ORIGINAL RESEARCH PAPER

Surgery

EFFECTIVENESS OF PROPHYLACTIC INTRAVENOUS METHYLPREDNISOLONE IN PREVENTING SEROMA FORMATION FOLLOWING MODIFIED RADICAL MASTECTOMY: A PROSPECTIVE CASE-CONTROL STUDY

KEY WORDS:

Dr Sanjana G K Senior Resident, Department of General Surgery, SDUAHER

Dr. Krishna Prasad K* Professor and Unit head, Department of General Surgery, SDUAHER *Corresponding Author

Dr. Ravikiran H R Professor and Unit head, Department of General Surgery , SDUAHER

ABSTRACT

Background: Seroma formation is the most frequent postoperative complication following modified radical mastectomy (MRM), contributing to increased morbidity, prolonged hospital stay, and delayed adjuvant therapy. Corticosteroids, due to their anti-inflammatory effects, may reduce seroma formation, but evidence remains inconclusive. **Objective:** To evaluate the effectiveness of a single preoperative dose of intravenous methylprednisolone in reducing postoperative seroma formation in patients undergoing MRM. **Methods:** This prospective case-control study included 32 patients with carcinoma breast undergoing MRM. Patients were randomized into two groups: Group A (n=16) received 120 mg IV methylprednisolone 1 hour prior to surgery, while Group B (n=16) served as controls. Postoperative drain output, duration of drainage, hospital stay, and pain scores were assessed. Statistical analysis was performed using independent t-test, with $p < 0.05$ considered significant. **Results:** Group A showed significantly lower total drainage (163.3 mL vs. 279.9 mL), earlier drain removal (POD 5 vs. POD 7), shorter hospital stay (10.18 vs. 15.25 days), and lower VAS pain scores (2.56 vs. 5.43) compared to Group B ($p < 0.05$ for all). No surgical site infections were observed. **Conclusion:** A single preoperative dose of IV methylprednisolone significantly reduces seroma formation and improves postoperative recovery following MRM. Larger studies are required to validate these findings.

INTRODUCTION

Breast cancer is the most common malignancy affecting women worldwide and remains a leading cause of cancer-related mortality. Globally, over 2 million new cases and approximately 685,000 deaths were reported in 2020 [1]. In India, breast cancer accounts for a significant proportion of cancer burden, with rising incidence in both urban and rural populations [2].

Despite advances in screening and breast-conserving surgery, modified radical mastectomy (MRM) continues to be the mainstay of treatment in patients presenting with advanced disease, particularly in low-resource settings [3].

Seroma formation is the most common postoperative complication following MRM, with incidence rates ranging from 3% to 85% [4]. It is characterized by the accumulation of serous fluid beneath skin flaps or in the axillary space. The pathophysiology involves disruption of lymphatic channels, creation of dead space, and an acute inflammatory response leading to exudation of fluid rich in cytokines, proteins, and inflammatory mediators [5].

Clinically, seroma can lead to wound dehiscence, infection, flap necrosis, patient discomfort, prolonged drainage, and delayed initiation of adjuvant therapy [6]. Various strategies have been proposed to reduce seroma formation, including prolonged drainage, flap fixation techniques, shoulder immobilization, and pharmacological agents such as tranexamic acid [7].

Corticosteroids, owing to their potent anti-inflammatory properties, have been investigated for their potential to reduce postoperative fluid accumulation. They act by suppressing inflammatory mediators, reducing capillary permeability, and limiting exudative fluid formation [8]. However, current literature presents conflicting evidence, and routine use is not yet established.

This study aims to evaluate the effectiveness of a single preoperative dose of intravenous methylprednisolone in reducing seroma formation in patients undergoing MRM.

Materials and Methods

Study Design and Setting

This prospective case-control study was conducted at RL Jalappa Hospital and Research Centre from September 2022 to June 2024.

Study Population

A total of 32 female patients diagnosed with carcinoma breast and planned for MRM were included in the study.

Inclusion Criteria

- Female patients aged 18–70 years
- Histologically confirmed carcinoma breast
- Planned for modified radical mastectomy

Exclusion Criteria

- Recent steroid use (within 3–6 months)
- Previous axillary surgery
- Prior radiotherapy to chest or axilla

Sample Size

Sample size was calculated using standard formula for comparison of two means, based on previous studies. A minimum of 16 patients per group was included.

Randomization and Intervention

Patients were allocated into two groups using an odd-even randomization method:

- Group A (Study group): Received 120 mg IV methylprednisolone 1 hour before surgery
- Group B (Control group): Did not receive steroids

All patients underwent standard MRM performed under uniform surgical protocols.

Postoperative Management

A closed suction drain was placed in all patients. Drain output was recorded daily. Drains were removed when output was ≤30 mL for three consecutive days.

Patients were monitored for:

- Seroma formation (clinical and ultrasound when required)
- Wound complications
- Pain (VAS score on POD 3)

Outcome Measures

Primary outcomes:

- Total drain output
- Time to drain removal

Secondary outcomes:

- Duration of hospital stay
- Postoperative pain score
- Surgical site infection

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS version 22. Continuous variables were expressed as mean ± standard deviation. Independent t-test was used for comparison between groups. A p-value <0.05 was considered statistically significant.

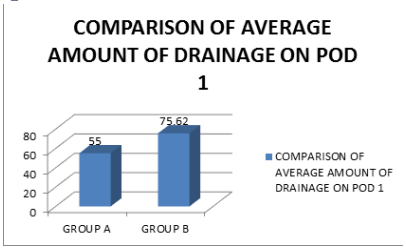
RESULTS

Baseline Characteristics

The mean age of patients was 64.13 years, with the majority in the 61–70-year age group. Most patients presented with a breast lump, and infiltrating ductal carcinoma was the most common histological subtype.

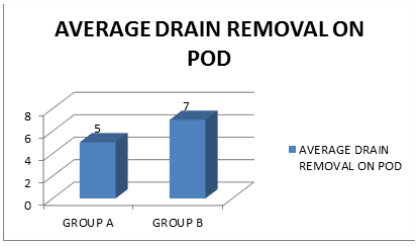
Postoperative Outcomes

Drain Output:



- Mean drainage on POD 1 was lower in Group A (55 mL) compared to Group B (75.62 mL).
- Total drainage was significantly lower in Group A (163.3 ± 38.7 mL) compared to Group B (279.9 ± 75.6 mL) (p=0.0001).

Drain Removal:



- Mean duration to drain removal was significantly shorter in Group A (5.18 days) compared to Group B (6.75 days) (p=0.0001).

Hospital Stay:

- Group A had a significantly shorter hospital stay (10.18 ± 1.51 days) compared to Group B (15.25 ± 5.67 days) (p=0.0013).

Pain Assessment:

- VAS pain score on POD 3 was significantly lower in Group A (2.56) compared to Group B (5.43) (p=0.0029).

Complications:

- No surgical site infections were observed in either group.
- Majority of drainage was serosanguineous in nature.

DISCUSSION

Seroma formation remains a major postoperative challenge following MRM, contributing significantly to patient morbidity and healthcare burden. The underlying mechanism involves lymphatic disruption and inflammatory exudation, making anti-inflammatory interventions a logical therapeutic approach.

In this study, administration of a single preoperative dose of methylprednisolone resulted in a statistically significant reduction in total drain output and earlier drain removal. These findings support the hypothesis that suppression of inflammatory response can reduce postoperative fluid accumulation.

The reduction in hospital stay observed in the steroid group is clinically significant, as it translates into decreased healthcare costs and improved patient satisfaction. Additionally, lower postoperative pain scores suggest an added benefit of corticosteroids in improving overall recovery.

Previous studies have reported mixed outcomes regarding the effectiveness of steroids in preventing seroma formation. While some studies demonstrated reduced drainage and earlier recovery, others found no significant long-term benefit [4,8]. The results of the present study align with those demonstrating short-term benefits in reducing seroma formation. Importantly, no increase in wound infection rates was observed, indicating that a single preoperative dose of methylprednisolone is safe in this context.

However, the small sample size and single-center design limit the generalizability of the findings. Variability in surgical technique and patient factors may also influence outcomes.

Limitations

- Small sample size
- Single-center study
- Lack of long-term follow-up
- Subjective variation in pain scoring

CONCLUSION

Preoperative administration of intravenous significantly reduces postoperative seroma formation, facilitates earlier drain removal, shortens hospital stay, and decreases postoperative pain in patients undergoing MRM. It represents a simple, safe, and cost-effective intervention. Larger randomized controlled trials are required to establish its routine use in clinical practice.

REFERENCES

1. Wilkinson L, Gathani T. Understanding breast cancer as a global health concern. Br J Radiol. 2022;95(1130).
2. Global Burden of Disease Cancer Collaboration, Fitzmaurice C, Abate D, et al. Global cancer statistics. JAMA Oncol. 2019;5(12):1749–68.
3. Mittal P, Kumar A, Kaur S, et al. Harmonic scalpel versus cautery in MRM. Niger J Surg. 2017;23:20–5.
4. Fatima S, Shafique MS, Shabana B, et al. Prevention of seroma using hydrocortisone. Cureus. 2024.
5. Albatanony AA, Assar AMA, El Balshy MAE. Role of inflammatory markers in seroma. Int Surg J. 2021;8:2544–52.
6. Talha A, Ramadan R, Abdelhamid S, et al. Postmastectomy seroma and IL-6/CRP. Egypt J Surg. 2015;34.
7. Prajapati S, Ramasamy S, Vats M, et al. Octreotide in lymphorrhea post-MRM. Cureus. 2021;13:e19225.
8. Okholm M, Axelsson CK. Steroids and seroma formation after mastectomy. Dan Med Bull. 2011.