



EVALUATING OUTCOME OF SUTURES V/S STAPLERS IN ABDOMINAL SURGERIES IN A TERTIARY CARE CENTRE

General Surgery

Dr Ayush Gupta*

Department Of General Surgery, S.M.S Medical College And Hospital, Jaipur, Rajasthan, India *Corresponding Author

Dr Pushpendra Singh Jakhar

Department Of Physiology, S.M.S Medical College And Hospital, Jaipur, Rajasthan, India

ABSTRACT

Background: Wound closure is as important as any major anastomosis. It should be healthy and aesthetically pleasing. We compared sutures and staples for skin in various abdominal surgeries in a tertiary care centre while evaluating the efficacy and safety profile of these methods. **Methods:** We conducted a retrospective cohort study in 100 patients divided into two groups randomly for closure using conventional sutures or staplers. Preoperative and postoperative antibiotics given in both groups and wound assessed for various parameters including dimensions, time for application, cosmesis and pain scores during application and removal. Wound infection assessed using Southampton wound assessment scale and proper management done accordingly. **Results:** Hundred patients of age group 15-60 yr were included in this study. Majority of them belonged to age group 30-45 yrs. The most common incision was midline laparotomy incision followed by para median. The time taken was more for sutures (8.4 min) as compared to staplers (4.9min). The pain scores were more during application of sutures while they were more during removal of staplers. The infection rates were more with sutures as compared to staplers. **Conclusions:** Wound infection, especially in major abdominal surgeries is of major importance as can lead to burst abdomen. Cosmesis is essential and a good surgical scar not only gives satisfaction to the patient but is also a representation of skill of the surgeon. All factors must be taken into account for taking decision of closure material to provide overall better outcome for the patient.

KEYWORDS

Laparotomy, wound infection, abdomen, sutures

INTRODUCTION

Good wound healing can be promoted by preserving blood supply, minimising tissue damage and proper approximation of edges without due tension and proper selection of suture materials to provide adequate strength, minimal inflammation and scarring.¹

This prevents perioperative complications of surgical wound and overall economic burden.²

The thickness, elasticity, healing rate and scarring is variable in body at different sites, thus different wounds require different surgical approach and although both sutures and staples can achieve the goal of proper wound closure but the outcome may be different at places.

Selection of proper incision, suture material and closure technique are important in assisting repair mechanisms and restoring normal anatomic relationships after surgery and promoting overall better outcome for the patient.³

The incidence of SSI is approximately 2% in surgical procedures and accounts for 20% of health care-associated infections.⁴ Surgical site infections (SSIs) can be incisional (superficial/deep) or organ/space infections.^{5,6}

Wound healing is affected by patient factors like age, underlying systemic illness, obesity, immune status and smoking.^{7,8}

Type and complexity of the surgical procedure, duration of operation, surgical approach (laparotomy or laparoscopic or robotic) is also important in predicting outcome of the surgical wound.^{9,10}

Sutures can be continuous or interrupted and the material used can be natural or synthetic, absorbable or non-absorbable, poly or monofilament depending on the length and location of the wound. Sutures being the most common closure technique have advantages in terms of flexibility, strength, non-toxicity, and in vivo degradation properties.^{11,12}

Staples are made of stainless steel which gives lower tissue reactivity, higher resistance to infection in contaminated wounds, reduces local inflammatory response, width of the wound, time to closure, and residual cross marks.¹³⁻¹⁵

This study evaluates wound infection, operative time, cost, cosmesis and overall outcome between skin staples and conventional sutures in abdominal skin closures in our institute.

METHODS

This retrospective observational study was conducted on 100 patients who underwent emergency and elective abdominal surgeries between the age of 15-60yrs during January 2024-July 2024 in the Department of Surgery of S.M.S medical college and hospital, Jaipur after taking approval from ethical committee from the institute.

We collected demographic data along with detailed history, thorough physical examination of each patient with history of co morbidities, prior surgeries, and complications with complete routine blood investigations and all surgical procedures carried out with proper informed written consent.

Patients were divided into 2 groups randomly i.e., group A with conventional suturing with Nylon sutures and group B with skin stapler.

In both the groups, first dressing opened on Post operative day 2 and then done daily with sterile gauze pad and 10% povidone iodine after proper washing with normal saline. The assessment of wound infection done and categorized on the basis of Southampton wound assessment scale¹⁶ on Postoperative day 2, 5 and on discharge.

Data was collected from the operating surgeon regarding the time and ease and patients in terms of postoperative pain, pain at removal, number of dressings done and cosmesis and overall satisfaction.

Inclusion Criteria

Patients undergoing both elective and emergency abdominal surgeries with clean and clean contaminated wounds between the age group 15-60 yrs.

Exclusion Criteria

- Immunocompromised patients like malignancies, AIDS and uraemia.
- Contaminated and dirty wounds.
- Patients not giving consent

Statistical analysis of data was done and represented in form of proper tables and charts.

RESULTS

Table 1: Patient characteristics

	Sutures (n=50)	Percentage	Staplers (n=50)	Percentage
Age(years)	Mean age- 38.6 yrs			
15-29	7	14%	8	16%

30-45	28	56%	26	52%
46-60	13	26%	14	28%
Sex				
Male	38	76%	31	62%
Female	12	24%	19	38%

Hundred patients with 50 in each group were included in this study from age 15-60 years with majority being men (76%) as indicated by **Table 1**.

In our study the commonest incision given was midline laparotomy incision in both sutures (54%) and stapler (40%) group followed by Para median incision (16% in suture and 28% in stapler group) as indicated in **Table 2**.

Wounds classified on the length of incision as, <7 cm with 14 (28%) cases in sutures and 24 (48%) cases in stapler group; 7-15 cm with 19(38%) cases in suture and 15(30%) in stapler group and >15 cm with 17(34%) cases in suture and 11(22%) cases in suture group as in **Table 2**.

Table 2: Wound Characteristics

	Sutures (n=50)	Percentage	Staplers (n=50)	Percentage
Type of incision				
Midline	27	54%	20	40%
Para median	8	16%	14	28%
Sub coastal	7	14%	4	8%
Mc Burney's	4	8%	9	18%
Inguinal	4	8%	3	6%
Length of incision				
<7 cm	14	28%	24	48%
7-15 cm	19	38%	15	30%
>15cm	17	34%	11	22%
Time for closure				
	Mean time- 8.4 minutes		Mean time- 4.9 minutes	
<5 min	28	56%	39	78%
5 – 10 min	16	32%	11	22%
>15 min	6	12%	0	0
Post op Pain (VAS)				
0-1	28	56%	35	70%
2-3	15	30%	12	24%
4-5	7	14%	3	6%

Time required for skin closure was <5minutes in 56% and 78% of patients with sutures and staplers respectively. 5-10 min were taken for closure in 16 (32%) and 11 (22%) patients for both groups respectively. No case took >15 min to close with help of staplers while in 6 (12%) of patients the surgeon took >15 min to close the skin as in **Table 2**.

Post operative pain score was more with sutures as compared to stapler with 70% of patients having score 0-1 with stapler as compared to 56% with sutures and 14% of patients had score >4 with sutures while only 6% had score >4 with staplers (**Table 2**)

Table 3: Wound Assessment

SOUTHAMPTON WOUND ASSESSMENT SCALE	Number of Patients					
	DAY 2		DAY 5		On Discharge	
	Suture	Staple	Suture	Staple	Suture	Staple
Grade 0 (Normal healing)	22	26	32	38	40	44
Grade I (Normal healing with mild bruising or erythema)						
I a- Some bruising	10	12	5	3	4	2
I b- Considerable bruising	3	2	1	2	0	1
I c- Mild erythema	0	1	0	0	0	0
Grade II (Erythema plus other signs of inflammation)						
II a- At 1 point	4	2	2	1	2	1
II b- Around sutures	1	1	0	0	1	0
II c- Along wound	0	1	0	0	1	1
II d- Around wound	0	1	2	1	0	0
Grade III (Clear or haemorrhous discharge)						
III a- At 1 point only (<2 cm)	4	2	2	2	1	1
III b- Along wound (>2 cm)	0	0	0	1	0	0

III c- large volume	1	0	0	0	0	0
III d- Prolonged (>3 days)	0	0	2	1	0	0
Grade IV (Pus)						
IV a- At 1 point only (<2 cm)	3	2	2	1	1	0
IV b- Along wound (>2 cm)	0	0	0	0	0	0
Grade V (Deep or severe wound infection)	2	0	1	0	0	0

Southampton wound assessment scale was used for assessment of wound and it was noted that higher grades of infections were common in sutures as compared to staplers as mentioned in **Table 3**.

Stony brooks scar evaluation system (SBSE) was used and we observed that in staples group, SBSE score >3 was seen in 86 % of cases and in sutures group, SBSE >3 was seen in 72 % of cases, as shown in **Table 4**.¹⁷

Table 4: Cosmetic outcome

Type of scar	Sutures	Percentage	Staplers	Percentage
SBSE <3	14	28 %	7	14 %
SBSE >3	36	72 %	43	86 %
Total	50	100%	50	100%

Pain while removal is analysed by Visual analogue scale for both the groups. In staples group, pain score was <2 in 58 % of patients and in sutures group; it was 78 % as shown in **Table 5**, indicating more pain and skin stretch during stapler removal.

Table 5: Pain during removal

Pain on removal	Sutures	Percentage	Staplers	Percentage
VAS <2	39	78 %	29	58 %
VAS >2	11	22 %	21	42 %
Total	50	100%	50	100%

DISCUSSION

In this retrospective observational study of 100 cases we found that maximum patients belonged to age group 30-45yrs in both groups, the mean age being 38.6 yrs. This is contrary to the study done by Naureen et al study where patients from 35-99 years for stapler group, with a mean age of 58.92 years and 30-80 years for suture group, with a mean age of 60.04 years.¹⁸

The most common incision given in both groups was midline laparotomy incision followed by para median and sub coastal incision. This is contrary to the study done by Chavan et al where the most common incision was inguinal followed by midline laparotomy incision.¹⁹

The mean time for suture closure was 8.4 min (504 sec) and staple closure was 4.9 minutes (294 sec) in our study. In the study done by Kanagaye et al study, the mean time for closure in staples group was 65 seconds and in sutures group was 397 seconds.²⁰

In our study there was higher wound infection with the use of sutures as compared to stapler, contrary to study done by Tuuli MG et al which showed that Staple closure was associated with a twofold higher risk of infection compared to suture closure.²¹

A multicentric study among 1080 patients conducted by Tsujinaka T et al showed no significant difference in wound infection between the two groups.²²

In our study 72% of sutured and 86% of stapled wounds were cosmetically acceptable which is comparable to study done by Karbhari et al with 90% good outcome in staples and 60% in sutures group.²³

Pain scores during application of sutures were more as compared to staples, while the pain scores on stapler removal were much more as compared to suture group contrary to the study done by dos Santos et al where pain scores were similar in both the groups.²⁴

Limitations in the study included single institutional nature, smaller sample size, cost and availability of staplers being difficult at times and surgeon bias as sutures and skin stapler were applied by different surgeons. More studies are needed with adoption of newer latest techniques which approximate the skin edges precisely to ensure minimal scarring with taking less time and skill to apply.

CONCLUSION

Wounds and its prompt management are fundamental to surgical practice. The surgical scar is the only visible evidence of the surgeon's skill and infrequently, all his efforts are judged on its final appearance. Skin staplers are a newer alternative to regular suturing as it is easy to apply, takes lesser time with minimal pain and giving better cosmetic outcome to the patient. Further studies with large sample size and multicentre study are essential to establish the role of staplers in abdominal surgeries for skin approximation.

REFERENCES

1. Schwartz S, Brunicaudi F. Schwartz's principles of surgery. 10th edn. New York: McGraw-Hill Medical; 2015
2. Bailey I. Bailey and Love's short practice of surgery. 26th edn. Hodder Arnold; 2013:34-35.
3. Sanz L, Smith S. Strategies in gynaecologic surgery. Springer; 1986:53-76
4. de Lissovoy G, Fraeman K, Hutchins V, Murphy D, Song D, Vaughn BB. Surgical site infection: incidence and impact on hospital utilization and treatment costs. *Am J Infect Control*. 2009;37(5):387-97.
5. Rosenberger LH, Politano AD, Sawyer RG. The surgical care improvement project and prevention of post-operative infection, including surgical site infection. *Surg Infect (Larchmt)*. 2011;12(3):163-8.
6. Alexander JW, Solomkin JS, Edwards MJ. Updated recommendations for control of surgical site infections. *Ann Surg*. 2011;253(6):1082-93.
7. National Institute of Health and Care Excellence (NICE). Surgical site infections: prevention and treatment. Clinical guideline [CG74]. October 2008. www.nice.org.uk/Guidance/CG74 [accessed January 6, 2017].
8. Cochetti G, Barillaro F, Cottini E, et al. Pneumococcal: report of two different cases and review of the literature. *Ther Clin Risk Manag* 2015; 11:581-7.
9. Cochetti G, Puxeddu E, Zingaro MD, et al. Laparoscopic partial nephrectomy of thyroid cancer metastasis: case report and review of the literature. *Onco Targets Ther* 2013;6:355-60.
10. Boni A, Cochetti G, Ascani S, et al. Robotic treatment of oligometastatic kidney tumor with synchronous pancreatic metastasis: case report and review of the literature. *BMC Surg* 2018;18:40.
11. Hochberg J, Meyer KM, Marion MD. Suture choice and other methods of skin closure. *Surg Clin North Am* 2009;89:627-41.
12. Edlich RF, Rodeheaver GT, Thacker JG, et al. Revolutionary advances in the management of traumatic wounds in the emergency department during the last 40 years: part II. *J Emerg Med* 2010;38:201-7.
13. Johnson A, Rodeheaver GT, Durand LS, et al. Automatic disposable stapling devices for wound closure. *Ann Emerg Med* 1981;10:631-5.
14. de Lissovoy G, Fraeman K, Hutchins V, et al. Surgical site infection: incidence and impact on hospital utilization and treatment cost. *Am J Infect Control* 2009;37:387-97.
15. Stillman RM, Bella FJ, Seligman SJ. Skin wound closure. The effect of various wound closure methods on susceptibility to infection. *Arch Surg* 1980;115:674-5.
16. Bailey IS, Karran SE, Toyn K, et al. Community surveillance of complications after hernia surgery. *BMJ*. 1992;304(6825):469-471
17. Singer AJ, Arora B, Dagum A, Valentine S, Hollander JE. Development and validation of a novel scar evaluation scale. *Plast Reconstr Surg*. 2007;120(7):1892-7
18. Naireen N, Raghavan RM, Parambil SM. A comparative study of skin staplers with skin sutures in abdominal skin wound closure in gastrointestinal malignancy- an institutional study. *J Evid Based Med Health*. 2016;3(30):1356-9.
19. Chavan DR, Metan BB, Kadlewad S, Bharath S. Study of skin staples and conventional sutures for abdominal clean wound skin closure: a randomized control trial. *J Evol Med Dent Sci*. 2014;3(20):5626-37.
20. Kanegaye J, Vance C, 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(5):808-13.
21. Tuuli MG, Rampersad RM, Carbone JF, Stamilio D, Macones GA, Odibo AO. Staples compared with subcuticular suture for skin closure after caesarean delivery: a systematic review and meta-analysis. *Obstet Gynecol*. 2011;117(3):682-90.
22. Tsujinaka T, Yamamoto K, Fujita J, Endo S, Kawada J, Nakahira S, et al. Subcuticular sutures versus staples for skin closure after open gastrointestinal surgery: a phase 3, multicentre, open-label, randomised controlled trial. *Lancet*. 2013;382(9898):1105-12.
23. Karbhari S, Patil R, Bhavikatti A. Study of skin staples and conventional suture for abdominal skin wound closure. *Int J Biomed Adv Res*. 2012;3(7)
24. Dos Santos LR, Freitas CA, Hojaj FC, Araújo Filho VJ, Cernea CR, Branda LG, Ferraz AR. Prospective study using skin staplers in head and neck surgery. *Am J Surg*. 1995;170(5):451-2