

A Comparative Study of Skin Staples and Conventional Sutures for Abdominal Skin Wound Closures

Sunny Kumar Gupta¹

Arif Hassan²

Jitendra Chaudhary³

Raj Shekhar Sharma⁴

¹Junior Resident III, Department of Surgery, Rajendra Institute of Medical Sciences, Ranchi

²Junior Resident III, Department of Surgery, Rajendra Institute of Medical Sciences, Ranchi

³Senior Resident, Department of Surgery, Rajendra Institute of Medical Sciences, Ranchi

⁴Professor, Department of Surgery, Rajendra Institute of Medical Sciences, Ranchi

Corresponding Author: Dr. Sunny Kumar Gupta

Abstract

Introduction: A wound is a result of any surgical intervention as it is the only way to get access to and treats the underlying pathology. The aim of surgical wound closure is to achieve rapid wound healing and a satisfactory cosmetic result, and to reduce the risks of complications, including dehiscence and infection. Different methods and materials are used for wound closure and they are highly dependent on the length and anatomical location of the wound.

Materials and Methods: This hospital based prospective, observational analytical study conducted on 120 cases that underwent abdominal surgeries. A comparative study of skin staples and conventional sutures for abdominal skin wound closures was done with objectives like incidence of wound infection, wound dehiscence, postoperative pain cosmesis and cost of sutures and staples. Among 19 emergency cases, 14 were in staple group and 5 were in suture and in 101 elective cases, 46 were in staple group and 55 were in suture group.

Results:

Time for closure was significantly less in stapler group as compared to suture group 137.96 versus 630 sec. Time for closure was significantly less in stapler group as compared to suture group 10.36 sec/cm versus 48.46 sec/cm. Among staple group 90% had optimal cosmetic appearance while 66.66 had optimal cosmetic appearance. Mean cosmesis score in staple group was 5.85 and in suture group 5.40. Difference between mean scores was statistically significant ($p < 0.001$). Time for removing the staple and suture was significantly less in stapler group as compared to suture group 74.23 versus 174.05 sec. VAS score in staple group was 4.98 while in suture group was 6.37. Mean cost of staple was Rs. 499 and mean cost of suture was Rs. 387 which was statistically significant ($p < 0.001$).

Conclusion: It is concluded that skin staplers are superior to sutures in many respect like better wound cosmesis, in reducing the post-operative pain, wound infection, and very much significant in saving time for skin closure.

Key words: Wound, suture, staple, cosmesis.

Date of Submission: 20-03-2023

Date of Acceptance: 04-04-2023

I. Introduction

To access the underlying pathology, any surgical procedures will result in a wound. The principle idea is to get back the wound strength as quickly as possible with minimal damage to the tissues and an acceptable cosmetic scar. The important step is the accurate apposition of dermaledges.

A wound is a result of any surgical intervention as it is the only way to get access to and treats the underlying pathology. Hence, it is up to the surgeon to use a closure technique that will facilitate suitable skin approximation, curtail the adverse effects of wounds like scarring and pain, and help in the wound healing process.

The aim of surgical wound closure is to achieve rapid wound healing and a satisfactory cosmetic result, and to reduce the risks of complications, including dehiscence and infection.

Different methods and materials are used for wound closure and they are highly dependent on the length and anatomical location of the wound. The ideal technique should be swift, simple and cost-effective while enhancing patient satisfaction and wound cosmesis.

Skin closure of surgical wounds is usually achieved with sutures. However, sutures have a limitation of requiring a longer time in applying with a cosmetically inferior scar. The principal advantages of sutures are their flexibility, strength, non-toxicity and in vivo degradation properties.

Staples are an alternative option to sutures and are mainly made of stainless steel, although staples using absorbable materials are now available.

The potential advantage of staples in surgical wound closure is related to their low level of tissue reactivity. It is thought that the use of staples reduces the local inflammatory response, width of the wound, time to wound closure and residual cross marks.

II. Material and Method

This prospective observational study was conducted in Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi from January 2021-October-2022. After approval from The Institutional Ethics Committee, the study was conducted on 120 patients, 60 in suture group and 60 in staple group, who underwent abdominal surgery. Patient came for follow-up to outpatient department at POD 15th and at POD 30th.

Aims:

A comparative study of skin staples and conventional sutures for abdominal skin wound closures.

Objectives:

To compare staples and conventional sutures for:

- Incidence of wound infection.
- Incidence of wound dehiscence.
- Post-operative pain.
- Cosmetic results of these two techniques.
- Surgeon's time requirement for suture and staple repairs.
- The total cost of suture and staples.

Inclusion criteria:

- Patients underwent abdominal surgery with normal albumin, Hb>10 gm%
- Age group 20-75 years
- Patients of either sex
- Patients willing to participate

Exclusion criteria:

- Patients having lacerated wounds with skin loss.
- Patients having raised blood sugar,
- HIV infection,
- BMI>30
- Clinically significant medical conditions that would impair wound healing including renal, hepatic, haematological, immunological and neurological disease

III. Results

Table 1: Comparison of means of the study groups based time required for closure

Group	No. of patients	Mean±SD	Std. Error Mean	t & df	p value
Staple	60	137.96±59.29 Sec	7.65	-14.389 & 118	<0.001
Suture	60	630.0±258.15 Sec	33.32		

Time for closure was significantly less in stapler group as compared to suture group 137.96 versus 630 Sec with a p value of <0.001.

Table 2 : Comparison of the study groups based time/cm required for closure

Group	No. of patients	Mean
Staple	60	10.36 sec/cm
Suture	60	48.46 sec/cm

Time for closure was significantly less in stapler group as compared to suture group 10.36 sec/cm versus 48.46 sec/cm.

Table 3 : Comparison of complications among the Study groups

Complications	Staple	Suture	Total	t value	p value
No complication (normal healing)	51 (85.0%)	39 (65.0%)	90 (75.0%)	8.84 df=3	0.065
Erythema + Inflammation	2 (3.3%)	3 (5.0%)	5 (4.2%)		
Serous discharge	3 (5%)	7 (11.66%)	10 (0.8%)		
Pus discharge	4 (6.7%)	11 (18.33%)	15 (12.5%)		

Above table shows that complications in study groups. In staple group, erythema & inflammation was found in 2 cases, serous discharge in 3 cases and pus discharge in 4 cases. In suture group, erythema & inflammation was found in 3 cases, serous discharge in 7 cases and pus discharge in 15 cases.

Table 4: Cosmetic appearance between the study groups

Cosmetic Appearance	Group		Total
	Staple	Suture	
Optimal	54	40	94
	90 %	66.66 %	78.33 %
Sub-optimal	6	20	26
	10 %	33.33 %	21.66 %

Among staple group 90% had optimal cosmetic appearance while 66.66 had optimal cosmetic appearance.

Table 5: Comparison means of wound cosmesis score between the study groups

Group	n	Mean± SD	Std. Error mean	t	p value
Staple	60	5.85±0.481	.062	3.29 df 118	<0.001
Suture	60	5.40±0.942	.122		

Above table shows that mean cosmesis score in staple group was 5.85 and in suture group 5.40. Difference between mean scores was statistically significant (p <0.001).

Table 6: Comparison of cost between the study groups

Group	n	Mean± SD	Std. Error Mean	t	df	p value
Staple	60	Rs. 499±41.183	5.317	17.159	118	<.001
Suture	60	Rs. 387±90.709	11.710			

Mean cost of staple was Rs. 499 and mean cost of suture was Rs. 387 which was statistically significant (p <0.001).

IV. Discussion

Mean age of subjects in stapler and suture group was 40.71 and 40.18 years respectively. Pandove et al.¹ in their study observed most of the patients in 41-50-year age group with 82% males to 18% females. My result almost matches with the results of Pandove et al.

In present study time for closure was significantly less in stapler group as compared to suture group 137.96 versus 630 sec which were similar to other studies.

Eldrup et al² shows the main advantage of using staples was time saving, as closure with mechanical sutures took one third of the time required for the conventional method.

In our study time for closure was significantly less in stapler group as compared to suture group 10.36 sec/cm versus 48.46 sec/cm.

Medina dos Santos³ in their study found that the cost difference between conventional sutures and staplers was only slight. However, in the present study staple was costlier than suture.

In our study among stapler group 51 had no complications, 2 had erythema with inflammation, 3 had serous discharge, and 4 had pus discharge whereas in suture group 39 had no complications 3 had erythema with inflammation 7 had serous discharge and 11 had pusdischarge.

Kanagaye et al⁴, in their study of 45 paediatrics cases observed no complications in the staple group.

Current study showed 4 had pus discharge among staple group and 11 had pus discharge in suture group which match with the Sagar S. et al⁵ and was different from Kanagaye et al⁴ and O. Smith et al.⁶

In the present study, scar was acceptable in stapler group and it was highly significant, meancosmesis score was 5.85 for stapler group and for suture group was 5.40. Stapler group had 90% optimal scar and suture group had 66.66%.

Basit A et al.⁷ and Ananda BB et al⁸. also observed no difference between the study groups regarding scar cosmesis. However, Shaikh S et al.⁹ and Karthikeyan S et al.¹⁰ in their studiesobserved that staples produced better scars than sutures.

Our results are in accordance with the results other studies except Basit A et al.⁷ and Ananda BB et al.⁸ VAS score in staple group was 4.98 while in suture group was 5.66 and it was statistically significant (<0.001). Jitendra Barta et al¹¹ reported that mean VAS score for difficulty in moving the neck 1 week after the surgery in suture group was 3.9 while in staple group was 4.2 which was statistically not significant.

V. Conclusion

We conclude that skin staplers are superior to sutures in many respect like better wound cosmesis, in reducing the post-operative pain, wound infection, and very much significant in saving time for skin closure. Taking all these into account our study recommends the use of skin staplers in spite of staple being costlier.

References

- [1]. Pandove PK, Sharma A, Kumar A, Pandove L, Aggarwal M, Singh R. A Comparative Study of Wound Closure with Disposable Skin Stapler Versus Conventional Sutures. *Int J Med Res Prof.*2017; 3(2); 102-06.
- [2]. Eldrup J, Wied U, Anderson B. Randomised trial comparing Proximate stapler with conventional skin closure. *Acta Chirurg Scand* 1981; 147:501-502.
- [3]. Medina dos Santos LR, Freitas CAF, Hojaji FC et al. Prospective study using skin staplers in head and neck surgery. *AM J Surg.* 195; 170-451-452.
- [4]. Kanagaye JT, Vance CW, Chan L, Schonfeld N. Comparison of skin stapling devices and standard sutures for pediatric scalp lacerations: a randomized study of cost and time benefits. *J Pediatr* 1997; 130:813.
- [5]. Sagar S. Kathare, Nandkishor D. Shinde. A comparative study of skin staples and conventional sutures for abdominal skin wound closures. *ISJ Vol. 6, No 6* (2019).
- [6]. Toby O Smith, Debbie Sexton, Charles Mann, Simon Donell. Meta analysis of stapler verse sutures. *BMJ* 2010; 340:c1199.
- [7]. Basit A, Abbasi SH, Haider S, Kiani YM, Shah FH. To Compare Outcomes of Stainless Skin Staples and Polypropylene Sutures for Skin Closure in Clean Elective Surgeries. *Isra Med J.* 2018; 10(1): 32-35.
- [8]. Ananda BB, Vikram J, Ramesh BS, Khan HM. A comparative study between conventional skin sutures, staples adhesive skin glue for surgical skin closure. *International Surgery Journal.* 2019 Feb 25;6(3):775-82.
- [9]. Shaikh S, Singh M, Panchabhai SV, Dhaigude BD, Bhushan A. Hernia with stainless steel staples compared to conventional sutures 63-66.
- [10]. Karthikeyan S. Stapler Suturing Vs Conventional Suturing -A Comparative Study on the Outcome of Wound Closure in Abdominal Skin Incisions. *IOSR-JDMS.*2018;17(2):9-15.
- [11]. Jitender Batra, Rajesh Kumar Bekal, Sunil Byadgi, Gyanander Attresh, Shanender Sambyal, and Chinmay Dilip Vakade. Comparison of skin staples and standard sutures for closing incision after head and neck cancer surgery: A double-blind randomized and prospective study. *Journal of Maxillofacial and Oral Surgery.* 2016; 15(2):243-250.

Dr. Sunny Kumar Gupta, et. al. "A Comparative Study of Skin Staples and Conventional Sutures for Abdominal Skin Wound Closures." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 22(4), 2023, pp. 13-16.