled trials

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HIGHLIGHTS

- Efficacy of bupivacaine or ropivacaine for pain relief in breast cancer surgery was evaluated.
- Analgesic consumption was not significantly different between experimental and control groups.
- Bupivacaine or ropivacaine infiltration caused less pain at 2 h postoperatively.
- No difference in postoperative pain reduction at 1, 12, and 24 h between two groups.

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ABSTRACT

Background: Although not completely painless, breast-conserving surgery is considerably less painful than modified radical mastectomy. Local anesthetics are speculated to reduce postoperative pain when placed at the surgical site. Thus, we conducted a systematic review of randomized controlled trials to evaluate the efficacy of bupivacaine or ropivacaine analgesia for pain relief in breast cancer surgery.

Methods: PubMed, Embase, the Cochrane Library, Scopus, and the ClinicalTrials.gov registry were searched for studies published up to July 2015. Individual effect sizes were standardized, and a meta-analysis was performed to calculate a pooled effect size by using random effects models. Pain was assessed using a visual analog scale at 1, 2, 12, and 24 h postoperatively. The secondary outcomes included complications and analgesic consumption.

Results: We reviewed 13 trials with 1150 patients. We found no difference in postoperative pain reduction at 1, 12, and 24 h after breast cancer surgery between the experimental and control groups. The severity of pain was significantly reduced in the experimental group (weighted mean difference −0.19; 95% confidence interval: −0.39–0.00) at 2 h postoperatively. Moreover, postoperative analgesic consumption did not differ significantly between the groups. No major drug-related complication was observed in any study.

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Conclusion: Administration of the local anesthetics bupivacaine or ropivacaine during breast cancer surgery decreased pain significantly at only 2 h but did not reduce pain at 12, and 24 h postoperatively.

Contents

1. Introduction

Breast cancer is the most common female malignancy in Western countries [1]. Surgical resection with or without axillary lymph node dissection (ALND), followed by adjuvant radiation therapy and chemotherapy, has greatly improved the oncological outcome of breast cancer [2]. In the recent decade, surgery evolution from modified radical mastectomy to breast-conserving surgery has emphasized cosmetic advantages and the concept of small wounds and pain reduction. Reducing postoperative pain following breast cancer surgery to achieve a more rapid recovery and shorten the hospital stay has become a crucial objective.

Traditionally, postoperative pain could be reduced by taking narcotics or nonsteroidal anti-inflammatory drugs; however, these drugs can cause adverse effects such as nausea, vomiting, and dyspepsia [3]. Alternative analgesic regimens in the peri- and postoperative periods may reduce unwanted side effects. Surgical wound infiltration with a local anesthetic solution is currently performed in many surgical procedures, including abdominal hysterectomy, cesarean section, and inguinal hernia repair [4,5].

Bupivacaine is an ideal choice for local analgesia in breast cancer surgery through instillation in the dissection space on the basis of its characteristic long-acting efficiency in similar applications. Moreover, ropivacaine is a long-acting local anesthetic that is structurally related to bupivacaine. Recent data show that ropivacaine produces fewer central nervous system and cardiovascular side effects compared with bupivacaine [6]. Several published randomized controlled trials (RCTs) have investigated the efficacy of intraoperative instillation of bupivacaine or ropivacaine along the surgical wound of mastectomy; however, the results were inconclusive [7]. Therefore, we investigated patient outcomes after wound infiltration with local analgesics in breast cancer surgery by conducting a systematic review and meta-analysis of the evidence available to date.

2. Materials and methods

2.1. Inclusion criteria

To be included in the analysis, studies had to be RCTs evaluating the outcome of wound infiltration with local analgesics in breast cancer surgery. In addition, studies had to clearly report the inclusion and exclusion criteria for patients, the anesthetic technique, the surgical technique used to treat breast cancer, and the definition and evaluation of postoperative pain. We excluded trials that met at least one of the following criteria: (1) the patients had not received partial or modified radical mastectomy for breast cancer, such as in studies that only included breast tumor sampling; (2) the patients had undergone non-cancer-related breast surgery; (3) the clinical outcomes had not been clearly stated; or (4) duplicate reporting of patient cohorts had occurred.

2.2. Search strategy and study selection

Relevant studies published before the end of July 2015 were identified by conducting a computer search of the PubMed, Embase, Scopus, and Cochrane databases. The following Medical Subject Headings search headings were used: *breast cancer* or carcinoma or neoplasm, mastectomy or lumpectomy or surgery or excision, bupivacaine or ropivacaine or carbostesin or marcaine or sensorcaine or vivacaine, and *local anesthesia*. The “related articles” function in PubMed was used to broaden the search, and all abstracts, studies, and citations retrieved were reviewed. In addition, we attempted to identify other studies by searching the reference sections of relevant papers and contacting known experts in the field. Finally, unpublished studies were sought using the ClinicalTrials.gov registry (http://clinicaltrials.gov/). No language restrictions were applied. The systematic review described herein