MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.59218/makrjms.2023.10.116.120

Comparative Study Between Traditional Skin Suturing vs Skin Stapler in Emergency Abdominal Surgery in Young Adults

[1]Audumbar Maske, [2]Balveer Saini, [3]Sanchit Khare and [4]Shukladhan Rode

[1-4]Department of General Surgery, Dr VM Govt Medical College, Solapur, India

ABSTRACT

Different methods and materials are used for wound closure and they are highly dependent on the type of surgery, the length and anatomical site of the wound. Most commonly used method for wound closure is skin suturing. The principal advantages of sutures are their flexibility, strength, non-toxicity and in vivo degradation properties. Although the sutures are the most commonly used technique of wound closure, they have increased risk of wound infection. Even if the skin closure is conventionally performed by sutures, staples appear to be more promising in terms of efficacy of fixation, decreased rate of infection, good cosmetic results and rapidity of application. The skin staplers have almost revolutionized wound closure techniques. During the last few decades, there have been innovative advances in the development of skin staples as well as tissue adhesives. The study was carried out in the department of General Surgery at tertiary care teaching hospital from December 2019 to October 2021. 60 patients of skin suturing and skin stapler (30 patients of each) undergoing surgical intervention were studied. Patients who met inclusion criteria were enrolled into the study. After the final diagnosis was made, patients were resuscitated and then posted for surgery. Check dressing of suture line was done in all the patients on 3rd post-operative day for possible wound complications. Patients were looked up for complications-infection, discharge, gaping and wound dehiscence-during the post-operative period. In case of wound infection/discharge in any group, the discharge was sent for culture and sensitivity. And antibiotic given according to culture sensitivity. All the patients were monitored for other possible complications in postoperative period. After suture removal patients were discharged and advised to follow up in OPD for examination after one month and three months. The mean age in staples group is 37.06 years and that of suture group is 39.70 years. The average time taken for skin closure in staples group was three times less than that required for suture group. The average time required for staples removal is 84.33±34.38 sec and for suture group is 210.33±62.06 sec. Conclusion- Wound complications are less in staple group as compared to traditional suturing group.

OPEN ACCESS

Key Words
Suturing, skin stapler, abdominal, surgery, traditional

Corresponding Author
Shukladhan Rode,
Department of General Surgery, Dr V M Govt Medical College, Solapur, India

Author Designation
[1]Associate Professor
[2]Senior Resident
[3,4]Assistant Professor

Received: 12 August 2023
Accepted: 20 September 2023
Published: 8 October 2023

Citation: Audumbar Maske, Balveer Saini, Sanchit Khare and Shukladhan Rode, 2023. Comparative Study Between Traditional Skin Suturing vs Skin Stapler in Emergency Abdominal Surgery in Young Adults. Res. J. Med. Sci., 17: 116-120, doi: 10.59218/makrjms.2023.10.116.120

INTRODUCTION

The term surgery was coined from the earlier name chirurgery which means handwork. It is the science that reveals the manner of exercising a manual operation necessary to heal or as much as possible by using of most expedient medicines[1]. Ancient Hindus first used the insect mandibles to close skin wounds and this evolved the idea for development of staple wound closure[2]. Stapling method of wound closure has been shown to be an excellent option in many situations[3]. No technique can supersede standard suturing methods for closing wounds requiring the most meticulous repair. Surgical wound closure aims to move close the skin flaps to favour rapid healing and a good cosmetic outcome with low risk of complications. Infection of surgical wound is a relevant complication with an incidence of 1-3%;, it is affected by age, underlying illness (American Society of Anesthesiologists score of three or more, diabetes, malnutrition, low serum albumin, radiotherapy and steroid use), obesity, host immune status, smoking, site, level of wound contamination[4,5]. Wound dehiscence is one of the main complications of surgical procedures. Dehiscence is a surgical complication where the edges of a wound no longer meet. It is also known as "wound separation[6]". A wound is at the greatest risk of dehiscence in the first two weeks after surgery, when the wound is still fresh and very fragile. It may be aggravated by many factors like malnourishment, sudden increase in intra-abdominal pressure due to coughing, sneezing, vomiting, bearing down to have a bowel movement, or lifting a heavy object, infection and obesity. Surgical site infections can sometimes be superficial infections involving the skin only. Other surgical site infections are more serious and can involve tissues under the skin, organs, or implanted material. Another important and relevant aspect of skin wound healing is cosmetic appearance of wound which undoubtedly affects satisfaction of patient. An estimated three to four people per 1000 population live with one or more wounds[7]. Patients have reported having reduced self-esteem, being stigmatized and having disrupted daily activities, anxiety and depression. The physical effects of scarring include dryness, itchiness, stiffness, tenderness and pain[8].

Different methods and materials are used for wound closure and they are highly dependent on the type of surgery, the length and anatomical site of the wound. Most commonly used method for wound closure is skin suturing. The principal advantages of sutures are their flexibility, strength, non-toxicity and in vivo degradation properties. From catgut, silk and cotton, there is now an ever-increasing array of sutures, approximately 5269 different types, including antibiotic-coated and knotless sutures.

Staples are a valid alternative to sutures and are mainly made of stainless steel, although staples using absorbable materials are now available[9]. The potential advantage of staples in wound closure is related to their low level of tissue reactivity[10]. This generates a higher resistance to infection in contaminated wounds, given the non-introduction of exogenous material and consequent impairment of local immune response[11,12]. Furthermore, 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[13]. Even if the skin closure is conventionally performed by sutures, staples appear to be more promising in terms of efficacy of fixation, decreased rate of infection, good cosmetic results and rapidity of application[14]. However, literature is scare in terms of which surgical skin closure technique is better or superior to other.

Hence, the above study was conducted to compare the traditional skin suturing vs skin stapler in emergency abdominal surgery in young adults.

MATERIALS AND METHODS

Study place: The study was carried out in the department of General Surgery at tertiary care teaching hospital from December 2019 to October 2021.

Study design: Prospective observational and comparative study.

Inclusion criteria: All the patients of14 to 60 year's age group, belonging to both the genders, undergoing emergency abdominal surgery and those willing to give informed consent.

Exclusion criteria: Patients below the age of 14 and above 60 years, having history of uncontrolled diabetes mellitus and hypertension, on immunosuppressive therapy like chemotherapy and steroids, with immunocompromised status like AIDS/HIV, TB and unwilling to give informed consent.

Sample size: 60 patients of skin suturing and skin stapler (30 patients of each) undergoing surgical intervention.

Data analysis: All the information was collected from the patients. Statistical analysis was carried out by SPSS (Statistical Package for Social Sciences.) version 16. Microsoft word and Excel have been used to generate graphs and tables.

Ethical considerations: Institutional Ethical Clearance was taken before starting the study.

All the patients were examined thoroughly and baseline findings were recorded. Necessary Investigations such as CBC, urine, bleeding and clotting time, LFT etc. were carried out in every patient to rule-out other associated pathologies, to confirm clinical diagnosis and fitness of patient for surgery. CT scan abdomen is done only when indicated and only in doubtful cases where ultrasound findings are inconclusive. After the final diagnosis being done, patients were resuscitated and then posted for surgery. Pre-anaesthetic evaluation was done and informed written consent of the patient for surgery was taken after explaining him/her about procedure in local language with the best of their satisfaction. Patient were explained about all the possible complications of the operative procedure as well as anaesthesia. The skin was approximated usually with vertical mattress sutures using non-absorbable sutures at a distance of 1cm from each other. For skin stapler technique, the edge of the wound was everted and lined up using toothed forceps. The stapler is then placed at a distance of 1 cm from each other. The time required for the closure of skin by either method was recorded. Post operatively the patients were monitored in surgical ward and if required selected patients were shifted to surgical ICU for continuous monitoring in consultation with anaesthetist. IV antibiotics and analgesics were given. Antibiotics were continued for 1 week in postoperative period. Pain intensity was measured using VAS score dressing of suture line was done in all the patients on 3rd postoperative day for possible wound complications. Patients were looked up for complications-infection, discharge, gaping and wound dehiscence-during the post-operative period. In case of wound infection/discharge in any group, the discharge was sent for culture and sensitivity and antibiotics were given accordingly. All the patients were monitored for other possible complications in postoperative period. In uncomplicated cases skin sutures were usually removed on 12th postoperative day. After suture removal, patients were discharged and advised to follow up in OPD for examination after one month and three months. Patients those who came for follow up were reviewed in OPD. At review, symptoms were asked for and operative site was examined for any complications.

RESULTS AND DISCUSSION

Total 60 patients undergoing emergency abdominal surgery were included in the study, 30 patients in each, staples group and suture group. The mean age in staples group is 37.06 years with maximum patients in the age group 26-35 years and that of suture group is 39.70 years with maximum patients in age group 36-45 years (Table 1).

The average time for closer of skin by suture was 436.67sec and by stapler was 164.00 sec. The p-value was found to be less than 0.01 hence this was statistically significant. The average time taken for skin closure in staples group was three times less than that required for suture group (Table 2).

Post-operative pain was assessed by visual analogue scale which showed less pain associated with staples. The p-value was found to be less than 0.01, Hence this was statistically significant (Table 3).

The average time required for staples removal is 84.33±34.38 sec and for suture group is 210.33±62.06 sec. The p-value was found to be less than 0.01, Hence this was statistically significant. The time taken to remove stapler was less when compared to sutures. Staples were more easy and quicker to remove as compared to suture group (Table 4).

Staples were more cosmetically better than sutures as calculated by wound cosmesis score. p-value was found to be less than 0.01 which was statistically significant (Table 5).

The mean length of incision in our study is 10.3 cm, for stapler being 10.47 cm and for traditional suturing being 10.13 cm (Fig. 1).

Table 1: Distribution according to age group

No.	Age (year)	Stapler (no. of cases)	Percentage	Suture (no. of cases)	Percentage	Total
1	14-25	7	23.33	6	20.00	13
2	26-35	9	30.00	6	20.00	15
3	36-45	6	20.00	7	23.33	13
4	46-55	4	13.33	5	16.67	9
5	>55	4	13.33	6	20.00	10
Total	30	100	30.00	100	60.00	

Table 2: Average time for skin closer (sec)

	Average time for skin closer (sec)		
Stapler/suture	Mean (sec)	Standard deviation	p-value
Stapler	164	72.76	<0.01
Suture	436.67	151.19	

Table 3: Visual analogue scale for post-operative pain

	Visual analogue scale for post-operative pain		
Standard deviation Stapler/suture	Mean (sec)	Standard deviation	p-value
Stapler	4.33	1.35	<0.01
Suture	5.47	1.46	

Table 4: Average time of suture/stapler removal (sec)

	Average time of suture/stapler removal (sec)		
Stapler/suture	Mean (sec)	Standard deviation	P-value
Stapler	84.33	34.38	<0.01
Suture	210.33	62.06	

Table 5: Wound cosmesis score

	Wound cosmesis score		
Suture/stapler	Mean (sec)	Standard deviation	P-value
Stapler	3.40	0.62	<0.01
Suture	2.93	0.78	

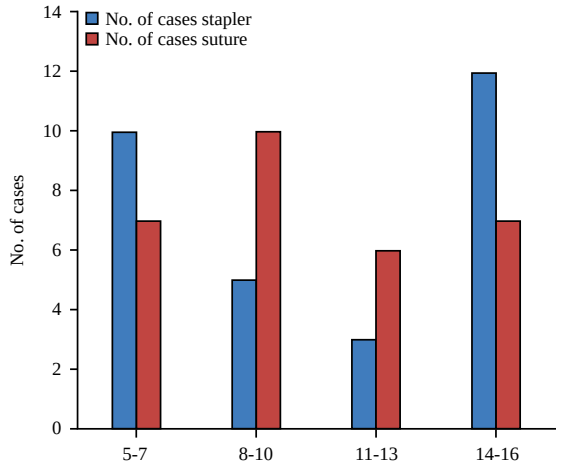

Fig. 1: Distribution of cases according to the length of the incision

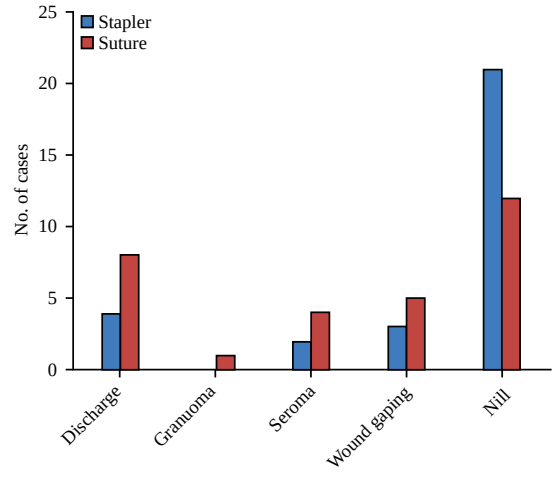

Fig. 2: Complications

Wound infection and discharge was the most common complication among this group. Complications are less in staple group as compared to traditional suturing group (Fig. 2).

CONCLUSION

From the above study we can conclude that Wound complications are less in staple group as compared to traditional suturing group. In both groups, most common complication is discharge. Although, more wound complications were seen in suture group but the difference is not statistically significant among the two groups. This may be due to small sample size. Staples are cosmetically much better than sutures with high patient satisfaction. Traditional skin suturing is cost effective as compare to skin stapler.

REFERENCES

1. Doctor, H.G., 1991. Surgeons and Sutures. 2th Edn., Ethicon, USA.
2. Orlinsky, M., R.M. Goldberg, L. Chan, A. Puertos and H.L. Slajer, 1995. Cost analysis of stapling versus suturing for skin closure. Am. J. Emerg. Med., 13: 77-81.
3. Menaker, G.M., 2001. Wound closure materials in the new millennium. Curr. Probl. Dermatol., 13: 90-94.
4. NICE., 2008. Surgical site infections: Prevention and treatment. Clinical guideline [CG74], https://www.nice.org.uk/guidance/cg74
5. Grassi, V., A. Pansadoro, G. Cochetti, F. Barillaro and E. Cottini *et al*., 2015. Pneumoscrotum: Report of two different cases and review of the literature. Ther. Clin. Risk Manage., 11: 581-587.
6. Zhan, C. and M.R. Miller, 2003. Excess length of stay, charges, and mortality attributable to medical injuries during hospitalization. JAMA., 290: 1868-1874.
7. Jørgensen, S.F., R. Nygaard and J. Posnett, 2013. Meeting the challenges of wound care in danish home care. J. Wound. Care., 22: 540-545.
8. Jourdan, M., D. Madfes, E. Lima, Y. Tian and S. Seité, 2019. Skin care management for medical and aesthetic procedures to prevent scarring. Clin. Cosmet. Invest. Dermatol., 12: 799-804.
9. Hochberg, J., K.M. Meyer and M.D. Marion, 2009. Suture choice and other methods of skin closure. Surg. Clin. North Am., 89: 627-641.
10. Edlich, R.F., G.T. Rodeheaver, J.G. Thacker, K.Y. Lin and D.B. Drake *et al*., 2010. Revolutionary advances in the management of traumatic wounds in the emergency department during the last 40 years: Part ii. J. Emerg. Med., 38: 201-207.
11. Johnson, A., G.T. Rodeheaver, L.S. Durand, M.T. Edgerton and R.F. Edlich, 1981. Automatic disposable stapling devices for wound closure. Ann. Emerg. Med., 10: 631-635.

12. de Lissovoy, G., K. Fraeman, V. Hutchins, D. Murphy, D. Song and B.B. Vaughn, 2009. Surgical site infection: Incidence and impact on hospital utilization and treatment costs. Am. J. Infec. Control., 37: 387-397.
13. MacGregor, F.B., A.W. McCombe, P.M. King and D.A.D. Macleod, 1989. Skin stapling of wounds in the accident department. Injury., 20: 347-348.
14. Clay, F.S., C.A. Walsh and S.R. Walsh, 1991. Staples vs subcuticular sutures for skin closure at caesarean delivery: A meta-analysis of randomized controlled trials. Austral. N. Z. J. Surg., 61: 363-365.