

Comparison of Skin Staples and Conventional Sutures for Abdominal Skin Wound Closures

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Abstract:

Background: Surgical wound closure is a crucial aspect of the surgical process aimed at promoting proper healing, and minimizing the risk of infection. The present study was conducted to compare skin staples and conventional sutures for abdominal skin wound closures.

Materials & Methods: 90 patients undergoing elective surgery, with clean wounds of both genders were divided into 2 groups of 45 each. In group I, staplers were used and in group II, sutures were used. The site of incision, classification of wounds, closure time and patient acceptance were recorded.

Results: Group I had 25 males and 20 females and group II had 23 males and 22 females. The site of incision was midline in 13 and 15, inguinal in 17 and 22, subcoastal in 9 and 6 and transverse in 6 and 2 patients. Classification of wounds was A in 36 and 35, B in 7 and 6 and C in 2 and 4. Patient acceptance was good in 40 and 35 and poor in 5 and 10 patients in group I and group II respectively. The difference was significant ($P < 0.05$).

Conclusion: Stapling was more convenient, and cost effective, routine staple removal is less painful compared to suture removal.

Key words: wound closure, Sutures, subcoastal

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Introduction

Surgical wound closure is a crucial aspect of the surgical process aimed at promoting proper healing, minimizing the risk of infection, and reducing scarring [1]. Sutures have been used for many years to approximate the borders of the skin, but they have two drawbacks: they take longer to apply and leave a less attractive scar [2]. In order to get over these drawbacks, the use of automatic stapling devices for skin closure has grown in popularity recently [3].

Different types of wounds may require different closure techniques. Sutures can be made of various materials, including absorbable (e.g., catgut, polyglycolic acid) or non-absorbable (e.g., silk, nylon) materials [4,5]. Interrupted sutures are separate and tied individually. Continuous sutures are single, continuous stitch used along the wound. Subcuticular sutures are placed beneath the skin surface for a more cosmetic appearance. Staples are typically made of stainless steel. Staples are applied with a stapler-like device and are commonly used for closing large incisions quickly [6].

Skin staples are better alternatives to conventional sutures in head and neck cancer surgery as they offer ten times faster wound closure, cost-effectiveness and similar results to sutures in terms of patient's

comfort, aesthetic outcome and complication rate [7].

Aims and Objectives: The present study was conducted to compare skin staples and conventional sutures for abdominal skin wound closures.

Materials & Methods

The present prospective hospital-based observational study will be conducted in the department of general surgery, Indira Gandhi Institute of Medical Sciences (I.G.I.M.S), Patna, Bihar, India. Ninety (90) patients undergoing elective surgery with clean wounds of both genders were selected for the current study. All gave their written consent to participate in the study. Data such as name, age, gender, etc. was recorded. The study was conducted from February 2018 to March 2020. Keeping power (1-beta error) at 80% and confidence interval (1-alpha error) at 95%, the minimum sample size required was 60 patients; therefore, we included 90 (more than the minimum required number of cases) patients in the present study.

Inclusion Criteria: patients undergoing elective surgery, with clean wounds.

Exclusion Criteria: patients having lacerated wounds with skin loss; patients having raised blood sugar, HIV infection, BMI>30.

Patients were divided into 2 groups of 45 each. In group I, staplers were used and in group II, sutures were used. The site of incision, classification of wounds, closure time and patient acceptance were recorded.

Investigations: Complete blood count, urine routine, bleeding time, clotting time, platelet count, serum electrolyte, and USG abdomen whenever necessary.

After the repair of the deeper layers, the following sequence number from a randomization determined

the skin closure methods for each case. The length of the incision, the number of staples or suture packs used, and the time it took to close were all recorded. The closure process was estimated in minutes. The gap between staples or sutures was about 1.3 cm.

Statistical Analysis: Data thus obtained were subjected to statistical analysis by using statistical software SPSS version 22.0 and Microsoft 16. P value < 0.05 was considered significant.

Results

Mean age of the study population was 48.52±14.75 years. Minimum age: 20 years; maximum age: 60 years. Mean age among stapler group was 48.62 years and that of suture group was 46.05 years. This difference was found to be not statistically significant at P value= 0.65.

Table I: Demographic distribution of patients

Characteristics	Group I (n=45)	Group II(n=45)
Method	staplers	sutures
Male	25	23
Female	20	22
Mean age (years)	48.62	46.05

Table I shows that group I had 25 males and 20 females and group II had 23 males and 22 females.

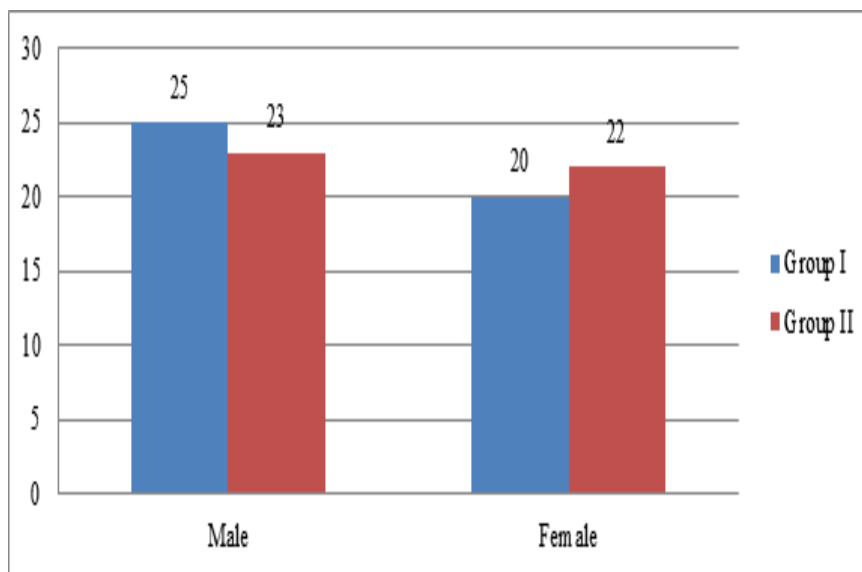


Figure 1: Gender wise distribution of study patients

Table II: Comparison of parameters

Parameters	Variables	Group I(n=45)	Group II(n=45)	P value
site of incision	Midline	13	15	0.08
	Inguinal	17	22	
	Subcoastal	9	6	
	Transverse	6	2	
classification of wounds	A	36	35	0.02
	B	7	6	
	C	2	4	
patient acceptance	Good	40	35	0.01
	Poor	5	10	

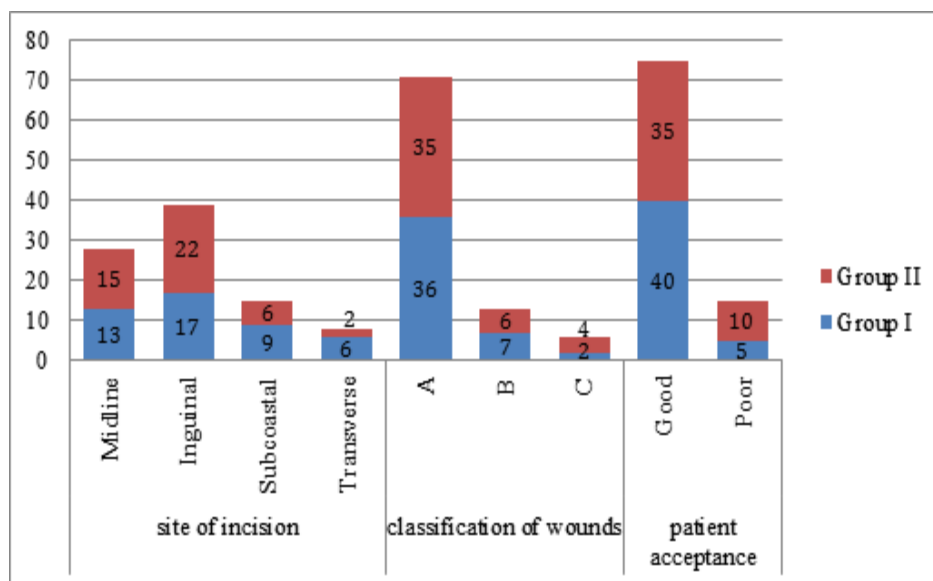


Figure 2: Comparison of various parameters in study patients

Table II, figure 2 show that site of incision was midline in 13 and 15, inguinal in 17 and 22, subcoastal in 9 and 6 and transverse in 6 and 2 patient in group I and group II respectively. The difference was not significant ($P > 0.05$).

Classification of wounds was A in 36 and 35, B in 7 and 6 and C in 2 and 4. Patient acceptance was good in 40 and 35 and poor in 5 and 10 patients in group I and group II respectively. The difference was significant ($P < 0.05$).

Table III: Distribution of study population based on type of closure technique, mean time for closure, and Visual Analogue Score

Parameters	Type of closure technique		P value
	Group I (staplers) (n=45)	Group II (sutures) (n=45)	
Mean time (Minutes) (Mean ± SD)	5.16 ± 2.10	10.82 ± 2.14	0.001
Visual Analogue Score (Mean ± SD)	36.82 ± 18.06	72.50 ± 6.32	0.001

The mean time for stapler closure was 5.16± 2.10 minutes and for suture closure was 10.82±2.14 minutes. This difference was found to be statistically significant ($p = 0.001$). The mean visual analogue score among stapler closure wounds was 36.82 ± 18.06 and among suture closure wounds was 72.50 ± 6.32. This difference was found to be statistically significant, ($p = 0.001$).

Discussion

Any method of skin closure should provide adequate approximation of the tissues to allow wound healing with minimal risk of infection and should produce an acceptable cosmetic result. The method should be simple and quick to use, and should be economical [8, 9]. Automatic skin staplers were first introduced in 1972 as a development from early Russian tissue-stapling devices [10, 11]. They are said to save considerable amounts of operating This has led to a steady growth in use of such staplers, their sizeable cost being justified by the resources saved [12,13]. The present study was conducted to compare skin staples and conventional sutures for abdominal skin wound closures.

We found that group I had 25 males and 20 females and group II had 23 males and 22 females. Tuuli et al. [6] found that staple closure (n=803) was associated with a twofold higher risk of wound infection or separation compared with subcuticular suture closure (n=684) (13.4% versus 6.6%). The number needed to harm associated with staple closure was 16. The increased risk persisted when analysis was limited to the RCTs. There was no evidence of significant statistical heterogeneity among studies or publication bias. Staple closure was associated with shorter duration of surgery, whereas the two techniques appeared equivalent overall with regard to pain, cosmetics, and patient satisfaction.

We found that the site of incision was midline in 13 and 15, inguinal in 17 and 22, subcoastal in 9 and 6 and transverse in 6 and 2 patients in group I and group II respectively. Classification of wounds was A in 36 and 35, B in 7 and 6 and C in 2 and 4. Patient acceptance was good in 40 and 35 and poor in 5 and 10 patients in group I and group II respectively.

Kathare et al. [14] compared operative time, the effect on wound healing, cosmetic results, patients acceptance and total cost with the use of sutures and staples. The study was conducted on 100 patients who were undergoing elective surgery. The patients were randomly selected to receive either suture or staple. The study group included 50 patients who underwent wound closure by staplers and 50 patients underwent suturing. The commonest region of the surgical wounds was Mc Burneys site. The time taken for wound closure using staplers showed statistically significant difference over closure with suture, it took the stapler 4 times less duration to perform wound closure. The average cost of using stapler was higher than suturing. The appearance of the scar among the staple group was good in 90% of those who returned for follow-up at 1 month, 10% had average scar. The patient's acceptance was better in staple group with less pain during removal as compared to suture group. The risk of developing a wound infection was found to be four times greater after staple closure than with suture closure, according to the study by Tuuli Mehodinn et al. [6].

In the present study, the time taken to complete wound closure was significantly less with the use of staplers as compared to sutures. The mean time for stapler closure was 5.16 minutes and for suture closure was 10.82 minutes.

The rate of wound closure in the Ranaboldo et al. [15] investigated the routine use of a skin stapling device for the closure of midline abdominal wounds, 48 patients were randomized to receive skin staples or subcuticular polydioxanone sutures. The mean (range) time for closure with staples was 12.7 seconds/cm when using sutures and 8 seconds/cm when using staplers. The mean time saved per patient with skin staples was 77 seconds. Wound pain and requirements for analgesia were significantly lower in the sutured group. The mean cost per patient was 1.41 pounds for subcuticular closure and 7.72 pounds for stapling; the latter also incurred an additional cost of 6.27 pounds for staple removal. No clear benefit derives from the use of staples in the closure of abdominal wounds. Staple closure was found to be safe, rapid, and cost-effective by Kanagaye JT et al. [1] at the Children's Hospital in Los Angeles, USA, after a study. Compared to normal sutures, staples were six times faster and showed no signs of complications. Less pain was felt during removal, and the scar was cosmetically acceptable.

The mean skin closure time using a staple was 5 minutes, whereas the mean skin closure time using a nylon suture was 25 minutes, and also observed that using skin staplers speeds up closure by 80%, produces a better cosmetic outcome, and does not raise the risk of complications despite coming at a slightly higher cost according to a prospective study by Medina dos Santos et al [13].

Limitations of the study: The limitation of the study is the small sample size.

Conclusion

Authors found that stapling was more convenient, and cost-effective, routine staple removal is less painful compared to suture removal.

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