

ORIGINAL RESEARCH

Comparative Evaluation of Surgical Wounds Management with Skin Stapler and Conventional Suturing at a Tertiary Care Medical College in West Bengal (India)

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ABSTRACT

Background: A comparative study between application of conventional suture and stapler closure of skin in abdominal wound following surgery was undertaken to compare the merits and demerits of the techniques with the aim to study the time required for closure of surgical wound with stapler, and patients' compliance in order to determine the better method in comparison to other.

Materials and Methods: This study included a total of 60 patients with 30 of them receiving skin closure using staples and the remaining 30 receiving closure using traditional nylon sutures. The duration of wound closure, any complications after the operation, and the pain level among patients post-op were documented for both groups.

Results: The present study found that the mean duration of time taken was less in stapler group with the mean duration of time taken for stapler closure was 38.47 ± 2.33 second and 171.29 ± 7.52 in suture significant in Burney's type incision. It was found that the mean duration of time taken for stapler closure was 67.95 ± 6.38 second and 181.58 ± 9.53 sec in suture group with statistically significant difference in Inguinal type incision. Similarly, statistically significant difference was present in subcoastal group with less time in stapler group. VAS score with less pain in stapler group ($p < 0.01$).

Conclusion: The use of a stapler to approximate skin edges is a better method for closing surgical wounds due to reduced discomfort, and pain compared to the use of traditional sutures. Nevertheless, there were no noteworthy post-operative problems observed in any group.

Keywords: Stapler, Sutures.

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INTRODUCTION

Ancient times reportedly witnessed the implementation of numerous innovative and captivating techniques to secure wounds. There have been reports of ants in India and South America biting across a wound that is tightly closed. After biting, the ants twist off their own bodies, leaving behind their jaws which act as staples to close the wound. This behavior is similar to the function of a surgical stapler used in surgeries. The Masai tribe in East Africa

traditionally inserted acacia thorns into the skin surrounding a cut, then fastened them together with woven plant fiber, effectively closing the wound.¹ By the mid-19th century, there was a significant amount of experimentation taking place in the field of surgery. Various materials such as aluminum, tendons, arteries, silver wire, copper, flex, cotton, hair, hemp, and catgut (produced from the submucosa of animal intestine) were being utilized. Sutures such as polyamide (Nylon), polyglactin 910 (Vicryl), and

polydioxanone (PDS) were mass-produced by the mid-20th century and are often used in operating rooms today.²

Rapid and aesthetic healing of skin incisions requires accurate re-approximation of wound margins.³ Application of suture is the technique of choice for approximation of skin edges in surgical wounds. Approximation edges (closure) of skin in surgical wounds with application of staplers is a faster method of closure with better cosmetic outcome. Rate of complications are low in comparison to conventional closure with application of suture materials. There is evidence that stapler causes considerably less damage to wound defences when compared even with least reactive non-absorbable suture materials.⁴ A comparative study between application of conventional suture and stapler closure of skin of wound following surgery was undertaken to compare the merits and demerits of the techniques with the aim to study the time required for closure of surgical wound with stapler, aesthetic outcome, post-operative complications and patients compliance in order to determine the better method in comparison to other.

MATERIALS AND METHODS

This study was a prospective, clinical observational study conducted in the Department of General Surgery and Department of Orthopaedics. It included a total of 60 patients with 30 of them receiving skin closure using staplers and the remaining 30 receiving closure using traditional nylon sutures. The duration of wound closure, any complications after the operation, and the pain level among patients post-op were documented for both groups. The study included patients who were undergoing elective surgery that was either clean or clean contaminated. The patients included in the study had ASA class I or II. The study excluded patients who were on long-term steroid and immunomodulation medication, had an ASA classification of III or higher, and had undergone previous open abdominal surgery (excluding both elective and emergency cases). The demographic data

of patients, along with the study protocols, were collected and organized in a pre-designed Performa. All patients received preoperative prophylactic antibiotics. A strict pre and perioperative antiseptic measures were implemented. The skin was prepped using a 10% betadine solution and allowed to dry prior to making the incision. After the procedure was finished, a biodegradable continuous suture made of Poly-dioxanone was utilized to close the fascia and muscles at intervals of 1 cm. The method of skin closure for each patient was decided through randomization after repairing the deeper layers. The duration of the closing process was measured in seconds. Staples or sutures were positioned at an interval of roughly 1 cm. The initial postoperative dressing was performed 48 hours after the operation. The wound was assessed and examined for any signs of accumulation or infection. The staples were removed on the 10th to 12th day after the operation. The staples were extracted using a painless gadget that opened them sideways, whilst the sutures were removed using the normal method. The patients' adherence to the removal of sutures and staples was documented. The pain resulting from the removal of a stapler or suture was evaluated using a Visual Analog Scale (VAS).

RESULTS

The majority of patients in the study were aged between 31-60 years (table 1) and 37 male patients and 23 female patients (table 2).

It was found that the mean duration of time taken for stapler closure was 38.47 ± 2.33 second and 171.29 ± 7.52 in suture significant in Burney's type incision. It was found that the mean duration of time taken for stapler closure was 67.95 ± 6.38 second and 181.58 ± 9.53 sec in suture group with statistically significant difference in Inguinal type incision. Similarly, statistically significant difference was present in subcostal group with less time in stapler group (table 3). Table 4 shows VAS score with less pain in stapler group ($p < 0.01$)

Table 1: Age distribution in study groups.

Age	Stapler group (n)	Suture group (n)
<20 years	1	3
21-30	5	6
31-40	8	8
41-50	7	8
51-60	8	3
>60 years	1	2
p	Not significant (>0.05)	
Total	30	30

Table 2: Gender wise distribution in study groups.

Gender	Stapler group (n)	Suture group (n)	Total
Male	17	20	37
Female	13	10	23
p	Not significant (>0.05)		

Table 3: Average time taken for wound closure

Type of Incisions	Stapler(Sec)	Sutures(Sec)	P value
Burney's	38.47±2.33	171.29±7.52	<0.01 (significant)
Inguinal	67.95±6.38	181.58±9.53	<0.01 (significant)
Sub-costal	69.46±4.31	237.65±7.52	<0.01 (significant)

Table 4: Mean VAS score

Group	Mean VAS score	P value
Stapler group	1.75±0.31	<0.01 (significant)
Suture group	4.63±0.24	

DISCUSSION

In the present study, the majority of patients in the study were aged between 31-60 years and 37 male patients and 23 female patients. Similar, Khan RJ et al⁵ found in their series of hip surgery 51.5% male in suture group and 55.6% male in staple group. In the current study it was observed that the in overall procedures, 348 (69.1%) were male and 155 (30.9%) were female. This wide disparity between male and female patient is because of the fact that males are exposed to wide range of trauma due to their more outdoor activities whereas females are usually domestic worker.

The present study found that the mean duration of time taken was less in stapler group with the mean duration of time taken for stapler closure was 38.47±2.33 second and 171.29±7.52 in suture significant in Burney's type incision. It was found that the mean duration of time taken for stapler closure was 67.95±6.38 second and 181.58±9.53 sec in suture group with statistically significant difference in Inguinal type incision. Similarly, statistically significant difference was present in subcoastal group with less time in stapler group. The results are comparable to other studies. In a study by Eldrup J et al⁶ the Proximate stapler was compared with usual skin closure in a randomized trial, with 137 patients having elective abdominal and breast surgery. The median duration of skin closure with the Proximate stapler was 80 seconds, which was significantly shorter than the median of 242 seconds with conventional closure. In another study by Meiring L et al⁷ a disposable skin stapler (Proximate; Ethicon) was compared with conventional nylon sutures in respect of time taken for wound closure, cosmetic result and ease of application and removal. It was found that a time saving of 80% is possible with the stapling device, and that the cosmetic result with staples is as good as if not better than that with nylon sutures. Ranaboldo CJ et al⁸ have found that the rate of wound closure was 8 seconds/cm with stapler and 12.7 seconds/cm with sutures. Santos LR dos et al⁹ concluded that the use of skin staples speeds up closure time by 80%. Kanagaye JT et al¹⁰ observed that staplers were six times faster than standard sutures. Khan RJ et al⁵ reported that wound closure was significantly faster with staples than with sutures (P<0.05). Another study, Gohiya A et al¹¹ also found that stapler is faster than sutures with mean duration

of closure by Staples were 0.96 minutes and by Nylon it was 4.24 minutes that is 4.42 times faster than nylon group. In the study by Eldrup J et al⁶, pain was more frequent after stapling which in contrast to our study. In our study VAS score with less pain in stapler group (p<0.01), this can be attributed as a certain amount of experience and practice facilitates the use of the stapler.

CONCLUSION

The use of a stapler to approximate skin edges is a better method for closing surgical wounds due to reduced discomfort, and pain compared to the use of traditional sutures. Nevertheless, there were no noteworthy post-operative problems observed in any group.

REFERENCES

1. Mcalister V. A History of Surgery Harold Ellis London, UK: Greenwich Medical Media, 2001, xxiii+264. Canadian Bulletin of Medical History in 2006;23(1):270-272.
2. Pai SA. A History of Surgery. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1121778/> BMJ. 2001;323:1312.
3. Taute RB, Knepil GJ, Whitfield PH. Use of staples for wound apposition in neck incisions. *Bri J Oral Maxillofacial Surg.* 2009;47(3):236-7.
4. Gatt D, Quick CR, Owen-Smith MS. Staples for wound closure: a controlled trial. *Ann Royal College Surgeons Eng.* 1985;67(5):318.
5. Khan RJ, Fick D, Yao F, Tang K, Hurworth M, Nivbrant B, Wood D. A comparison of three methods of wound closure following arthroplasty: a prospective, randomised, controlled trial. *The Journal of Bone & Joint Surgery.* 2006 Feb 1;88(2):238-42.
6. Eldrup J, Weid U, Anderson B. Randomised trial comparing Proximate stapler with conventional skin closure. *Acta Chirug Scand.* 1981;147:501-2.
7. Meiring L, Cilliers K, Barry R, Nel CJ. A comparison of a disposable skin stapler and nylon sutures for wound closure. *S Afr Med J.* 1982 Sep 4;62(11):371-2.
8. Ranaboldo CJ, Rowe-Jones DC. Closure of laparotomy wounds: skin staples versus sutures. *British journal of surgery.* 1992 Nov;79(11):1172-3.
9. Santos LR dos, Freitas CA, Hojaij FC, Araújo Filho VJ, Cernea CR, Brandão LG, Ferraz AR; Prospective study using skin staplers in head and neck surgery; *Am J Surg.* 1995;170(5):451-2.
10. 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(5):808-13.
11. Gohiya A, Gupta DC, Gaur S. Comparative study of outcome of two methods (sutures vs staples) of skin closure in orthopedic surgery. Int J Med Res Rev. 2015;3(1):16-22.