

Comparison of the Skin Closures Using Staples Versus Prolene Sutures in Patients Undergoing Clean Elective Abdominal Surgeries.

Skin Closures Using Different Sutures in Abdominal Surgery

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ABSTRACT

Objective: To assess the surgical site infection and skin closure time of individuals receiving clean elective abdominal operations with prolene sutures vs staples.

Study Design: Randomized Controlled Trial study

Place and Duration of Study: This study was conducted at the Department of Surgery, Lady Reading hospital, Peshawar from 1st Jan 2021 to July 2021.

Methods: This Randomized Controlled Trial study was conducted with the necessary approvals from the ethical board and research committee of the CPSP at the Department of Surgery, Lady Reading hospital, Peshawar. A total of 124 patients, of various genders, underwent clean elective abdominal surgery and were included in the study. Patients in group A underwent skin closure using the staple method, while patients in group B underwent skin closure using the prolene suture method after surgery.

Results: Participants in this research ranged in age from 18 to 65, with Group A averaging 45.048 ± 7.83 years and Group B 43.451 ± 9.27 years. SSI rates differed significantly between groups A and B. SSI occurred in 19 (30.6%) of group A patients and 37 (59.7%) of group B patients ($P=0.001$). The mean skin closure time in group A was substantially lower than group B ($p=0.000$). Group A had an average closure time of 126.774 ± 32.78 seconds, whereas Group B had 459.677 ± 60.43 seconds.

Conclusion: Our study results indicate that skin staples have been found to result in lower rates of wound infection compared to sutures in clean elective surgeries.

Key Words: Clean procedures, Skin closures, Staples, Prolene sutures, Surgical Site Infection, Closure time

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INTRODUCTION

A wound closure technique should be easy to use, have similar strength across the incision, ensure skin apposition till healing, avoid wound infection, and be aesthetically pleasing. A good wound closure material is cheap, non-allergic, and easy to create and use.¹ Any skin approximation method must keep the margins in place long enough for healing². The wound closure technique and material contribute to wound infection because the substance acts as a foreign entity and

causes a variable inflammatory response that limits tissue blood flow and causes ischemia.³ Braided suture gaps may harbor pathogens. The surgeon should employ less-traumatic sutures with enough mechanical strength. To minimize scarring, remove sutures promptly⁴. Carefully suture incisions and wounds, using suitable closure methods⁵. Surgical wounds are usually sutured. The surgeon may use continuous or interrupted, natural or synthetic, absorbable or non-absorbable, single filament or braided sutures, depending on wound length and location⁶. Staples may be better for surgical wound closure because to their low tissue reactivity. Contaminated wounds are more resistant to infection because foreign material cannot enter and damage the local immune response. Staples may reduce incision diameter, wound healing time, local inflammation, and cross marks.⁷⁻⁹

Inert polypropylene monofilament sutures are one type. They reduce infection risk. Silk and other coated sutures induce infection more often. Metal skin staples made of stainless steel are easy to install. They may close skin 80% faster than subcuticular or interrupted suturing¹⁰. Previous research found substantial differences in skin closure time and surgical site

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infection (SSI) incidence between prolene suture and staples groups: 251.07 ± 28.61 vs. 87.28 ± 17.20 seconds ($p < 0.0001$) and 61.2% vs. 38.8% ($p 0.024$). Current study will test skin staples and prolene sutures for SSI and skin closure time following elective abdominal surgery.

METHODS

With CPSP ethics board and research council approval, Lady Reading Hospital's Department of Surgery in Peshawar, Pakistan, conducted this Randomized Controlled Trial from 1st Jan 2021 to July 2021. The study comprised all eligible out-of-department patients. The patients were told about the research's purpose, benefits, and surgical method before signing their informed consent. Every patient was examined and historyd. Each patient was randomly assigned to two groups using a blocking approach. Group A patients received staples for skin closure after surgery, whereas group B got prolene sutures. A single, qualified general surgeon with at least five years of experience conducted each treatment.

Using a timer, the student tracked the time between the first and last skin sutures throughout the surgery. All patients received standard post-op care.

Diabetes, liver cirrhosis, using steroids within six months, and severe renal sickness were eliminated from the study owing to their potential to bias the results. The next 30 days, all patients were followed for SSI. Data was analyzed using SPSS 20. Chi square was utilized to compare SSI across groups, and independent samples measured skin closure time. A significance level of < 0.05 was used for the T Test.

RESULTS

The study has 18–65-year-old participants. In Group A, the average age was 43.45 years $\pm 9.27SD$, weight was 69.983 Kg $\pm 10.94SD$, height was 1.538 meters $\pm 0.11SD$, BMI was 29.837 Kg/m² $\pm 5.29SD$, and skin closure time was 459.677 sec $\pm 60.43SD$. Ages ranged from 18 to 65 in the research. at Group B. Mean scan time is 0.7463, however age, weight, height, and BMI p-values are not significant. A 0.000 p-value showed that both groups closed differently.

Group A included 43 males (69.4%) and 47 women (75.8%), whereas group B had 19 women (30.6%) and 15 men (24.2%). Males dominated both groups but were statistically insignificant with a p-value of 0.5463. Table III shows surgery distribution by group within each group. Group A had 23 exploratory laparotomies (37.1%), 25 open appendices (40.3%), and 14 hernia repairs (22.6%).

Surgical site infection (SSI) occurred in 19 (30.6%) patients in group A and similar pattern was found in group B, although neither group was significantly different (-v a l u e = 0.7673 Fig. 1 SSI was substantially greater in Group B than Group A

($p=0.001$). Compared to prolene suture, staple is more practicable. Table 1

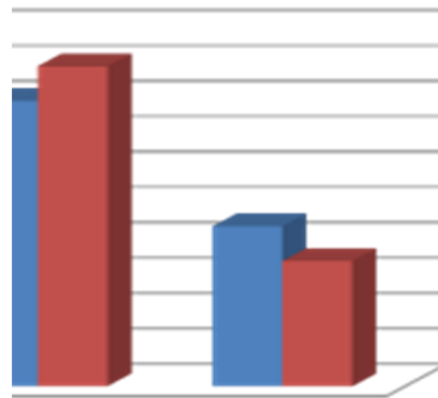


Figure No. 1: Indication of surgery in both groups

Table No. 1: SSI in both groups n=124

| SSI | N=62 | | P-valve |
|-------|------------|------------|---------|
| | Group-A | Group-B | |
| Yes | 19 (30.6%) | 37 (59.7%) | 0.001 |
| No | 43 (69.4%) | 25 (40.3%) | |
| Total | 62 (100%) | 62 (100%) | |

DISCUSSION

NICE's latest surgical site infection prevention and treatment guidelines addresses suturing and surgical site infections for the first time. This is the first time that sutures are recommended over staples for closing the skin post-caesarean section to prevent wound dehiscence in postpartum mothers. However, sutures have little evidence to support use over staples in other surgeries. Different closure procedures affect surgical site infections differently based on the anatomical location. In craniofacial surgery, suture and staple groups had comparable infection rates (2 and 3%)¹². Two meta-analyses comparing staples and sutures in orthopedic procedures found conflicting results on surgical site infection risks¹³. An revised meta-analysis indicated no significant difference in SSI risk between staples and sutures¹⁴. Cochrane review data on coronary artery bypass surgery showed comparable findings¹⁵. In addition to skin staples, drape fusion, hernia mesh fusion, and intestinal anastomosis may be employed in surgery.^{16,17} Nowadays, most skin staples are stainless steel, although absorbable ones were used sometimes. Animal studies showed low inflammation with absorbable staples.¹⁸ Another author found that skin staplers are only faster in elective breast and abdominal surgeries¹⁹. In the staples and suture groups, the mean closure time was 80 and 242 seconds, respectively. Suturing and stapling cause comparable wound infections. In the beginning and during removal, staples hurt more.²⁰ Some research found that staples are less uncomfortable than sutures after six weeks.²¹ We found that the suture group had a closure time nearly three

times longer than the staples group (126.774 ± 32.78 seconds vs. 459.677 ± 60.43 seconds, p value < 0.0001). Stapling may be seven times faster than stitching.^{22,23} Prolene or nylon sutures scar face better than staples in cosmetic surgery.²⁴ For abdominal procedures, sutures were more cosmetically pleasing.²⁵ Cosmetic appearance and patient satisfaction with suture and staples may be the same at six weeks in elective cesarean sections.¹⁹ Sutures were more cosmetic than staples for emergency cesarean sections. Staples lengthen hospital stays.^{25,26} According to a metaanalysis by Smith et al., skin staples in orthopedic surgery are linked to greater infection rates. In hip and knee surgery, staples are not advised.¹³ Another research found comparable findings for orthopedic surgery wound infection. A research found SSI in 19.6% of patients in group A and 37.7% in group B ($P = 0.001$). In one research, prolene suture and staples groups had 61.2% and 38.8% (p value 0.024) surgical site infections (SSIs)¹¹. Since sutures and staples have pros and downsides, the contradictory evidence may be justified. Metal staples may be less irritative and more infection-resistant than least reactogenic sutures²⁷. Staples are recommended in emergencies because they close skin quicker, saving 5.5 to 8 minutes. Staples may cause staple track development, hair follicle damage, perspiration and sebaceous gland damage, bacterial migration into the wound bed, and pain during removal. Tight skin closure that retains dermal structure may avoid surgical site infection, since the patient's fetoplasm is the main source of infection. Intracutaneous sutures tighten the skin without harming it. Patients may find absorbable sutures more pleasant since they may remain in the wound without removal. Additionally, sutures cost just 20% of staples²⁸. All suture materials are alien to human tissue and may promote inflammation, compromising wound healing and increasing infection risk²⁹. Surgeons choose staples for midline incision closure, despite potential hazards and benefits.

CONCLUSION

We found that skin staples cause less wound infection than sutures in clean elective surgeries. Staples resemble skin quicker than stitches. Well-designed randomized controlled studies with large sample numbers are required to corroborate this since surgeons need better evidence for decision-making. Future studies should address obesity and other postoperative complications risk factors.

Author's Contribution:

Concept & Design of Study: Shumaila Naseer
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 Data Analysis: Nida Mumtaz
 Revisiting Critically: Shumaila Naseer, Tariq

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