



WOUND RELATED COMPLICATIONS OF SKIN SUTURES – A PROSPECTIVE STUDY

General Surgery

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ABSTRACT

Introduction: Surgery, historically known as chirurgery, signifies handwork and encompasses the art and science of performing manual operations to heal the human body using the most effective techniques and medicines available. The primary objectives of surgery are to achieve healing with minimal swelling, no discharge or infection, and minimal scar formation. The success of a surgical procedure is often judged by the lack of postoperative complications and the cosmetic appearance of the scar. **Aim:** This study aims to examine the complications associated with skin sutures. **Materials And Methods:** This cross-sectional study was carried out in the Department of General Surgery at Narayana medical college and hospital, involving 100 patients eligible for various elective and emergency surgeries. Among them, 50 patients had skin suturing with silk, while the other 50 had suturing with prolene. The surgical sites were evaluated for infection and wound gaping. **Results:** In the silk group, 34% of participants were aged 30-39 years, followed by 22% aged 40-49 years. The majority were male (66%). Wound-related complications were observed in 26% of patients in the silk group, with 23.07% experiencing acute wound dehiscence and 76.93% developing surgical site infections. In contrast, the prolene group had complications in 10% of the patients, all of which were surgical site infections. No cases of abdominal wound dehiscence were reported in the prolene group. The study found a statistically significant correlation between the type of suture material and the occurrence of complications, with a P value of 0.03. **Conclusion:** Silk sutures are associated with a higher incidence of complications compared to prolene sutures. However, the overall development of wound dehiscence and infection depends on multiple factors beyond the choice of suture material.

KEYWORDS

Wound Infection, Suture, Suture Material, Complications.

INTRODUCTION:

Surgery, originating from the term "chirurgery" which means handwork, is both a science and an art. It encompasses all necessary manual operations to heal or alleviate conditions in the human body using the most effective medicines or techniques available. The primary goal of surgery is to facilitate healing with minimal swelling, no discharge or infection, proper wound edge approximation, and minimal scar formation. The success of surgical procedures and the efficiency of the surgeon are evaluated based on two main factors: a complication-free post-operative period and the cosmetic outcome of the scar.

Healing by primary intention is achieved through careful tissue approximation, provided there is no tension and a good blood supply. The process of suturing any incision or wound requires careful consideration of the site and tissues involved, the type of suture material, and the chosen closure technique. While the correct choice of suture technique and material is crucial, it cannot make up for poor operative technique. Proper wound healing necessitates a good blood supply and tension-free closure. The type of suture material used for skin closure is thought to impact post-operative wound complications, although many studies have shown no significant differences between various suture materials. This study aims to evaluate the wound-related complications of different skin sutures during the post-operative period.

Aim: To study the wound-related complications of skin sutures

Objectives:

- To examine the wound-related complications associated with skin sutures.
- To assess the association between the two suture materials used

MATERIALS AND METHODS:

Place of study: The study was conducted in the Department of General Surgery at Narayana Medical College and Hospital, a tertiary care center in Nellore.

Study design- This was a cross-sectional study conducted from December 2022 to December 2023.

Study Population

The study included all patients admitted as inpatients for surgical treatment of various diseases in the Department of General Surgery at Narayana Medical College and Hospital.

Study Sample Size

A total of 100 patients were enrolled in the study.

Methodology:

A total of 100 patients who met the inclusion criteria were enrolled in the study. Fifty patients underwent skin closure with silk sutures, while the remaining fifty underwent skin closure with prolene sutures.

Inclusion Criteria

- Patients willing to give informed written consent.

Exclusion Criteria

- Patients unwilling to participate in the study.
- Patients with immune deficiencies.
- Patients with conditions like diabetes or arterial diseases that affect wound healing.

Procedure:

Patients meeting the inclusion criteria were included in the study. A pre-designed, pre-tested, semi-structured, and pre-coded proforma was used to record all findings. The questions were partially closed-ended. Ethical clearance was obtained from the Institutional Ethical Committee before the study commenced. Each participant was interviewed for an average of 20 minutes.

The questionnaire covered the following areas:

- Demographic Information:** Age, gender, etc.
- Clinical Data:** Diagnosis, physical examination, and investigations, including: Complete blood picture to rule out anaemia, complete urine examination and renal function tests to rule out kidney abnormalities, Blood sugar levels to rule out diabetes, Liver function tests, chest X-ray, and ECG if necessary.

Both general and spinal anesthesia were used. Pre-operative procedures, such as shaving 24 hours before surgery and administering an antibiotic test dose, were performed for all patients.

After surgery, 50 patients had skin closure with silk sutures, and the other 50 with prolene sutures. On the third post-operative day, wounds were evaluated for infection and gaping. Patients were discharged after suture removal on the 7th to 8th post-operative day. In cases of wound infection or discharge, a sample was sent for culture and sensitivity testing. Patients were re-evaluated for inflammation, infection, and gaping during follow-ups at 15 days and one month.

Data Entry and Analysis: Data was entered into Microsoft Excel 2013 and analysed using the same software. Descriptive and inferential statistical analyses were used. Continuous measurements were presented as Mean $\pm$ SD (Min-Max), and categorical measurements were presented as Number (%). Significance was assessed at a 5% level.

Ethical Clearance: Ethical clearance was obtained from the Institutional Ethical Committee of Narayana Medical College and Hospital.

RESULTS:

The study was conducted in the Department of General Surgery at Narayana Medical College and Hospital, a tertiary care center in Nellore. The results are as follows:

Table 1: Showing the age distribution of study population.

Age in years	Silk group		Prolene group	
	Frequency	Percentage	Frequency	Percentage
< 20 years	4	8	3	6
20-29 years	7	14	7	10
30-39 years	17	34	17	34
40-49 years	11	22	10	20
50-59 years	7	14	8	16
>60 years	4	8	5	10
Total	50	100	50	100

Table 2: Showing the gender distribution of study population

Gender	Silk group		Prolene group	
	Frequency	Percentage	Frequency	Percentage
Male	30	60	36	72
Female	20	40	14	28
Total	50	100	50	100

Table 3: Showing the diagnosis of study population

Diagnosis	Silk group		Prolene group	
	Frequency	Percentage	Frequency	Percentage
Inguinal hernia	20	40	14	28
Incisional hernia	7	14	10	20
Umbilical hernia	7	14	8	16
Appendicitis	8	16	7	14
Cholecystitis	5	10	7	14
Intestinal obstruction	3	6	0	0
Duodenal perforation	0	0	4	8
Total	50	100	50	100

Table 4: Showing the complications noted among the study population

Complications	Silk group		Prolene group	
	Frequency	Percentage	Frequency	Percentage
Acute wound dehiscence	1	23.07	0	0
Surgical site infection or wound infection	12	76.93	5	100
Total	13	100	5	100

Table 5: Showing the association between complications among the study population

Complications	Silk group		Prolene group		Chi Square test and P value
	Frequency	Percentage	Frequency	Percentage	
Present	13	26	5	10	Chi Square value is 4.336 P = 0.03 (2 tailed)
Absent	37	74	45	90	
Total	50	100	50	100	

Discussion on Wound Closure and Suture

Materials: Importance of Wound Closure- Wound closure is a critical component of surgical procedures, influencing both healing and the aesthetic outcome. Effective closure ensures a strong, healthy scar, which is essential for patient recovery and satisfaction. Skin staples and sutures are two common methods used, each with unique advantages. Sutures, specifically, aid in wound healing by: Eliminating dead space within the wound, Providing support until the wound develops sufficient tensile strength, Bringing the skin edges together Sutures and Inflammation- While necessary, sutures can also trigger a

foreign body response, resulting in tissue inflammation. This reaction is caused by the injury from the needle and the presence of the suture material itself. The inflammatory response typically peaks between 2 to 7 days post-implantation. The longer the suture material remains in the body, the greater the likelihood of undesirable tissue reactions. As Fitz Gibbon noted, "By your scars you will be judged" (Fitz Gibbon, 1968).

Silk Group Findings- In this study, 50 patients received silk sutures. Among these patients, 68% underwent hernioplasty, 16% had an appendectomy, 10% underwent a cholecystectomy, and 6% had resection and anastomosis for intestinal obstruction.

Complications occurred in 26% of these cases, with 23.07% experiencing acute wound dehiscence and 76.93% developing surgical site infections.

Prolene Group Findings- Another 50 patients were sutured with prolene. In this group, 64% underwent hernioplasty, 14% had an appendectomy, 14% had a cholecystectomy, and 8% received a Graham patch repair for duodenal perforation. Complications were observed in 10% of these patients, all of whom had surgical site infections. No cases of abdominal wound dehiscence were reported in the prolene group.

Association- The study revealed a statistically significant association between the type of suture material used and the incidence of complications, with a P value of 0.03. Silk sutures were linked to more complications compared to prolene. However, factors other than suture material also influence the development of wound dehiscence and infection.

Justification- Silk sutures, derived from silkworms, are natural and non-absorbable. They are braided and treated with silicone to enhance strength and ease of passage through tissues. Although widely used due to their cost-effectiveness, silk sutures can cause significant tissue reactions and are not recommended in the presence of infection. Silk sutures can harbor bacteria in their crevices, particularly in environments rich in bacteria like the bowel. Despite these drawbacks, silk remains popular in ocular, neural, and cardiovascular surgeries.

Adverse Reactions to Silk sutures: can lead to adverse effects, including wound dehiscence, gradual loss of tensile strength, allergic reactions, calculus formation in urinary and biliary tracts, infection, acute inflammation, and local irritation

Prolene: Polypropylene sutures are synthetic, non-absorbable monofilaments offering permanent wound support and excellent tensile strength. These sutures are used in various surgeries, including orthopaedic, plastic, microsurgery, general closures, and cardiovascular procedures. Polypropylene sutures elicit minimal tissue reaction and do not support infection, although they have disadvantages such as high cost, fragility, and difficulty of use.

Study Conclusion

This study concluded that the type of suture material is significantly associated with postoperative wound complications, with silk sutures being linked to higher complication rates. The higher incidence of wound infections in the silk group is likely due to its poor microbe resistance. Despite this, silk sutures are commonly used because they are less expensive than other materials.

CONCLUSION

Various methods, such as staples, clips, steric strips, and glue adhesives, are available for skin closure. Preventing wound infection is crucial, especially in abdominal surgeries, to avoid complications like hernia recurrence. The study highlights that the choice of suture material plays a significant role in postoperative outcomes, emphasizing the need for careful selection based on individual patient circumstances.

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