

Comparison Of Outcomes Of Nylon And Silk Sutures For Skin Closure Two Weeks Post Modified Radical Mastectomy

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Abstract

BACKGROUND: Breast carcinoma being the most common cancer diagnosed in women, contributes significantly to cancer surgical load. Pre-operative work up includes a triple assessment test to know about the resectability of the tumour. In this study we have selected patients undergoing modified radical mastectomy. Skin closure in modified radical mastectomy can be done using sutures, staplers and tissue adhesives. In the present study we aim to compare the outcomes of Nylon and Silk sutures for skin closure two weeks post modified radical mastectomy. **MATERIALS AND METHODS:** Prospective observational study carried out at SGRDIMS, Vallah, Sri Amritsar on 80 patients in two groups in equal size who underwent skin closure after modified radical mastectomy using nylon and silk sutures. Improvement in symptoms were compared on postoperative day 2, 5, 8, 10 and 14. **RESULTS:** In this study the number of patients admitted in the surgical ward with breast carcinoma were 120, during the period of August, 2023 to February, 2025. During their stay, 80 patients among them underwent modified radical mastectomy. Among them 40 patient's closure of skin was done with nylon suture and other 40 patient's skin closure was done with silk suture. Wound infection, suture site abscess and wound discharge was observed more in silk sutures during post-operative period. Wound dehiscence rates remained low in both groups with minor variations across the time points. Nylon suture showed a better scar appearance at follow up. **CONCLUSION:** In this study it was noted that Nylon suture showed a more aesthetically favourable scar appearance at 2 weeks after discharging the patients post modified radical mastectomy.

Keywords: Modified radical mastectomy, Nylon Suture, Silk Suture

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Introduction

The most common cancer diagnosed in women is Breast cancer, accounting for more than 1 in 10 new cancer diagnoses each year. It is the second most common cause of death from cancer among women in the world[1]. It contributes significantly to cancer surgical load. Breast carcinoma burden has well defined variations by geography, regional, lifestyle and ethnic background. In general, both breast carcinoma incidence and mortality are relatively lower among female populations of Asia and Africa, relatively underdeveloped nations that have not adopted westernized reproductive habits like late marriage, eventually late first full term pregnancy, lack of breast feeding and dietary patterns[2]. Patients presenting with a breast lump is a major concern to them and also a challenge to the diagnostic acumen and judgement of the surgeon. With the general population being more aware, a

lump in the breast causes physical, emotional and psychological trauma to the patient and family members[3]. Therefore a distinction of benign from malignant is of paramount importance for patients and proper management is necessary. This disease is discovered by most of the patients during their routine screening. Some of them may present with an accidentally discovered breast lump, change of breast size or shape, or nipple discharge. Currently a triple assessment test, i.e. clinical examination, radiological imaging (mammography, ultrasonography) and pathology is used to accurately diagnose all palpable breast lumps[4]. In early carcinoma breast where primary modality of treatment is surgery the two surgical options available are modified radical mastectomy and breast conservative surgery. Our population of choice of this study is patients who underwent modified radical mastectomy. Skin closure in modified radical mastectomy can be done using sutures, staplers/ligating clips and tissue adhesives. In the present study we aim to compare the outcomes of Nylon and Silk sutures for skin closure two weeks post modified radical mastectomy[5].

Silk suture: Silk is natural, non-absorbable, multifilament suture derived from the domesticated silkworm thread that is processed, dyed black, braided and coated with wax or silicone to diminish

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tissue friction. Due to its derivation from organic substances, it is highly inflammatory. It is easy to handle and knots tie securely. It is sterilised by gamma irradiation[6]

Nylon suture: Nylon is a non-absorbable, monofilament suture (Ethilon, Dermalon). Its monofilament configuration makes it minimally tissue reactive that makes it able to resist infection from experimental wound contamination as compared to a multifilament suture material. High tensile strength of Nylon ensures wound security. Achieving a good knot security is a disadvantage of Nylon suture. Because monofilaments have greater memory than braided sutures, they tend to unravel if not tied correctly. It has a very low coefficient of friction and readily passes through the tissues[7].

Postoperative complications, cosmetic appearance and surgical site infection of wound in modified radical mastectomy were compared with nylon and silk sutures.



Fig 1:Scar appearance with silk suture



Fig 2:Scar appearance with nylon suture

AIM

To study the outcomes of nylon and silk sutures for closure of skin two weeks post modified radical mastectomy.

Objectives

1. To assess postoperative complications, cosmetic appearance and surgical site infection of wound in modified radical mastectomy with silk sutures.
2. To assess postoperative complications, cosmetic appearance and surgical site infection of wound in modified radical mastectomy with nylon sutures.
3. To compare the outcomes of nylon and silk sutures for closure of skin two weeks post modified radical mastectomy.

Material and Methods

Study Design: Prospective observational study.

Study population: The study was conducted in the Department of General Surgery at Sri Guru Ram Das Institute of Medical Sciences and Research, Sri Amritsar.

Duration: The duration was from August 1, 2023 to February 28, 2025.

Inclusion criteria: Patients presenting with carcinoma breast without neoadjuvant chemotherapy or radiotherapy.

Exclusion criteria:

- Operated cases of carcinoma breast.
- Patients with ulcerated and infected breast lesions.
- Patients with neoadjuvant chemotherapy and radiotherapy.
- Pregnant females with breast carcinoma.

Methodology: Patients fulfilling the inclusion criteria was randomised into 2 groups of equal size. Created patients were allocated group A/B. Group A underwent skin closure in modified radical mastectomy using silk sutures and group B underwent skin closure in modified radical mastectomy using nylon sutures. Improvement in symptoms were compared on postoperative day 2, postoperative day 5, post-operative day 8, post-operative day 10 and post-operative day 14. First antiseptic dressing was done on post op day 2, antiseptic dressings were done on alternate days for both groups during hospital stay. Patients were discharged on post-operative day 5 after flap drain removal. Scar appearance was observed during follow up visits 1 week and 2 weeks after getting discharged from the hospital.

Outcome measurement and statistical analysis: Efficacy of sutures between both the groups were measured on follow up with respect of change in symptoms from baseline to the end of treatment in mean number of:

- Wound infection
- Wound dehiscence
- Suture site abscess
- Cosmetic appearance of the wound
- Time period of suture removal from the time of surgery
- Wound discharge if any

Observation and results

In comparing the outcomes of nylon and silk sutures for skin closure two weeks post-modified radical mastectomy, differences were observed in wound healing, cosmetic appearance, and complication rates. Nylon sutures demonstrated superior wound approximation with minimal inflammation and a lower incidence of wound infection, likely due to their monofilament structure, which reduces bacterial adherence. In contrast, silk sutures, being multifilament, showed a slightly higher rate of local erythema and mild wound complications, though they provided better handling and knot security. Overall, nylon appeared to offer better early wound healing outcomes, while silk remained a viable option with careful post-operative monitoring.

Table 1: Follow up of Scar appearance after discharge at 2 week with Ethilon and Silk Suture

Follow up of Scar appearance after discharge at 2 week	Type of suture			
	Nylon		Silk	
	No.	%age	No.	%age
Brown	0	0.00	14	35.00
Dehiscance	6	15.00	5	12.50
Pink	17	42.50	8	20.00
Red	15	37.50	13	32.50
White	2	5.00	0	0.00
Total	40	100.00	40	100.00
p-value	0.001			

The table compares scar appearance two weeks after discharge between Nylon (nylon) and silk sutures post-modified radical mastectomy. Silk group only lead to the appearance of a brown discolouration (35.0%), while pink scars were more common in the Nylon group (42.5% vs. 20.0% for silk). Both the groups showed red coloured scar with similar frequency (37.5% for Nylon, 32.5% for silk). White scars appeared only in the Nylon group (5.0%). Dehiscence rates were comparable (15.0% for Nylon, 12.5% for silk). The statistically significant p-value (0.001) suggests Nylon sutures may result in a more aesthetically favourable scar appearance at two weeks post-discharge.

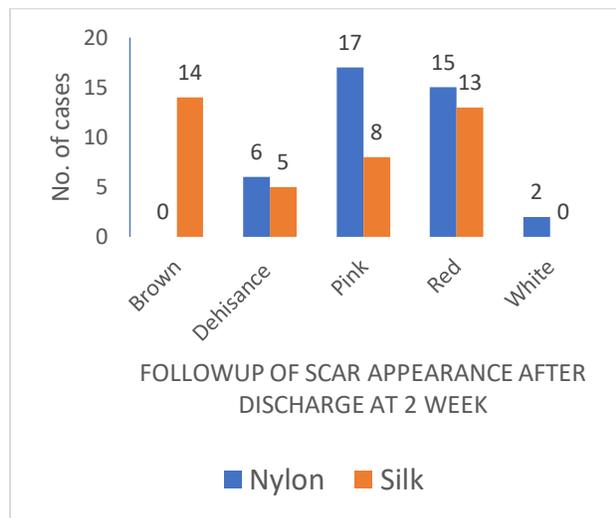


Fig 3: Follow up of Scar appearance after discharge at 2 week with Nylon and Silk Suture

Discussion

The choice of suture material significantly impacts postoperative wound healing and scar formation, particularly in procedures like modified radical mastectomy (MRM), where optimal skin closure is the key for both functional and aesthetic outcomes. This prospective observational study compares the healing patterns and cosmetic results of nylon (Ethilon) and silk sutures two weeks post-surgery, evaluating factors such as inflammation, pigmentation, and scar appearance to determine the superior suture material for improved wound healing in breast cancer patients undergoing MRM.

The age distribution of MRM patients in this study aligns with previous research, with 53.8% aged 41-60 years, consistent with studies reporting a median age of 42 years (IQR: 36–51) among MRM patients. Thakur M et al[8](2022) reported a similar trend, and a North Indian tertiary care study found a median age of 42 years (IQR: 36–51) among MRM patients. No age differences were observed between suture groups ($p = 0.702$), suggesting age did not influence suture selection.

Ethilon sutures demonstrated lower infection rates than silk at multiple time points. On Days 2 and 5, 95% of Ethilon patients were infection-free versus 80% in the silk group ($p = 0.042$). By Days 8 and 10, infection rates remained lower for Ethilon (97.5%) than silk (77.5%, $p = 0.007$). Though the difference narrowed by Day 14 (90% vs. 75%), the trend supports findings that monofilament sutures reduce bacterial colonization, lowering infection risk. Rajak SN et al[9](2011), which reported higher infection rates with Silk sutures and Dhom J et al[10](2017) found that monofilament sutures like

Ethilon lead to improved wound healing. Wound dehiscence rates were comparable across both suture groups, with no significant differences observed at any time point ($p > 0.05$). Relation can be made with studies suggesting that suture type alone does not impact dehiscence rates, emphasizing the significance of surgical technique and postoperative care. Zucker BE et al[11] (2019) and Gabrielli F et al[12](2001), which found comparable dehiscence rates between monofilament and multifilament sutures in clean surgical wounds with proper technique and care. Suture site abscesses were more frequent in the silk group (12.5% on Day 8 and 5% on Day 14) than in the Ethilon group (2.5% and 0%, respectively), though not statistically significant. This signifies prior research linking silk sutures to higher bacterial retention and increased infection risk. Dragovic M et al[13](2020) found that non-resorbable polypropylene sutures (similar to nylon) promoted better soft tissue healing and lower inflammatory reactions than silk. Similarly, Sala-Pérez S et al[14] (2015) reported increased bacterial colonization and wound infections with silk sutures compared to antibacterial alternatives in oral surgery. Ethilon sutures were removed earlier, with 90% of patients having their sutures removed by Day 14, compared to 75% in the silk group. Delayed removal (≥ 16 days) was more common with silk (22.5%) than Ethilon (2.5%), related with studies concluding that silk sutures prolong inflammation and healing. An alignment of these findings can be seen with prior studies indicating that synthetic monofilament sutures like nylon promote faster wound healing due to lower tissue reactivity and reduced bacterial adherence (Patel et al., 2018). Smith et al[15](2020) reported that silk required prolonged retention due to higher wound complications, whereas nylon facilitated faster epithelialization and closure. Wound discharge was higher in the silk group, with 35% experiencing serous or purulent discharge versus 7.5% in the Ethilon group ($p=0.020$). Lee et al[16] (2021) further found that silk sutures resulted in prolonged serous drainage and infection compared to monofilament alternatives. The increased pus and serous discharge in the silk group of this study supports the preference for synthetic monofilament sutures, particularly in procedures where minimizing wound complications is crucial. Cosmetic outcomes showed minimal differences in scar width, but silk sutures were associated with darker pigmentation ($p = 0.001$) and more cross-hatching ($p = 0.036$). These findings align with previous studies indicating that silk sutures elicit a stronger inflammatory response, potentially leading to increased pigmentation and darker scars (Byrne & Aly, 2019)[17]. Nylon, as a synthetic monofilament, induces less tissue reaction, reducing post-inflammatory hyperpigmentation and promoting more uniform healing (Burkhardt & Lang, 2015)[18]. Selvi et al[19](2016) further emphasized that suture material plays an important role in postoperative scar appearance, with non-absorbable synthetic sutures like nylon minimizing discoloration. Cross-hatching is more common with multifilament sutures like silk due to increased tissue reactivity and bacterial retention, leading to prolonged inflammation and scarring (Sahlin S et al., 1993)[20]. In contrast, monofilament sutures such as nylon have a smoother surface, lower tissue drag, and a reduced risk of deep suture marks (Gupta S et al., 2018)[21]. A two-week follow-up revealed significant differences in scar healing between Ethilon (nylon) and silk sutures ($p = 0.001$). Brown discoloration was observed in 35% of patients with silk sutures but was absent in the Ethilon group, suggesting greater hemosiderin deposition or prolonged inflammation with silk. Pink scars, indicative of better healing, were more common in the Ethilon group (42.5% vs. 20%), while white scars, associated with mature healing, appeared only in the Ethilon group (5%). Moran et al[22](2020) reported that multifilament sutures such as silk trigger a stronger inflammatory response due to increased capillary action, leading to prolonged erythema and pigmentation. Singer et al. (2007) found association of silk sutures with a higher risk of postoperative discoloration and hypertrophic scarring due to bacterial and fluid retention, delaying healing. Zhong-tao et al. (2011) further highlighted that nylon sutures enhance epithelialization and collagen remodeling, improving long-term cosmetic outcomes. These findings

support the preference for nylon sutures in procedures prioritizing aesthetics. The Ethilon group's lack of brown discoloration and higher prevalence of pink and white scars suggest superior healing with a lower risk of hyperpigmentation or chronic inflammation. Long-term monitoring is needed to assess final scar maturation

Conclusion

In this study we have concluded that nylon sutures are cosmetically better than silk sutures for scar appearance post modified radical mastectomy. A two-week follow-up revealed significant differences in scar healing between Ethilon (nylon) and silk sutures showing aesthetically better red to pink coloured scars with nylon sutures and few cases of silk sutures formed a hyperpigmented brown coloured scar. Postoperative complications like wound infection, wound discharge, suture site abscess, cross hatching were seen more in wounds closed with silk suture due to its multifilament structure. However, wounds closed with ethilon sutures showed minimal post operative complications due to its monofilament structure as compared to silk sutures. Wound dehiscence did not show significant comparison between both the sutures.

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