

How to Relieve Pain after Immediate Breast Reconstruction with Sub Muscular Tissue Expander

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Introduction

Breast reconstruction with tissue expander is known to be the most painful procedure among breast surgical procedures and is more painful than mastectomy or axillary dissection [1]. This fact was confirmed with National Mastectomy and Breast Reconstruction Audit in England in 2011 [2]. Severe pain was traditionally treated with intravenous narcotic analgesia. We are still searching for more effective non-opioid methods relieving pain in order to reduce the use of narcotics.

Methods of Loco regional Pain Management

Local anesthesia

In the last decade it becomes obvious that local anesthetics are a good treatment option. Lu and Fine [3] have shown the efficacy of continuous local anesthetic infusion after breast reduction mammoplasty and reconstruction. They compared consecutive patients treated with continuous local anesthetic infusion and patients, who were treated with traditional opioid method before the study. Patients, treated with use of indwelling catheters into surgical wound for the continuous infiltration of local anesthetic had lower pain in recovery room and lower consumption of pain medications during hospitalization in comparison to control group of patients [3]. Turan and Sandelin [4] found out the same effect after immediate breast reconstruction with implants. They used the same methodology as Lu and Fine. Turan and Sandelin compared consecutive patients treated with periodic local anesthetic injection and previously treated patients. Periodic injection of local anesthetic into surgical wound through indwelling catheter reduced hospital stay and consumption of oral opioids [4]. Chaudhry et al. have shown in a retrospective analysis on 50 patients that use of the local anesthetic infusion pump reduces pain during the first 24 hours after surgical procedure. Patients with elastomeric pump had a trend toward shorter hospital stay [5]. We have observed the same result-lower pain in our prospective study of 60 breast carcinoma patients after immediate breast reconstruction with a tissue expander. We compared two groups of patients. The test group got continuous infusion of local anesthetic into surgical wound; the standard group got intravenous piritramide. Patients with local anesthetic suffered less pain in recovery room; they used fewer narcotics and were more alert in comparison to traditionally treated patients. Moreover, patients treated with local anesthetics had less often persistent pain after three months in comparison to control group of patients. There were no complications due to use of indwelling catheters into surgical wound for the continuous infiltration of local anesthetic. Time needed to insert the catheter was brief and it

didn't prolong the surgical procedure. There were no significant differences between the study groups in hospital stay [6]. The method is now a standard procedure in our institute. In last year (2015), a hospital stay after operation in patients with immediate breast reconstruction was 12 hours shorter than it was during our study period (January 2011 till May 2012).

Paravertebral block

Beside technique with indwelling catheters into surgical wound there is a well-known regional anesthetic technique with preoperative paravertebral block. Paravertebral block was the most widely used technique of regional anesthesia for breast surgeries. Aufforth et al. found out in a retrospective chart review of 337 patients with various types of breast surgery that preoperative paravertebral block may have an important role in decreasing postoperative pain and opioid analgesic usage in patients electing to have immediate breast reconstruction with a tissue expander. From 337 patients, only 59 patients had immediate tissue expander reconstruction and only in these patients a paravertebral block decreased postoperative pain [7]. Coopery et al. have shown in a retrospective review that patients with a preoperative paravertebral blockade undergoing mastectomy plus immediate reconstruction had shorter hospital stay, had quicker conversion to oral narcotics and lower incidence of postoperative nausea [8]. However, a preoperative paravertebral block has a risk of pneumothorax, inadvertent entry of needle into the vertebral canal, with consequent spinal cord trauma. Furthermore, it does not provide complete analgesia to the anterior chest wall, since the innervation is not exclusive by thoracic spinal nerves, but also from brachial plexus, via medial and lateral pectoral nerves [9].

Pecs bloks

Blanco and his group have introduced a new superficial blocks of pectoralis nerves. First they used superficial Pecs I block, later they got into Pecs II block. The Pecs block I (pectoral nerves block) is an easy and reliable superficial block inspired by the infraclavicular block approach and the transversus abdominis plane blocks. Indications are implantation of a breast expander, portocath, or pacemaker and pain after traumatic chest injury. With the ultrasound probe at the mid clavicular level and angled inferolaterally, axillary artery and vein are located. Then pectoralis minor muscle, serratus anterior muscle, the 2nd rib immediately under the axillary artery, the 3rd rib and the 4th rib are identified. With the image centered at the level of the 3rd rib, the needle is advanced in-plane from medial to lateral in an oblique manner until the tip lies between pectoralis major and minor and 10 mL of local anesthetic is injected between pectoralis major and minor muscle in order to block lateral and medial pectoral nerves [9,10].

Pecs II block was proposed in order to cover all pain sources with a single block. The main indications is more extensive breast surgery involving serratus anterior and the axilla, implantation of a breast expander or a subpectoral prosthesis, because a distension of these muscles is extremely painful. This novel approach aims to block at least the pectoral nerves, the intercostobrachial, intercostals III-IV-V-VI and the long thoracic nerve. These nerves need to be blocked to provide a complete analgesia during breast surgery, and it is an alternative or a rescue block if paravertebral blocks and thoracic epidurals fail. This block has been used in their unit in the past year for the Pecs I indications described, and in addition for, tumorectomies, wide excisions, and axillary clearances. Formal prospective randomized studies are needed to compare Pecs block to paravertebral and epidural blocks. Intravascular injection into the pectoral branch of the acromiothoracic artery is a possible complication of this block. The puncture of the axillary fascia has also been described, probably due to a very high approach in the axilla. Both possible complications should be easily avoided with proper ultrasound training, and looking for the right pattern of spread of local anaesthetic [11].

Liposomal bupivacaine

Another new approach to minimize postoperative pain, nausea, and enhance recovery was reported by Abdelsattar et al. in 2016. They retrospectively compared the effectiveness of intraoperative local infiltration of liposomal bupivacaine to preoperative paravertebral block. Liposomal bupivacaine group had decreased narcotic use in recovery room, fewer needs for antiemetic and lower pain scores on the day of surgery. Besides, a skin incision can start earlier with omission of preoperative paravertebral block [12].

Botulinum toxin A

A tissue expander implantation may be followed with a very severe and unpleasant pain which can be prevented and relieved with use of botulinum toxin A [13]. Seven studies were found on MEDLINE and EMBASE reporting the efficacy of perioperative botulinum toxin A injections following breast surgery with a subpectoral prosthesis. Three of them measured pain as primary outcome. Most patients (91.8%) got injections intraoperatively, while 4.7% got injection following augmentation mammoplasty. The results suggest that botulinum toxin-A injections may alleviate postoperative pain associated with the placement of subpectoral tissue expanders and implants. But the available data on outcome assessment of this method are inconsistent; the quality of this evidence was low. Further studies are needed to test use of botulinum toxin A injections for pain relief after breast reconstruction with tissue expander [13]. A beneficial effect of botulinum toxin A injection was shown in a pilot study of Gabriel et al. in 2015. They studied 30 patients who underwent mastectomies with immediate expander or acellular dermal matrix reconstruction. Half of them got four serial injections of neurotoxin botulinum A into pectoralis major muscle, and the placebo group received 4 serial injections of 0.9% NaCl. Botulinum toxin A was injected within the pectoralis major muscle, first at the tail of the muscle, where the nerve enters, and subsequent passes toward its inferior attachment. The toxin was injected retrograde upon removal of the 25-gauge needle to confirm accurate intramuscular infiltration. The tissue expander was subsequently placed underneath pectoralis major muscle. All patients were followed over one year. The neurotoxin group had less pain and larger volume of expansion per visit in comparison to placebo group. There was no significant difference in narcotic use in the first three

days after surgery; however there was a significant decrease in use of narcotics from 7 to 45 days in the neurotoxin group [14].

Thoracic epidural technique

Lai et al. found out that thoracic epidural anesthesia was feasible, effective, and even better than conventional alternative anesthetic techniques for breast augmentation [15]. Jarosz et al. used thoracic epidural anesthesia for oncological and reconstructive surgical procedures of the breast [16]. But, thoracic epidural blocks are technically more difficult to accomplish than lumbar blocks because of greater angulation and overlapping of the spinal processes at the thoracic level in comparison to lumbar vertebra. There is a potential risk of spinal cord injury or accidental dural puncture [17]. Freise and Van Aken reported about severe impairment because of spinal cord injury after thoracic epidural anesthesia [18]. Lai et al. stated that a prerequisite for safe thoracic epidural anesthesia was an experienced anesthesiologist [15].

Summary

We can summarize that many methods are used to prevent postoperative pain, nausea, and enhance recovery after immediate breast reconstruction with a tissue expander. They include traditional intravenous opioid analgesia and a variety of regional blocks: thoracic epidural block, paravertebral block, superficial Pecs blocks. Other approach use infiltration techniques: continuous local anesthetic injection with elastomeric pump, intraoperative local infiltration of liposomal bupivacaine and serial injections of botulinum toxin A into pectoralis major muscle. Physicians and scientists are searching for new methods.

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