

Comparison of postoperative pain in diathermy and conventional scalpel Skin incision after mastectomy in Ibadan, Nigeria

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Abstract

Introduction: Pain control is a challenge after surgery. Inadequate control of acute postoperative pain in mastectomy patients may lead to chronic post mastectomy pain syndrome. The study aimed to compare the effect of diathermy incision with scalpel incision on the severity of acute postoperative pain after mastectomy.

Method: Sixty three females had mastectomy under general anaesthesia. Thirty two patients had skin incisions made with scalpel while 31 patients with diathermy. Both groups received intraoperative Fentanyl and Tramadol. Tramadol was also employed as postoperative analgesic while Paracetamol was given as the rescue analgesic. The outcome measures were pain scores using visual analogue score (VAS) and analgesic consumption within the twenty four hours postoperatively.

Results: The mean VAS in the diathermy group versus scalpel group at 6th, 12th, 18th and 24th hour post operatively were 11.84 ± 6.15mm versus 16.18 ± 8.5mm (p=0.001), 11.10 ± 4.26mm versus 15.84 ± 5.12mm (p=0.001), 11.07 ± 4.15mm versus 17.32 ± 6.01mm (p=0.001), 10.6 ± 8.08mm versus 19.19 ± 8.7mm (p=0.001) respectively. The mean dose of Tramadol was 264 ± 84 mg in the diathermy group versus 278 ± 64 mg in the scalpel group p=0.189, three patients required rescue analgesic (paracetamol) in the diathermy group mean dose 1.57 ± 0.54g versus 7 patients in the scalpel group, mean dose 1.67 ± 0.58g p=0.75.

Conclusion: Diathermy can contribute to reduction in the acute postoperative pain in patients undergoing mastectomy.

Keywords: Post operative pain scores, Diathermy and Scalpel skin incision

Résumé

Contexte: Le contrôle de la douleur est un défi après la chirurgie. Le contrôle inadéquat de la douleur aiguë postopératoire chez les patients ayant subi une mastectomie peut conduire à un syndrome douloureux

post-mastectomie chronique. L'étude visait à comparer l'effet de l'incision à l'aide de la diathermie avec l'incision à l'aide du scalpel sur la sévérité de douleur postopératoire aiguë après une mastectomie. **Méthode:** Soixante trois femmes avaient une mastectomie sous l'anesthésie générale. Trente-deux patients avaient incisions cutanées faite avec le scalpel tandis que 31 patientes avec la diathermie. Les deux groupes ont reçu Fentanyl et Tramadol à l'intra-opératoire. Tramadol a également été utilisé comme analgésique postopératoire tandis paracétamol a été donné comme l'analgésique de secours. Les mesures de résultats étaient les scores de douleur en utilisant le score analogue visuelle (VAS) et la consommation d'analgésiques dans les 24 heures après l'opération.

Résultats: Le VAS moyen dans le groupe de diathermie par rapport au groupe de scalpel à la 6^{ème}, 12^{ème}, 18^{ème} et 24^{ème} heure post-opératoire étaient 11,84 ± 6,15mm contre 16,18 ± 8,5mm (p = 0,001), 11,10 ± 4,26mm contre 15,84 ± 5,12mm (p = 0,001), 11,07 ± 4,15mm contre 17,32 ± 6,01mm (p = 0,001), 10,6 ± 8,08mm contre 19,19 ± 8,7 mm (p = 0,001) respectivement. La dose moyenne de tramadol était de 264 ± 84 mg dans le groupe de diathermie contre 278 ± 64 mg dans le groupe de scalpel p = 0,189, trois patients ont exigé analgésique de secours (paracétamol) dans le groupe de diathermie, dose moyenne de 1,57 ± 0,54g contre 7 patients dans le groupe de scalpel, dose moyenne de 1,67 ± 0,58g p = 0,75.

Conclusion: diathermie peut contribuer à la réduction de la douleur postopératoire aiguë chez les patients subissant la mastectomie.

Mots-clés: scores de douleur postopératoire, incision cutanée à l'aide de diathermie et Scalpel

Introduction

Breast cancer is a major public health problem worldwide; more than one million new cases of female breast cancer are diagnosed each year, making it the most commonly occurring disease in women [1]. Mastectomy remains the most commonly performed procedure for breast cancer despite increasing trend towards breast conserving surgery [2]. With mastectomy and early institution of radiotherapy and chemotherapy, life expectancy after breast cancer has increased [3].

Post operative pain following mastectomy is an issue; it can lead to prolonged hospital stay, post-discharge readmissions and increasing overall morbidity and cost [4]. Inadequate management of pain in the acute phase is one of the predictor of chronic pain syndrome, so it is vital to control acute pain adequately to prevent chronic pain syndrome [5]. Chronic post mastectomy pain syndrome is neuropathic pain that may arise from direct injury to the nerve during surgery. The commonest nerve reportedly injured is intercostobrachial nerve during axillary dissection [6].

Pain is controlled by pharmacological and non pharmacological methods. Pharmacological approach includes the use of opioid and non-opioid drugs (non-steroidal anti-inflammatory, paracetamol and adjunct analgesics like clonidine, ketamine and gabapentin). Non pharmacological approach to postoperative pain management includes physical method, acupuncture, TENS (Trans electrical nerve stimulation) and other simple surgical technical modification like the use of diathermy [7].

Electro surgery is the application of high frequency electric current to biological tissue as a means to cut, coagulate, desiccate or fulgurate tissues [8]. Electro surgical units develop localized heat by electrical resistance to alternating current between 100KHz and 33,000 MHz thereby avoiding both the neuromuscular stimulation and pain fibers found at lower frequencies and radiating heat that complicates higher frequencies. This principle allows the use of diathermy electrode without causing excessive surrounding tissue damage [9].

Traditionally, skin incisions are made by scalpel. The use of diathermy as a cutting instrument for skin and surgical incision is not as common as scalpel. Many studies conducted on comparison between electrosurgical incision with scalpel incision showed that electrosurgical incision is better than scalpel incision in terms of faster time taken for incision, less pain, better wound healing and reduced blood loss [10-12], however the fear of delayed wound healing, excessive scarring and the risk of infection have curtailed the widespread use of surgical diathermy for skin incision by some surgeons [13,14].

A systematic review and meta-analysis conducted by Ly *et al* on cutting diathermy compared with scalpel for skin incision based on previous studies revealed no statistical difference in pain scores at 24 hours between the 2 groups [15]. Shivagouda *et al* also found no significant difference between postoperative pain score following diathermy and scalpel skin incisions [16].

This prospective randomized study was conducted to compare the effect of diathermy skin incision with conventional scalpel incision on acute postoperative pain in patients undergoing mastectomy under general anaesthesia.

Materials and methods

Institutional ethical approval was obtained, all patients undergoing elective modified radical mastectomy under general anaesthesia between January and July 2011 were recruited. Patients below 16 years, those who could not comprehend the visual analogue scores (VAS), patients on chronic analgesic use, previous reaction to tramadol, renal or cardiovascular diseases or those who refused to participate were excluded from the study.

This was a prospective, double blind randomized study. Sixty three females were recruited and allocated to one of two groups using the simple balloting method; Groups D and S. Thirty one patients were in group D, diathermy skin incision while 32 patients were in group S, conventional scalpel skin incision. The process of generation, allocation and implementation of randomization was done by a House Surgeon. Both the patient and the house surgeon were blinded to the type of skin incision employed in theatre. Patients were educated about the use of the pain scale preoperatively to assess the pain score and pain relief. The pain assessment was the visual analogue scale which is a 100mm line with end point described as no pain marked at the left hand end of the line and worst pain imaginable marked at the right hand end. The patient was asked to mark a point on the line which best represents her pain.

Anaesthetic technique:

Preoperative visit was done a day before surgery to assess the fitness of the patients for surgery. The patients were fasted overnight, and pre-medication given based on the patient's pre-morbid condition. However all patients received 5mg diazepam orally on the morning of surgery, IV metoclopramide 10mg and IV 4mg dexamethasone at induction as anti-emetic.

General anaesthesia with endotracheal intubation was used in all patients. Induction was with either intravenous Propofol 2mg/kg or Sodium thiopentone 4mg/kg. Intravenous Fentanyl 2ug/kg was administered at induction and intraoperative analgesia was maintained with boluses of Fentanyl 0.5ug/kg, muscle relaxation for endotracheal intubation was with Pancuronium (0.1mg/kg). Patients were connected to anaesthetic machine and

ventilated manually or with ventilator, anaesthesia was maintained with Isoflurane 1.2% and oxygen. Heart rate, blood pressure and oxygen saturation were recorded every 5 minutes until the end of surgery. Intravenous tramadol hydrochloride 1mg/kg was administered 20 minutes before the end of surgery to all patients. Residual neuromuscular block was reversed with Atropine 1.2mg and Neostigmine 2.5mg and endotracheal extubation after suctioning.

On the ward, the analgesic regimen was tramadol 1mg/kg 6hourly, rescue analgesia was intravenous paracetamol 1gram with a maximum dose of 3 gram within 24 hours. Pain was assessed at 1, 6, 12, 18, 24 hours postoperatively before analgesic was given.

Data collected included demographic data, pain score (VAS), total analgesic consumption and rescue analgesia doses.

Statistical analysis

Analysis was done using SPSS 18.0. Descriptive data was used to calculate the demographic data while the pain score in both groups was compared using student t -test. P value of <0.05 was considered significant.

Results

Sixty three females who had mastectomy aged 33-73 years were enrolled into the study. Thirty one (49.2%) patients were randomized into group D (Diathermy group) while 32 (50.8%) patients into group S (Scalpel group).

Table 1: The age distribution of patients in the 2 groups

Years	Diathermy group n=31	Scalpel group n=32
30-39	11	13
40-49	9	10
50-59	9	8
>60	2	1

The mean age of patients in group D was 44 ±13.94 years while in groups was 43± 15.99 years =0.88. The body mass index was 24.91± 6.77 in group D while 25.17± 5.5in group S, p=0.63. Table 1 shows the age distribution of patients in the two groups. Table 2 shows the comorbidities in the 2 groups. Hypertension was the commonest comorbidity in both groups.

At 1 hour, the mean VAS in Group D and S were 13.65±6.1mm and 14.9 ±7.3mm respectively, p >0.05. However, there were differences in the mean VAS between the two groups at 6th, 12th, 18th and

24th hour post operatively. At the 6th hour, the mean VAS was 11.84 ±6.15 mm versus 16.18±8.5mm in the diathermy and scalpel group respectively p=0.001. At 12th hour, the mean VAS was 11.10± 4.26mm versus 15.84±5.12mm in the diathermy and scalpel groups respectively p=0.001, at 18th hour the mean VAS was 11.07± 4.15mm versus 17.32±6.01mm in the diathermy and scalpel groups respectively p=0.001 while at 24hours the mean VAS was 10.6± 8.08mm versus 19.19±8.7mm in the diathermy and scalpel groups respectively p= 0.001. Table 3

Table 2: The comorbidities in the 2 groups

Comorbidities	Diathermy=8	Scalpel =7
Hypertension	4	5
Diabetes mellitus	2	0
Hypertensive heart disease	1	1
Asthma	1	1

Table 3: The mean pain intensity scores (visual analogue score) in the 2 groups

Postoperative hour	Diathermy group	Scalpel group	P value
1	13.65±6	14.92±7.3	NS
6	11.84±6.15	16.18±8.5	0.001
12	11.10± 4.26	15.84±5.12	0.001
18	11.07± 4.15	17.32±6.01	0.001
24	10.6±8.08	19.19±8.7	0.001

The dose of Tramadol was 264 ±84 mg in group D compared to 278±64 mg in group S, p=0.189, however three patients required rescue analgesic (paracetamol) in the diathermy group with a mean dose of 1.57 ± 0.54g versus 7 patients in the scalpel group with a mean dose 1.67± 0.58g, p=0.75.

Discussion

The reduction of acute postoperative pain in mastectomy was an important outcome in this study. Our findings showed that pain was mild in intensity immediately after surgery in both groups however there is a relative increase in pain scores within 24hours in the scalpel group compared with the diathermy group.

The initial reduction in pain scores after surgery may be attributed to intraoperative opioids. The mean VAS scores assessed 6hourly within the first 24 hours postoperatively in both groups were all less than 30

implied low pain intensity and it might be difficult to demonstrate an additional benefit with stronger analgesic when baseline pain score is already low.

The mean VAS ranged between 10.6-13.65 in the diathermy group and 14.92-19.19 mm in the scalpel group within 24 hours, this was in contrast to a study done by Khan-Joad *et al* that found that majority of their patients had mild to moderate pain and one patient had severe pain after mastectomy under general anaesthesia using the same analgesics tramadol for postoperative pain [17]. The only difference between their study and ours was the use of diathermy that could simply explain a lower VAS scores in the diathermy group.

Pearlman found that the total pain score for the first three days was 14 ± 4 in the diathermy group versus 18 ± 6 in the scalpel group [10], this was comparable to the range obtained in our study while Kearns *et al* reported significantly lower pain score on the first day ($p=0.04$) and second day ($p=0.02$) with no difference between the groups from the third day onward [11]. Hussein also reported the pain scores assessed every 4 hours during the first 24 hours postoperatively to be significantly lower in the diathermy group [12], however, Upadhyay and colleague demonstrated significant less pain score only at the fourth postoperative hour with diathermy use and no difference in pain score at subsequent assessments [18].

The doses of tramadol and rescue analgesic given to patients in our study were not statistically different in the two groups, this was similar to the study by Pearlman *et al* who found no significant difference in the median total amount of morphine use during the 72 hours postoperatively [10]. However, Kearns *et al* noted that morphine requirement through a patient controlled analgesia (PCA) was higher 66mls in the diathermy group versus 92mls in the scalpel group within the first 24 hours [11]. Hussein *et al* also found fewer doses of morphine injection in the diathermy group 30mg versus 52 mg in scalpel group in the first 24 hours postoperatively [12].

Tramadol was used in this study as post-operative analgesia because it was indicated in mild to moderate pain with less adverse effects such as respiratory depression when compared with morphine [19]. No drug reaction was observed with the use of tramadol and paracetamol in this study. Meta-analysis studies showed that pain relief provided by tramadol and paracetamol combination was superior and more effective than tramadol or paracetamol alone in the postoperative period [20].

Conclusion

Low pain scores were observed in mastectomy patients and diathermy skin incision produces lower pain score within 24 hours of study compared to the conventional scalpel incision although there was no difference in the analgesic doses in the two groups.

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