

# Effect of Preoperative Steroid Injection on Wound Drainage after Modified Radical Mastectomy

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## ABSTRACT

**Background:** After surgery for breast cancer, there is a risk of increased wound drainage and seroma formation. Various treatments are utilized to overcome this issue with variable effectiveness.

**Objective:** To compare the outcome of a single preoperative dose of intravenous steroid injection versus control group on wound drainage in patients undergoing modified radical mastectomy (MRM) for stage I and II breast cancer.

**Methodology:** It is a randomized control trial conducted over a period of 6 months. Total 60 patients who underwent MRM for carcinoma of breast were included. They were divided into 2 groups with each group having 30 cases. In group-A 120 mg (3 ml) of injection depomedrol was given one hour before surgery while in group B, 3 ml of normal saline was used, and MRM was performed and two drains were placed. At the time of drain removal, drainage volume was assessed in both groups.

**Results:** Mean age of the patients was 47.3±7.89 and the mean drainage volume in group A versus B was 672±117.63 and 1020±159.9 respectively. Among the patients, 51.7% had stage I and 48.3% had stage II breast cancer. The two groups had statistically significant difference in terms of mean drainage volume (p value =0.048).

**Conclusion:** In patients who underwent MRM, prophylactic steroid injection was associated with significant reduction in mean drainage volume compared to normal saline.

**Keywords:** Modified Radical Mastectomy, Steroid, Seroma Formation

## INTRODUCTION

Breast cancer or CA breast (CAB) is one of the most common malignancies in women and is estimated to cause mortality in every fourth women. In Pakistan, the data regarding CAB is not accurate due to under-reporting of the cases but a careful estimated stat show that among women malignancies, CAB has the share of 34.6%. In the postmenopausal women CAB accounts for 23% of all malignancies.<sup>1</sup> The incidence of CAB is rising in Pakistan. Among treatment options the surgical option i.e. modified radical mastectomy (MRM) is done with curative intent. After surgery >35% patients experience morbidity in terms of increase wound drainage and seroma formation.<sup>2</sup>

To reduce the drainage and incidence of seroma formation after MRM various ailments are suggested. The use of pressure dressing, flap fixation techniques, OK-432 use, preoperative steroid injections, ultrasonic scalpel can reduce postoperative drainage in MRM.<sup>3-6</sup> The steroids can reduce the inflammation of the wounded area and may reduce the seroma formation. The steroids have been used sporadically in some cases to decrease localized wound drainage in some surgeries.<sup>7</sup> Khan, M. A. (2017) conducted a randomized controlled trial in which the effect of a single dose of steroid injection was observed on postoperative drainage after MRM. The results showed that steroid group had reduced drainage as compared to control group i.e. 755.4 ± 65 versus 928.3 ± 102.5 ml for steroid and control groups respectively (p value <0.005)<sup>2</sup>

In my proposed study I wanted to compare a single preoperative steroid dose with placebo in terms of wound drainage after MRM. The increased wound drainage and seroma formation is always associated with morbidity in terms of delayed hospital discharge, delayed healing and infections. The delay in healing can lead to delay in the chemotherapy or radiotherapy. In Pakistan there is only one study<sup>2</sup> regarding this specific topic, rest of the national and international data is limited. My study would help us to ascertain whether preoperative steroids can reduce the drainage or not. The study was carried out by aiming that if steroids proved to be effective, then they would help us to manage these cases effectively. This would reduce the morbidity of these patients which would in turn reduce the healthcare burden and early oncological treatment of CAB.

## MATERIAL AND METHODS

Total of 60 patients of MRM for CA breast fulfilling inclusion and exclusion criteria were selected from the outpatient department of General surgery, Jinnah Hospital, Lahore after permission from ethical committee. Inclusion criteria includes female Patients who were planned for MRM with age range of 30 to 60 years. Patients with chronic medical comorbid conditions (diabetes mellitus, renal or hepatic insufficiency and coronary artery disease), CAB stage III or IV as per AJCC staging system, already on steroids, previous history of radiotherapy, chemotherapy or breast surgery and pregnant or lactating mothers were excluded from the study. All patients were admitted, informed written consent was taken. The evaluation by detailed history, clinical examination and relevant investigations was done. The pre-anesthesia evaluation and workup was done. Patients were divided into two equal groups A and B via computer generated numbers. In group A, 120 mg (3 ml) of injection depomedrol was given one hour before surgery while in group B, 3 ml of normal saline was given. MRM was performed on both groups by the same consultant surgeon with the same dissection method i.e. steel scalpel dissection. At the end of procedure, two suction drains were placed i.e. one at breast site and other at axillary area. Same standard pre and postoperative care was provided to all patients. The drain was removed and drain volume was measured as per operational definitions. All the data was entered in a specially designed proforma attached as Annexure A. SPSS version 25 IBM registered for Windows was used for data analysis. Age, BMI, duration of disease and drainage volume (quantitative variables) was expressed as mean ± SD. The stage of disease (qualitative variable) was expressed as frequency and proportion. Both groups were compared in terms of the drainage volume by applying independent sample t test. Different variables like age, BMI, duration of disease and stage of the disease were stratified and further analyzed by independent sample t test. P value ≤ 0.05 was considered as significant

## RESULTS

Total 60 females with mean age of 47.3±7.89 years were included in this study. The mean BMI in our cohort was 26.9±3.38 kg/m<sup>2</sup> with the mean duration of symptoms of 1.6±0.62 years. The mean drainage volume in group A was 672±117.63 ml and in group B was 1020±159.9 ml. Among the patients, 51.7% had stage I and

48.3% had stage II breast cancer. The two groups were compared in terms of mean drainage volume (in ml) and it was found that single preoperative dose of steroid reduced more mean drainage volume compared to control in patients undergoing modified radical mastectomy and the difference was statistically significant as indicated by an independent t-test value of 4.078 ( $p$  value =0.048) as shown in table 1

Table 1: Comparison Of Both Groups In Terms Of Mean Drainage Volume By Independent T-Test

Group	N	Mean±standard deviation	Independent sample t-test	
			F	Significance
A	30	672±117.63	4.078	0.048
B	30	1020±159.9		

Data was stratified for age, BMI, duration of symptoms and stage of disease and post-stratification independent t-test was applied and no statistically significant effect of these effect modifiers was seen on the mean drainage volume (table 2-5).

Table 2: Effect of Age on Mean Drainage Volume.

Age group	N	Mean±Standard Deviation	Independent Sample t-test	
			F	Significance
Early Middle Age	24	879.5±221.3	0.001	0.978
Late Middle Age	36	823.6±226		

Table 3: Effect of BMI With Mean Drainage Volume

BMI Category	N	Mean±Standard Deviation	Independent sample t-test	
			F	Significance
Normal BMI (20-25 Kg/m <sup>2</sup> )	21	841.7±221.9	0.299	0.587
Abnormal BMI (>25 Kg/m <sup>2</sup> )	39	848±227.9		

Table 4: Effect Of Duration Of Disease With Mean Drainage Volume

Duration of disease	N	Mean±standard deviation	Independent sample t-Test	
			F	Significance
Short duration (<1 year)	24	824±239.6	0.402	0.529
Long duration (>1 year)	36	860.5±215.1		

Table 5: Effect Of Stage Of Breast Cancer With Mean Drainage Volume

Stage of Disease	N	Mean±Standard Deviation	Independent Sample t-Test	
			F	Significance
Stage I	31	815.9±235.9	0.041	0.840
Stage II	29	878±209.7		

## DISCUSSION

Breast cancer is the most common cancer diagnosed in women, accounting for more than 1 in 10 new cancer diagnoses each year.<sup>1</sup> International Agency for Research on Cancer (IARC) reported that there were 1.7 million new cases of breast cancer in 2012 and 6.3 million women survived from CAB in last 5 years.<sup>7</sup> This incidence of breast cancer has increased by more than 20% in 2018 with deaths reported by CAB escalated to 14%.<sup>8</sup> Moreover, the incidence of breast cancer in Pakistan is about 2.5 times higher than its neighboring countries.<sup>9</sup> An interesting fact observed in Pakistan is the involvement of younger age woman in CAB, contrary to what is observed in the West. Managing CAB needs a multidisciplinary approach with surgery being a vital step supported by radiotherapy, hormone therapy and chemotherapy. Among different surgical approaches modified radical mastectomy (MRM) with axillary clearance is considered the most widely accepted.<sup>8</sup>

CAB surgery is a complex surgery with many intra-operative and postoperative complications. Among these complications

seroma formation is the commonest one with incidence of 35–80%.<sup>10-14</sup> It is very important to prevent seroma formation, because it results in prolonged hospital stay, long outpatient follow-up and delay in subsequent adjuvant therapies which further adds to the patient miseries.<sup>15</sup>

Role of steroid in preventing seroma formation is quite debatable. In present study it was found that in female patients who underwent modified radical mastectomy and received steroid injection an hour before had mean drainage volume of 672 ml compared to 1020 ml in the normal saline group and the difference between the groups in terms of mean drainage volume was statistically significant i.e.  $p=0.048$ . The drainage volume was less in the late middle age group (46-60 years), in those with normal BMI (20-25 Kg/m<sup>2</sup>), short duration of disease (<1 year) and with stage 1 breast cancer. However, these findings were statistically insignificant ( $p>0.05$ ).

Over the past years, there has been substantial evidence suggesting that seroma is an exudative discharge which occurs because of acute inflammation that occurs after surgical trauma, rather than a simple serous fluid accumulation.<sup>16</sup> Presence of proteinases and their inhibitors as well as cytokines in the seroma fluid support this concept.<sup>17</sup> Immunomodulatory compounds have been assessed and were found effective in preventing formation of seroma.<sup>18</sup> In a rat model, such a compound was 5-fluorouracil and in the human model, sapylin was used. Consequently, for managing seroma, steroids can also be used as potent agents with anti-inflammatory action.<sup>7</sup> Glucocorticoids are utilized for treating various inflammatory diseases such as rheumatic fever as well as allergic conditions and administered frequently as either an intra-articular injection or a local intramuscular injection. Effectiveness of steroids has also been assessed in different types of surgery such as resection of colon, plastic surgery, cardiac surgery and head and neck surgery. In a RCT, Taghizadeh et al.<sup>19</sup> assessed steroid's effect on the recurrence of seroma after reconstruction of breast using latissimus dorsi. The authors injected as single dose of triamcinolone in one group and normal saline in the other group after first aspiration of seroma and looked for its recurrence<sup>19</sup> and found results similar to current study results that is there was less mean drainage volume in patients who received steroid injection compared to those who received normal saline.<sup>19</sup> The effects were similar to the current study although in our study steroid was injected prophylactically and in the study by Taghizadeh et al.<sup>19</sup> it was injected late. The administration of steroids prophylactically led to significant reduction in the total volume of fluid drained from the surgical site in our study as well as that of Taghizadeh et al.<sup>19</sup>

Axelsson et al.<sup>9</sup> compared the effect of injecting local steroid in the mastectomy cavity versus normal saline at the time of removal of drain and found that there was statistically significant reduction in terms of number of punctures, total volume of fluid drained and duration of formation of seroma.<sup>9</sup> Qvamme et al.<sup>10</sup> also carried out a randomized controlled trial using a single injection of steroid in one group and normal saline in other group in patients undergoing mastectomy and similarly reported statistically significant reduction in the mean drainage volume in the steroid group compared to normal saline.<sup>10</sup> In 2017 Khan et al. revealed that the mean drainage in steroid group was significantly reduced as compared to control group i.e. 755.4±65ml vs 928.3±102.5 respectively.<sup>2</sup> These findings are in line with the findings of current study showing superiority of steroids over normal saline in terms of reduced drainage volume when given prophylactically to patients undergoing modified radical mastectomy.

Turel et al.<sup>15</sup> used a similar technique but on a rat model and injected methylprednisolone injection into the space present under the skin flaps after mastectomy and dissection of axillary lymph nodes.<sup>15</sup> The author revealed that although injecting steroids was effective in preventing the formation of seroma and reducing the drainage volume, but because of the high risk of infection of the wound it should not be used generally.<sup>15</sup> Our study similarly reported reduction in drainage volume in the steroid group as was revealed by Turel et al.

Okholm et al.<sup>20</sup> evaluated if a single dose of glucocorticoid given intravenously 1.5 hours before surgery was beneficial in preventing seroma formation after mastectomy and axillary dissection in a controlled pilot research.<sup>25</sup> The drainage volume, total seroma volume, and number of seroma punctures were all reduced, albeit not significantly, over the first two postoperative days. The authors concluded that steroid injection was not associated with significant reduction in drainage volume. The results of Okholm et al.<sup>25</sup> is different from our study results which reported that there was significant reduction in terms of drainage volume in patients who received prophylactic steroids.

The current study supports the use of prophylactic steroid injection in patients undergoing modified radical mastectomy. However, the risk of wound infection must be kept in mind while dealing with such cases as steroids can increase infection risk. Therefore, adequate prophylactic antibiotic cover must be used while using steroids for controlling drainage volume and reducing the rate of seroma formation.

### CONCLUSION

The current study concluded that compared to normal saline, prophylactic use of steroid injection in females undergoing modified radical mastectomy was more effective in reducing mean drainage volume in patients with stage I and II breast cancer. Since the commonest complication following mastectomy is formation of a seroma, steroid therapy steroid therapy appears to be the most cost-effective and promising technique for reducing drainage volume that leads to decrease in the formation of seroma. It is suggested that it be used on a regular basis in all cases, as long as there is enough antibiotic coverage and wound care. Future studies must be carried out on larger sample sizes and must incorporate other stages of breast cancer in order to validate the current study findings.

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