

Evaluation of the Role of Local Irrigation of 0.25% Bupivacaine in Alleviating the Post-Operative Pain: A Clinical Study

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Abstract

Aim: The aim of the present study was to evaluate the role of local irrigation of 0.25% bupivacaine in alleviating the post-operative pain.

Methods: This was an observational study conducted on 100 patients who had undergone MRM in department of Anesthesia, Anugrah Narayan Magadh Medical College and Hospital, Gaya, India, in between one year. All those who fulfilled the inclusion and exclusion criteria and those who were willing to participate were included as study participants.

Results: The mean age and weight of the study population were comparable between both the groups before the start of the study. There was no significant difference in means between both the groups. The duration of surgery and dose of fentanyl given was more or less similar in both the groups. Both the groups were similar with respect to ASA status and mallampati score. Post-operative nausea and vomiting was present in 4 in study population and 20% in control group. The result was statistically significant.

Conclusion: Irrigation of wound with 0.25% Bupivacaine is found to reduce the pain sensation with minimal side effects without systemic compromise.

Keywords: Bupivacaine, Modified radical mastectomy, Rescue analgesia, Post-operative pain

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Introduction

Around the world, breast cancer is now acknowledged as the most prevalent cancer among females. The estimated incidence of breast cancer was 20% which has risen drastically since 2008, while mortality has escalated by 14%. One in every four females dies due to breast cancer. [1] In India among all the cancers, breast cancer accounts for 37.7% among females in 25-49 years of age and 46.5% among females of 50-69 years of age. [2] In spite of

improvements in medical treatment, surgery plays a principal role in its management. Unfortunately, very little advancement has been made to improve postoperative pain control after modified radical mastectomy (MRM). Modified Radical Mastectomy (MRM) is the most common surgical procedure for operable breast malignancies. Following mastectomy, the patients are emotionally disturbed apart from the physical suffering.

Various strategies like non-steroidal anti-inflammatory drugs, opioids, peripheral nerve blocks, wound infiltration with local anaesthetics, wherever possible were found to have significantly improved the postoperative pain. An alternative technique that has widespread applicability is the insertion of catheters to allow for continuous infusions of local anaesthetics into the surgical wound at the end of the procedure. Continuous wound irrigation catheters with local anaesthetic drugs confer several benefits, including improved analgesia, reduced opioid use and its side effects, increased patient satisfaction and reduced hospital stay. Direct application of local anaesthetic to wounds directly blocks transmission of pain from nociceptive afferents from the wound surface; reduce release of inflammatory mediators from neutrophils, reduce neutrophil adhesion to the endothelium, reduce formation of free oxygen radicals and decrease oedema formation. [3,4]

The technique of infiltration or irrigation of local anaesthetic is widely used as a part of multimodal analgesia in plastic reconstructive breast surgery, with remarkable effectiveness and without adverse effects. [5,6] In contrast to other breast surgeries, MRM involves more extensive tissue dissection. Infiltration of local anaesthetic along the line of incision is not recommended in malignant lesions, because of the fear of needle track seedlings and cutaneous spread of malignancy. [7] As the breast tissue is dissected beyond the surgical incision, effective analgesia may not be provided by the drug along the line of surgical incision.

The current study intends to evaluate the role of local irrigation of 0.25% bupivacaine in alleviating the post-operative pain.

Material & Methods

This was an observational study conducted on 100 patients who had undergone MRM in department of Anesthesia, Anugrah

Narayan Magadh Medical College and Hospital, Gaya, India, in between one year. All those who fulfilled the inclusion and exclusion criteria and those who were willing to participate were included as study participants.

Exclusion criteria

Patients with history of routine analgesic usage, adverse drug reaction to local anaesthetics; clinically significant hepatic, neurologic and psychiatric disease were excluded from the study.

All patients underwent a prescribed standard anesthetic protocol. Fentanyl was infused at the rate of 0.5mcg/hour to all the patients from the commencement of surgery till closure of the wound. Patients underwent general anesthesia with balanced anesthesia technique. Patients were randomly allotted to control group, where the routine post-operative pain management was followed. Another 50 were randomly allotted to study group where, before closure of the wound, a 20G scalp vein set was used to prepare for continuous irrigation catheter. Using sterile technique, length of the incision was measured, and multiple punctures were given starting from distal end of scalp vein set; length of which will be equal to the incision length. Distal end of the set along with the needle was cut, removed and that end tightly closed with suture. This catheter was placed subcutaneously, and the wound was closed. The proximal end of this irrigation catheter was kept outside the wound through which 10ml of 0.25% bupivacaine was given before the patient was reversed from muscle relaxant before extubation. Later patient was shifted to postoperative unit. Continuous wound irrigation was given using 0.25% bupivacaine at a rate of 0.04ml/kg/hour for 24 hours.

Pain scores were noted sixth hourly in a visual analogue scale (VAS) for 24 hours post-operatively. Intra venous tramadol (1 mg/kg) was given for patients whose visual

analogue scale was more than four. The total requirement of cumulative analgesia was also recorded for twenty-four hours. Other adverse effects like nausea & vomiting, hematoma, wound dehiscence and infection were also noted during post-operative stay in the hospital.

Statistical Analysis

Data was coded and entered in MS excel and analysis was done using SPSS 17. Descriptive analysis was done. Percentage and frequency were used to denote the

discrete variables. Continuous variables were expressed as Mean \pm standard deviation. Chi-square / Fischer exact test was done to look for associations between categorical variables. T-test was done to measure the association between need for rescue analgesia and various parameters. ANOVA was computed to see if there is any difference between in mean VAS score at different time intervals in the study group.

Results

Table 1: Comparison of mean values of various parameters between study and control group

	Study group		Control group		Mean diff.	P Value
	Mean	SD	Mean	SD		
AGE (years)	55.25	6.54	53.17	6.40	2.08	0.220
Weight (Kg)	53.27	6.24	54.16	7.03	0.89	0.625
Duration of surgery(min)	158.02	16.04	165.05	18.22	7.03	0.132
Fentanyl dose infused(μ g)	118.72	11.07	116.32	12.48	2.40	0.402
Number of rescue analgesia doses needed in 24 hours	0.45	0.13	2.35	0.64	1.9	<0.001
VAS 0	0.42	0.935	0.64	1.36	-0.22	<0.475
VAS 6	0.48	0.965	2.36	0.94	1.88	<0.001
VAS 12	0.68	1.556	4.16	0.86	3.48	<0.001
VAS 18	0.72	1.576	3.16	0.68	2.44	<0.001
VAS 24	0.42	1.305	1.94	0.70	1.52	<0.001

The mean age and weight of the study population were comparable between both the groups before the start of the study. There was no significant difference in means between both the groups. The duration of surgery and dose of fentanyl given was more or less similar in both the groups.

Table 2: Bi variate analysis of ASA grade, Mallampatti score and side effects between both groups

		Study Group	Control group	P Value
ASA Classification	I	8 (16)	12 (24)	0.40
	II	34 (68)	35 (70)	
	III	8 (16)	3 (6)	
Mallampatti Score	1	15 (30)	10 (20)	0.644
	2	21 (42)	25 (50)	
	3	14 (28)	15 (30)	
Post-operative nausea and vomiting	Present	2 (4)	10 (20)	0.048
	Absent	48 (96)	40 (80)	

Both the groups were similar with respect to ASA status and mallampati score. Post-

operative nausea and vomiting was present in 4 in study population and 20% in control

group. The result was statistically significant.

Discussion

Modified Radical Mastectomy (MRM) is the primary and popular mode of treatment for operable breast cancers. [8] In India among all the cancers, breast cancer accounts for 37.7% among females in 25-49 years of age and 46.5% among females of 50-69 years of age. [9] There is not only physical suffering that needs to be managed but also the emotional suffering. Hence the pain sensation will be felt higher. Post-operative pain is one of the main reasons for prolonged hospital stay. Painless postoperative period is essential to make the patient comfortable. Postoperative analgesia can be offered by different modalities like peripheral nerve blocks, administering opioids, local anesthetic drugs, NSAIDS (non-steroidal anti-inflammatory drugs). But evidence is there to confirm, that effective postoperative analgesia is not achieved completely. As a routine procedure, the local anesthetic drug is used in the breast reconstructive plastic surgeries to improve the clinical outcome. [5,6,10] MRM necessitates more breast tissue removal sparing the pectoralis major. [7] Epidural analgesia/perineural catheters provides superior analgesia. But they are expensive, time consuming, needs more medical supervision and labor intensive. [11,12] The irrigation of local anesthetic is a relatively simple and cost effective technique and portable pumps can be utilized for the same. [13] The efficacy of this technique reported by various studies ranges between 30 to 86%. [14,15]

The mean age and weight of the study population were comparable between both the groups before the start of the study. There was no significant difference in means between both the groups. The duration of surgery and dose of fentanyl given was more or less similar in both the groups. Both the groups were similar with respect to ASA status and mallampati score. Post-operative nausea and vomiting was

present in 4 in study population and 20% in control group. The result was statistically significant. Even from earlier times, many methods have been tried for the management of postoperative pain. Since a large amount of tissue is removed, the pain sensation in breast surgery will be usually more and opioid analgesics improved the pain tolerance of the patients. But usage of opioids is related to vomiting, nausea, episodes of respiratory depression, ileus and pruritis. Hence there was a need for finding out a better non opioid analgesic technique for a better patient care. Local anesthetics (LA) were found to have a better control in management of post-operative pain in breast surgeries. [16,17] The LA also found to reduce the pain signals and also the inflammatory reaction. Regional anesthesia techniques though not regularly used, is regarded as one of the better methods for post-operative pain relief. [18]

Legeby et al [19] observed that levobupivacaine had better pain reduction when injected locally compared to oral paracetamol/systemic morphine. Talbot et al [13] and Fredman et al [20] in their respective studies found that there was no significant difference in pain reduction between local administration of levobupivacaine. The occurrence of nausea and vomiting was less in study group which implies that local administration of the drug reduces the occurrence of post-operative nausea and vomiting. Fredman et al [20] observed that the adverse effects like vomiting and nausea decreased with the administration of local anesthetics compared to systemic use of analgesic drugs.

Conclusion

The irrigation of wound with local anesthetics is a simple, effective and economical way to provide good analgesia to patients who are undergoing MRM procedure without significant side effects. Wound infection and healing do not seem to be a major concern. The irrigation of

surgical wound with local anesthetics is a simple, effective method which can be incorporated in the therapeutic armamentarium of multimodal analgesia postoperatively. This cost effective procedure reduces opioid consumption, lessen postoperative sedation and the requirement for antiemetic drugs. Hence we concluded by saying Irrigation of wound with 0.25% Bupivacaine is found to reduce the pain sensation with minimal side effects without systemic compromise.

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