

Wound related complications of skin sutures – A prospective study

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Abstract

Introduction: Surgery is derived from the earlier name chirurgery, which means handwork. It is a science and art that shows the manner in which to work on man's body exercising all manual operations necessary to heal or as much as possible using most expedient medicines or techniques. The goal of surgery is to achieve healing by such means with minimal edema, no serous discharge or infection, without separation of the wound edges and with minimal scar formation.

The success of the surgery and the efficiency of the surgeon is judged by two things: An uneventful post operative period (without complications) and Cosmetic appearance of the scar.

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

Materials and Methods: The present cross sectional study was conducted in the Department of General Surgery, Shadan Institute of Medical Sciences hospital among 100 patients who were satisfying the inclusion criteria for various elective and emergency surgeries. 50 patients underwent skin suturing with silk and remaining 50 patients underwent skin closure with prolene. The surgical site was inspected for infection and gape.

Results: Majority of the study population in both the groups (34% each) belonged to the age group of 30-39 years, followed by 40-49 years (22% in silk group and 20% in prolene group). Majority (66%) were males. Among Silk group, Wound related complications were present in 26% of the study population out of which 23.07% had acute wound dehiscence and 76.93% had surgical site infection or wound infection. Among prolene group, Wound related complications were present in 10% of the study population. All 10% of them had surgical site infection or wound infection. There were no cases of abdominal wound dehiscence in the prolene group. The findings of the present study showed a statistically significant association with the type of suture material used with P value of 0.03.

Conclusion: Use of Silk as suture material is associated with more complications than prolene.

Keywords: Wound Infection, Suture, Suture Material, Complications.

Introduction

Surgery is derived from the earlier name chirurgery, which means handwork. It is a science and art that shows the manner in which to work on man's body exercising all manual operations necessary to heal or as much as possible using most expedient medicines or techniques.¹⁻³

The goal of surgery is to achieve healing by such means with minimal edema, no serous discharge or infection, without separation of the wound edges and with minimal scar formation.

The success of the surgery and the efficiency of the surgeon is judged by two things: An uneventful post operative period (without complications) and Cosmetic appearance of the scar.

After any surgical procedure (assuming there are no tension and a good blood supply) careful approximation of the tissues will allow healing by primary intention.⁴⁻⁷

The suturing of any incision or wound needs to take into consideration the site and tissues involved, type of the suture material to be used and the technique for closure should be chosen accordingly.

Therefore, the correct choice of suture technique and suture material is vital, but will never compensate for inadequate operative technique, and for any wound to heal well, there must be a good blood supply and no tension on the closure.⁸

The type of suture material for skin closure is also reported to influence post-operative wound complications. However, several other studies have failed to demonstrate significant differences between different types of suture material.⁹⁻¹⁶

Hence this study was taken up to assess the wound related complications of skin sutures during post operative period.

Aim

To study the wound related complications of skin sutures.

Objectives

1. To study the wound related complications with respect to skin sutures.
2. 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, Shadan Institute of Medical Sciences hospital. It is a tertiary care center in Hyderabad.

Study design

Cross sectional study.

Study period

October 2018 to August 2019.

Study population

All the patients who were admitted as In patients for surgical treatment for various diseases in the department of General Surgery, Shadan Institute of Medical Sciences.

Study sample size

A total of 100 patients were enrolled in the study.

Methodology

A total of 100 patients who were satisfying the inclusion criteria were enrolled into study. 50 patients underwent skin closure with silk and remaining 50 with prolene.

Inclusion criteria

Patients who are willing to give an informed written consent.

Exclusion criteria

1. Patients who are not willing to participate in the study.
2. Patients with immune deficient states.
3. Patients with conditions like diabetes, arterial diseases which effect wound healing

Procedure

All the patients meeting the inclusion criteria were taken into the study. A pre-designed, pre-tested, semi structured and pre-coded proforma was used for recording all the findings. The questions were partially closed ended. After obtaining Ethical clearance from the Institutional Ethical Committee, study was conducted. The duration of the interview, on an average was 20 minutes for each participant.

The questionnaire had the questions regarding the following:

1. Demographic information: Details like age, gender, were obtained.
2. Clinical Data: Details about the diagnosis of the conditions, physical examination and investigations. Investigations included
 - a. Complete blood picture to rule out anemia.
 - b. Complete urine examination, renal function tests to rule out kidney abnormalities.
 - c. Blood sugar levels to rule out diabetes.
 - d. Liver function tests, Chest X ray and ECG were done (if necessary)

Anesthesia either general or spinal was given. Pre operative procedures like shaving 24 hours prior to the surgery, antibiotic test dose etc was given to all the patients.

After the surgery, 50 patients underwent skin closure with silk and remaining 50 patients underwent skin closure with prolene.

On the 3rd post operative day, the wound was evaluated for infection and gape. Patients were discharged after suture removal on 7-8th post operative day. In cases of any wound infection or discharge in any group, discharge was sent for culture and sensitivity. Patients were re evaluated for inflammation, infection and gape during the follow up on 15 days and one month.

Data entry and analysis

The data was entered in Microsoft Excel 2010 version. Data was analyzed using Microsoft Excel 2010 and Epi Info 7.2.1.0. Descriptive and inferential statistical analysis were used in the present study. Results on continuous measurements were presented on Mean±SD (Min-Max) and results on categorical measurements were presented in Number (%). Significance was assessed at 5% level of significance.

Ethical clearance

Ethical clearance was obtained from the Institutional Ethical Committee, Shadan Institute of Medical Sciences, Hyderabad.

Results

The study was conducted in the Department of General Surgery, Shadan Institute of Medical Sciences hospital. It is a tertiary care center in Hyderabad. The results of the study 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

Wound closure is as important as any other action performed by the surgeon. And apart from the need for producing a healthy and strong scar, it is the surgeon's responsibility to ensure its aesthetically pleasing physical appearance. Skin staples are an alternative to regular sutures in offering this advantage. Sutures are used to facilitate the process of wound healing by:

1. Closing dead space within wound

2. Supporting wounds until their tensile strength is increased

3. Approximating skin edges.

Sutures initiate a foreign body response (i.e. tissue reaction). The initial tissue reaction is attributed to the injury inflicted by the passage of suture and needle and reaction to the suture material itself. The reaction of living tissue to injury or foreign bodies is called inflammation. The inflammatory response usually peaks between 2 to 7 days after implantation. The

longer a suture mass stays in the human body, the more likely it is to produce undesirable tissue reactions. For the surgeon, a scar may be the only trademark of the surgical procedure performed, as Fitz Gibbon has stated, "By your scars you will be judged." (Fitz Gibbon, 1968).

Silk group

In the present study, 50 patients underwent suturing with silk. 68% underwent hernioplasty, 16% underwent appendectomy, 10% underwent cholecystectomy and 6% underwent resection and anastomosis or intestinal obstruction. Wound related complications were present in 26% of the study population. 23.07% had acute wound dehiscence and 76.93% had surgical site infection or wound infection.

Prolene group

In the present study, 50 patients underwent suturing with prolene. 64% underwent hernioplasty, 14% underwent appendectomy, 14% underwent cholecystectomy and 8% underwent Graham patch repair for duodenal perforation. Wound related complications were present in 10% of the study population. All 10% of them had surgical site infection or wound infection. There were no cases of abdominal wound dehiscence in the prolene group.

Association

The findings of the present study showed a statistically significant association with the type of suture material used with P value of 0.03. Use of Silk as suture material is associated with more complications than prolene.

However, the development of acute wound dehiscence and wound infection also depend on many factors other than suture materials as discussed above.

Justification

Silk sutures are old standbys. They are a natural, non absorbable material actually produced by the silkworm. They are a braided material that is easily used by the surgeon. Silk is typically not used in the presence of infection. Silk sutures are specially treated with silicone to give strength and smoothen the surface which provides easy passage through tissues. Silk sutures are specially treated with silicone to give strength and smoothen the surface which provides easy passage through tissues.

Pecha¹⁷ describes its use in intestinal surgery, a common practice of surgeons globally. In three cases Pecha described, the silk suture migrated toward the

intestinal lumen, causing ulcerations and bleeding up to six months postoperatively. As with natural absorbable sutures, silk also tends to cause more tissue reaction than a synthetic product of the same size. Because silk is used as a braided suture, some feel the crevices caused by the braiding process can harbor bacteria or more foreign material which reacts with body tissues, especially in a bacteria-rich environment such as the bowel.¹⁷

However, silk is still popular in ocular, neural, and cardiovascular surgery owing to its advantageous characteristics. One of the major drawbacks associated with silk sutures is its poor microbe-resistance characteristics. Other drawback of silk suture is since is not absorbed, progressive degradation of the proteinaceous silk fiber in vivo may result in a gradual loss of the suture tensile strength over time.

Adverse reactions to silk

Adverse effects associated with the use of this device include wound dehiscence, gradual loss of strength over time, allergic response in patients that are known to be sensitive to silk, calculus formation in urinary and biliary tracts when prolonged contact with a salt solution such as urine or bile occur, infecting wounds, acute inflammatory tissue, and transitory local irritation

Prolene

Polypropylene sutures are monofilament sutures of an isotactic crystalline stereoisomer of polypropylene, a synthetic linear polyolefin. Polypropylene sutures are non-absorbable and provide permanent wound support. Polypropylene sutures have excellent tensile strength and are used for orthopedic, plastic and micro surgeries, general closure and cardiovascular surgeries. Polypropylene sutures elicit minimal tissue reaction and do not cause tissue rupture or support infection. Its advantages include minimal tissue reactivity and durability. Its disadvantage is that it requires the use of an ultrasonic generator, a reusable hand piece, and a disposable welding component.¹⁸ Other disadvantages include fragility, high plasticity, high expense, and difficulty of use.

The findings of the present study showed a statistically significant association with the type of suture material used with P value of 0.03. Use of Silk as suture material is associated with more complications than prolene.

Increased incidence of wound infections in the silk group can be attributable to the poor microbe resistance property of the silk suture. Despite this property, this is the most commonly used suture

material owing to its cost. It's cheaper when compared to other suture materials.

In contrast to the present study, there are studies that did not demonstrate significant differences between different types of suture material.⁹⁻¹⁶

Conclusion

Several methods of skin closure are available to close the skin incisions in place of sutures such as staples, clips, steri strips, and glue adhesives.

Wound infection is a great hazard in abdominal skin closure as it can lead to disastrous complications. Preventing wound infection is necessary as it may lead not only to an ugly scar but also occurrence and recurrence of hernia.

The present study concluded that type of suture material is associated with post operative surgical wound complications with P value of 0.03

Source of funding

None.

Conflict of interest

None.

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