



COMPARISON OF SKIN STAPLES AND CONVENTIONAL SUTURE FOR ABDOMINAL SKIN CLOSURE

General Surgery

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ABSTRACT

Aim- To compare the conventional suture vs staples for abdominal skin closure

Objectives

- To compare the effect on wound healing (pain/ associated infection/ presence of wound gaping/ discharge from the wound) with the use of sutures and staples.
- To compare the cosmetic results(condition of wound/ scar/ appearance) of these two techniques.
- To compare the total cost and surgeon's suturing time requirement for suture and staple repairs

KEYWORDS

INTRODUCTION

Skin closure is one of the important determining factors for success of a surgery. It's been over 50000 years physicians have been searching for ideal suture material. The skin is protective and self repairing barrier between the body and external environment. The method of closure should be simple, quick to use and cost effective. Many factors are involved in the choice of the skin closure material, including the type and place of the wound, available materials, physician expertise and preferences, patient age and health. Mostly surgeons use staples, interrupted suture or subcuticular suture immediately below the skin layer to close the skin during surgeries. The choice of the suture materials may affect the overall prognosis of wound in terms of time taken for skin closure, duration of hospital stay, wound infection, pain during the suture removal cosmetic outcome of the scar. Sutures have the disadvantages of consuming more time in applying with a cosmetically inferior scar. Orlinsky et al studied the cost related to both equipment and personnel time in a general emergency setting and found staplers to be more time and cost efficient in repairs performed by physician's assistance. Staplers were originally developed to address the perceived problem of patency i.e., security against leaks of blood or bowel contents in anastomoses in particular. Leaks from poor suturing of bowel anastomoses were at that time a significant cause of post-surgical mortality. More recent studies have shown that with current suturing techniques there is no significant difference in outcome between hand sutured and mechanical anastomoses, but mechanical anastomoses are significantly quicker to perform. Fitz Gibbon has stated, "By your scars you will be judged". Several studies show that sutures are superior for cosmeses and that they decrease postoperative pain and are more cost-effective. So the cost of procedure should also be considered. The closure should serve both functions and aesthetic purposes. The aesthetically reduced scar can have an adverse impact on overall quality of life causing considerable distress and unhappiness. Precaution of wound infection is also necessary as it may lead not only an ugly scar but also occurrence and recurrence of a hernia.

MATERIALS AND METHODS

The present study is a prospective study consists of 120 patients admitted in Mahatma Gandhi Medical College and Hospital, Jaipur during the study from June 2019 to June 2021. 120 patients for the purpose of the study were selected randomly to receive either staples or conventional sutures for abdominal skin wound closures.

Inclusion criteria

- All patients giving written and informed consent.
- Patients undergoing all elective surgeries.

Exclusion criteria

- Patients having lacerated wounds with skin loss.
- Patients with peritonitis.
- Any history of previous abdominal surgeries
- History of co-morbidities (like DM, TB), immunocompromised patients

- Patient receiving radiotherapy or immunosuppressive drugs

RESULTS

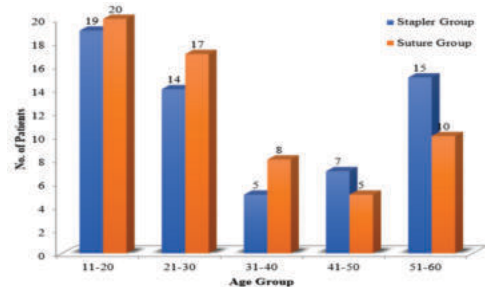
In this study, 60 patients who underwent wound closure by staplers and 60 patients who underwent the prolene suturing

Table 1: Age distribution

Age Group	Stapler Group		Suture Group		Total
	No.	%	No.	%	
11-20	19	31.67	20	33.33	39
21-30	14	23.33	17	28.33	31
31-40	5	8.33	8	13.33	13
41-50	7	11.67	5	8.33	12
51-60	15	25.00	10	16.67	25
Total	60	100.0	60	100.0	120

In stapler group, 19 patients (31.67%) in age group of 11-20 years, 14 patients (23.33%) in age group of 21-30 years, 5 patients (8.33%) in age group of 31-40 years, 7 patients (11.67%) in age group of 41-50 years and 15 patients (25.00%) in age group of 51-60 years.

In the suture group, 20 patients (33.33%) in age group of 11-20 years, 17 patients (28.33%) in age group of 21-30 years, 8 patients (13.33%) in age group of 31-40 years, 5 patients (8.33%) in age group of 41-50 years and 10 patients (16.67%) in age group of 51-60 years.

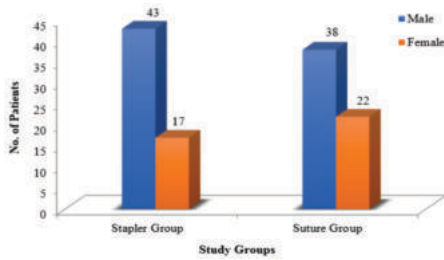


Graph 1: Age distribution

Table 2: Sex Distribution

Gender	Stapler Group		Suture Group		P value
	No.	%	No.	%	
Male	43	71.67%	38	63.33%	0.387
Female	17	28.33%	22	36.67%	
Total	60	100.0	60	100.0	

There were 43 (71.67%) males and 17 (28.33%) females in the stapler group while there were 38 (63.33%) males and 22 (36.67%) females in the suture group. Using a chi-square test, there were no statistically significant difference between the both groups (p=0.387).

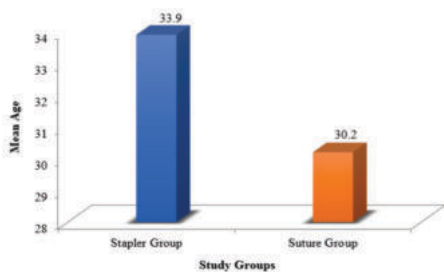


Graph 2 : Sex Distribution

Table 3: Mean Age of both groups

Groups	N	Mean	Std. Deviation	Std. Error Mean	P value
Stapler	60	33.90	16.154	2.085	0.194
Suture	60	30.20	14.882	1.921	

In the mention above table, mean age of 33.90±16.154 years and range between 12 and 60 years in the stapler group. Similarly, mean age of 30.20±14.882 years and range between 10 and 60 years in the suture group. Using an independent sample t-test, there were no statistically significant difference between the both groups (p=0.194).

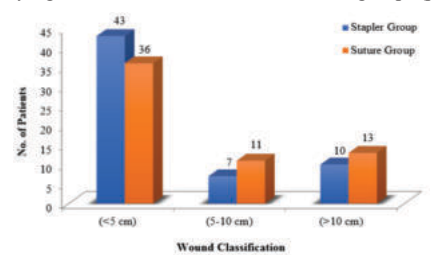


Graph 3: Mean Age of both groups

Tables 4: Wound Classification

		A (<5 cm)	B (5-10 cm)	C (>10 cm)	P value
Stapler	Count	43	7	10	0.014
	% of Total	35.8%	5.8%	8.3%	
Suture	Count	36	11	13	
	% of Total	30.0%	9.2%	10.8%	
Total	Count	79	18	23	
	% of Total	65.8%	15.0%	19.2%	

There were 43 patients whose wound length belonged to group A (1-5 cm), 7 patients in group B (5-10 cm) and 10 patients in group C (>10 cm) in the stapler group. Among the suture group, there were 36, 11 and 13 patients in groups A, B and C. Using a chi-square test, there was statistically significant difference between the both groups (p=0.014).



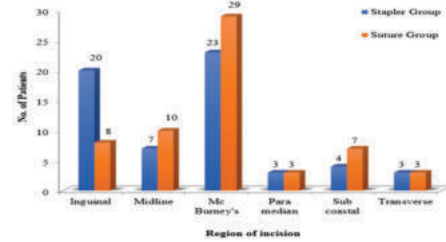
Graph 4: Wound Classification

Table 5: Region of incision

		Inguinal	Midline	Mc Burney's	Para median	Sub costal	Transverse	P value
Stapler	Count	20	7	23	3	4	3	0.207
	% of Total	16.7%	5.8%	19.2%	2.5%	3.3%	2.5%	
Suture	Count	8	10	29	3	7	3	2.5%
	% of Total	6.7%	8.3%	24.2%	2.5%	5.8%	2.5%	
Total	Count	28	17	52	6	11	6	
	% of Total	23.3%	14.2%	43.3%	5.0%	9.2%	5.0%	

The commonest region of the surgical wounds in this study was Mcburneys, 23 in staplers and 29 in suture group. The regional

distribution of surgical wounds in the staples group was inguinal 20, midline 7, Mcburney's 23, paramedian 3, subcostal 4 and transverse 3. The regional distribution of surgical wounds in the suture group was inguinal 8, midline 10, Mcburney's 29, paramedian 3, subcostal 7 and transverse 3 among the suture group. Using a chi-square test, there was no statistically significant difference between the both groups (p=0.207).

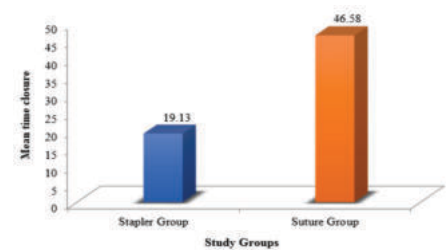


Graph 5: Region of incision

Table 6: Mean time closure of both groups

Groups	N	Mean	Std. Deviation	Std. Error Mean	P value
Stapler	60	19.13	12.843	1.658	0.000
Suture	60	46.58	23.649	3.053	

It took the stapler three times less duration to perform wound closure. With staplers the mean time taken was 19.13 seconds whereas with prolene suture, the mean time taken was 46.58 seconds per centimeter of wound length. The time taken for wound closure using staplers showed statistically significant difference over prolene suture closure (p=0.000).

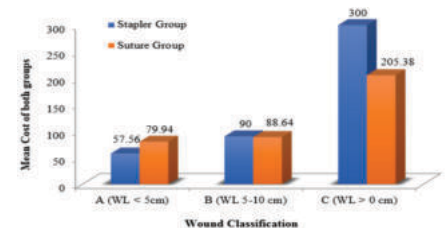


Graph 6: Mean time closure of both groups

Table 7: Groups Vs Cost

Groups	Staple Group (Mean Rs.)	Suture Group (Mean Rs.)	P value
A (WL < 5cm)	57.56	79.94	0.000
B (WL 5-10 cm)	90.00	88.64	
C (WL > 10 cm)	300.00	205.38	

The cost of the procedure with stapler depended on the length of the wound. For group A wound, the average cost was Rs. 57.56, for group B it was Rs. 90.00 and for group C it was Rs. 300. The cost of prolene suture for group A was Rs. 79.94, for group B was Rs. 88.64 and for group C was Rs. 205.38. Using a student sample t-test, there was statistically significant difference between the both groups (p=0.000).



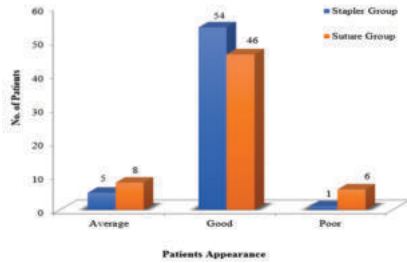
Graph 7: Groups Vs Cost

Table 8: Patients Appearance

		Average	Good	Poor	P value
Stapler	Count	5	54	1	0.086
	% within Groups	8.3%	90.0%	1.7%	
	% of Total	4.2%	45.0%	0.8%	
Suture	Count	8	46	6	
	% within Groups	13.3%	76.7%	10.0%	
	% of Total	6.7%	38.3%	5.0%	

Total	Count	13	100	7
	% within Groups	10.8%	83.3%	5.8%
	% of Total	10.8%	83.3%	5.8%

The appearance of the scar among the staple groups was good in 90% of those who returned for follow up at one month, 8.3% had average scar and 1.7% had poor scar with widening or hypertrophy of the scar with itching. The cosmetic appearance of the scar was good in 76.7% of the cases in the suture group, with 13.3% with average and 10% poor scars. Using a chi-square test, there was no statistically significant difference between the both groups (p=0.086).



Graph 8: Patient's Appearance

Linear verbal analog pain score⁴⁶

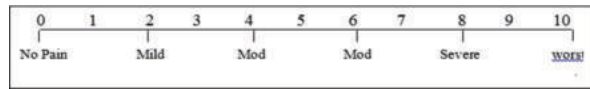


Table 9: Pain Scoring

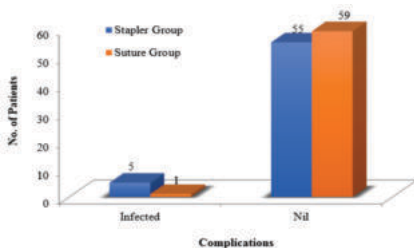
	Staplers	Sutures
Ranaboldo CJ,	4.79	3.9
Pain while removal (Scale 10)	1	6

Subjective quantification of the pain during suture removal showed that most of the patients registered score of 5 and 6. Among the stapler group of patients most of the patients registered score of 1.

Table 10: Complications

		Infected	Nil	P value
Stapler	Count	5	55	0.094
	% of Total	4.2%	45.8%	
Suture	Count	1	59	
	% of Total	0.8%	49.2%	
Total	Count	6	114	
	% of Total	5.0%	95.0%	

Out of 60 patients, 5 (4.2%) patients infection in the stapler group and only 1 (0.8%) patient infected in the suture group. Using a chi-square test, there was no statistically significant difference between the both groups (p=0.094).



Graph 10: Complications

Summary

120 patients who were admitted for elective surgery during the study period received staple or suture repair as two groups of equal number.

1. The age ranged from 10 year to 60 years in both the groups.
2. There was a slight female preponderance in the staple group as compared to the suture group.
3. Inguinal region was the commonest anatomical region in both groups.
4. The surgical wounds were categorized into A, B and C depending on the wound length; <5cm, 5-10, and >10cm respectively.
5. The average time taken for wound closure with staple was 19 seconds and with suture was 46 seconds per centimeter of wound length.

6. The average cost of using staple was higher than silk suture.
7. But in group A type of wound, the cost difference was slight, whereas the time saved and cosmetic appearance were significant and hence staples appeared to be more beneficial.
8. In group C, though the time saved was very significant with the use of staples, the cost was a handicap.
9. There were 1 complication in the suture group in the form of wound infection and 5 cases of postoperative wound infection in the stapler group.
10. The appearance of the scar was good in 90% of the staple group and 76.7% of the suture group among those patients who were available for follow up.
11. Patient acceptance was better in the staple group with less pain during removal as compared to the suture group.

CONCLUSION

- Staples did not cause excessive wound pain. Local staple removal was unnecessary to allow drainage of moderately infected wounds
- Routine staple removal was no more difficult nor painful than suture removal
- No difference was found in the final grading of wounds between the groups, so the merits of stapling come down to its convenience, rapidity and cost.
- Staplers were well liked by operators and resulted in a substantial and worthwhile saving in time for wound closure. Provided the instruments are reused.
- Stapled skin closure is not as uneconomic as previously believed.