Print ISSN: 2321-6379
Online ISSN: 2395-1893

Original Article

Study of Comparison between Skin Sutures and Skin Staplers: Two hundred Studies

Sathish Rajkumar, G H Harish Kumaar, Sharath Rajkumar, M Rajkumar

Department of General Surgery, Meenakshi Medical College and Hospital and Research Institute, Kanchipuram, Tamil Nadu, India

Abstract

Background: There are various ways the skin approximation, whether it be sutures, staplers, glues, and sterile tapes, all of these have the same purpose of but the one which provides the best scar with least wound infection and consumes the least time is the one that should be used. So here, we have studied 200 patients for 10 months, comparing skin sutures with staplers and their outcome with respect to time consumed and percentage of complication.

Materials and Methods: A prospective type of study was conducted from October 2016 to July 2017 at Meenakshi Medical College and Hospital – Enathur, Kanchipuram, for comparison between skin sutures and skin staplers in terms of effectiveness and complications in 200 patients who underwent various surgical procedures. The patients included in this study were randomly selected from those who underwent various surgical procedures which were either elective or emergency with various incisions.

Results: The average time taken for skin closure by staplers is 1.84 min per 10 cm of the wound, and for skin sutures, it is 6.61 min per 10 cm of wound and complication rate for suturing is 30%, and for staplers, it is about 12%.

Conclusion: The outcome of staplers is cosmetically superior to skin sutures with overall less complication as compared to skin sutures.

Key words: Suturing, Staplers, Skin suture, Sutures

INTRODUCTION

Accurate tissue approximation is essential for operative repair of defects and execution of defects and execution of a safe healing process. Aside from gentle handling of tissues and careful dissection, the approximation must be achieved without tension and without compromising the integrity of the blood supply which is essential for healing process. The perfectness of tissue approximation and type of approximation influences the tissue healing rate, post-operative early and late complications of the surgical wound, and economical burden of the hospital. Through the ages, man sought for methods of binding wounds to promote healing. In the olden days spider webs, warrior ants, etc., were used until suture materials were discovered. In this modern era, broadly speaking, the materials or gadgets for the approximation of tissues are the sutures, staples or clips, glues, steritapes, etc., the secret to achieve a good wound healing lies in meticulous tissue dissection selection of suture material, methods of wound closure, and post-operative complications. The key principles involved to achieve perfect healing are the preservation of blood supply, minimal tissue damage, an approximation of edges without tension, correct suture spacing, and suture bites with proper selection of suture materials.

In conclusion, the surgical technique is far more important than the sutures used, but a good scientific knowledge of different sutures and needles and how they perform will aid the surgeon to achieve optimum wound healing. Since suture technology has kept pace with advances in surgical techniques, it is imperative on the part of the surgeon not only to be fully aware of them but also to keep them in their surgical armamentarium. Skin staplers are far better for skin closure in terms of effectiveness, cost, and terms of compliance and complications.

Access this article online

www.surgeryijss.com

Month of Submission : 08-2020
Month of Peer Review: 09-2020
Month of Acceptance : 10-2020
Month of Publishing : 10-2020

Corresponding Author: Sathish Rajkumar, Department of General Surgery, Meenakshi Medical College and Hospital and Research Institute, Kanchipuram, Tamil Nadu, India. E-mail: sathishrajkumarmailbox@rediffmail.com

This study is conducted for comparison of skin closure using skin sutures and skin staplers with respect to effectiveness and complications.[1-5]

Aim of Study

The aim of this study was to study the outcome of wound closure by skin sutures and skin staplers in terms of effectiveness and complications – a comparison study.

MATERIALS AND METHODS

This is a prospective type of comparison study conducted from May 2016 to October 2017 at Meenakshi Medical College – Kanchipuram, which includes 200 patients who underwent various surgical procedures.

The patients included in this study were randomly selected from those who underwent various surgical procedures including elective-emergency procedures with various incisions.

The relevant data of patients included in the study were collected and recorded as follows. Age of the patient, sex, occupation, type of incision, length of incision, gadget used for skin closure, time taken for skin closure, and post-operative complications, namely, wound infection, seroma formation, stitch abscess, stitch granuloma, wound gaping, and adverse scars were observed for and recorded in the pro forma.

The post-operative day of suture removal was also observed. The final outcome of the scar, whether good, fair, or ugly, was observed in the follow-up period and recorded in the pro forma.

Skin closure was done using suture materials, namely, silk, Prolene, and nylon and compared with staplers and the outcome was observed and recorded. The methods used for skin closure with suture materials were a simple, mattress and subcuticular sutures using various suture materials which are chosen based on the availability of suture materials in the operation theatre.

Observation

This study included a total of 200 cases that underwent various surgical procedures at various sites, various types of incision from the period of October 2017 to July 2018. Out of these 200 cases, 100 cases underwent skin closure by sutures, and 100 patients underwent skin closure by skin staplers.

The methods adopted for skin closure were chosen randomly in this study which revealed that suture materials were used in 100 patients and staplers in 100 patients.

Table 1: Percentage distribution of site of wounds

S. No	Site of wound	Number of patients	Percentage
1.	Head and neck	40	20
2.	Thorax.	40	20
3.	Abdomen and groin.	80	40
4.	Upper and lower limbs	40	20

Pie chart showing the % distribution of wounds with respect to the site

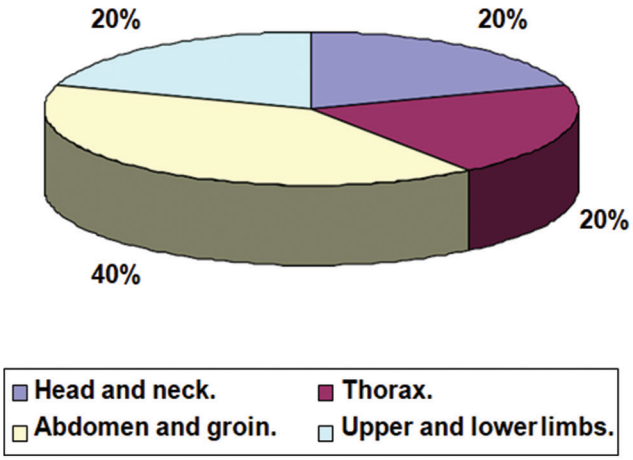


Table 2: Gadgets for skin closure

S. No	Gadget used	Number of patients	Percentage
1.	Suture	100	50
2.	Stapler	100	50

Bar chart showing the percentage distribution of complication rates among wounds closed with skin sutures.

Complications studied are wound gaping, wound infection, seroma formation, tissue reaction around the suture material, suture line necrosis, stitch abscess, granuloma, and ugly scars.

Average length of the wound and time of closure is nothing but the arithmetic mean obtained from the master chart.

Calculation

- The length of each wound and its time taken for closure using skin sutures is calibrated for a length of 10 cm
- Thus, the average time taken for closing 10 cm wound with skin sutures is $=\sum x/n = 6.61$ min (please refer to master chart for data).

Bar diagram showing percentage distribution of complication rates with skin staplers with respect to various site:

Table 3: Outcome for skin sutures

Site of the wound	Average length of wound	Type of suturing	Average speed of closure – minutes/10 cm wound	Materials used	Percentage of complications
Head and neck	7.3 cm	Simple (for face) and vertical mattress (for scalp) and subcuticular (for neck)	8.04	Prolene for face and neck and silk for scalp	6
Chest wall	9.05 cm	Vertical mattress	3.5	Silk	6
Abdomen and groin	12.9 cm	Vertical mattress	8.52	Silk	14
Upper and lower limb	10.3 cm	Vertical mattress	6.23	Silk	4

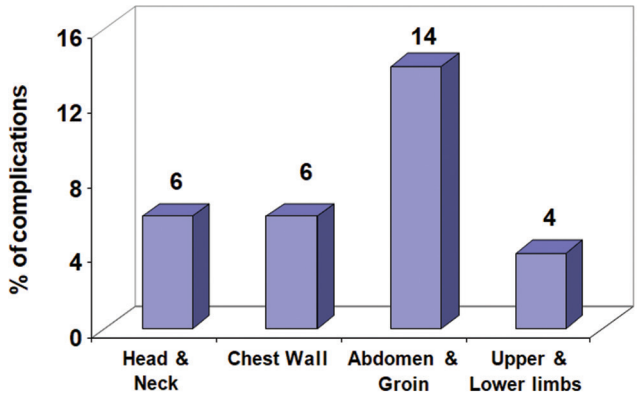
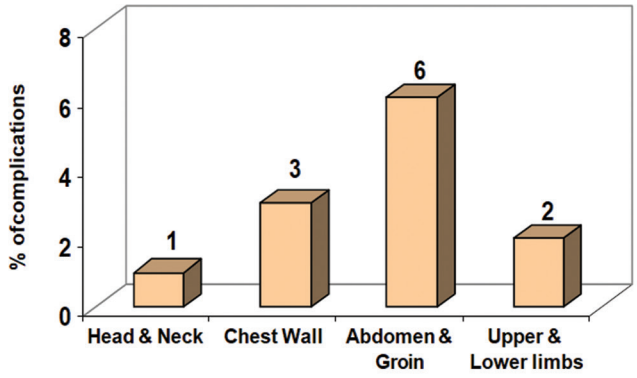


Table 4: Outcome for staplers

Site of wound	Average length of wound	Materials used	Average speed of closure in – minutes/10 cm wound	Percentage of complications
Head and neck	7.52 cm	Staplers	1.74	1
Chest wall	8.5 cm	Staplers	2.43	3
Abdomen and groin	9.95 cm	Staplers	1.65	6
Upper and lower limbs	10.9 cm	Staplers	1.54	2



Complications studied are wound gaping, wound infection, seroma formation, tissue reaction around the suture material, suture line necrosis, stitch abscess, granuloma, and ugly scars.

The average length of the wound and time of closure is nothing but the arithmetic mean obtained from the master chart.

Calculation

- Length of each wound and its time taken for closure using is calibrated for length of 10 cm
- Thus, the average time is taken for closing 10 cm wound with skin staplers $=\sum x/n = 1.84$ min (please refer master chart for data).

Percentage distribution of complications for sutures versus staplers.

Using the formula $\sum(O\text{-}E)^2/E$ the Chi-square value (X^2) is calculated as 9.76.

The degree of freedom for the above table is calculated using the formula (Column-1) × (Row-1), and the value is 1.

Table 5: Comparison between sutures and staplers

Gadgets used	Average speed of closure in minutes per 10 cm wound	Compliance of patients and surgeon	Incidence of complications
Suture	6.61	Fair	30%
Stapler	1.84	Good	12%

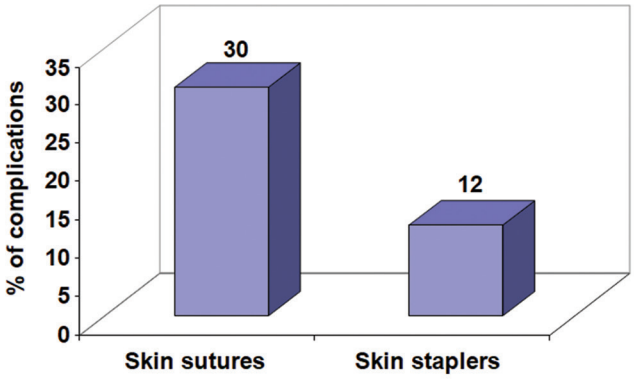


Table 6: Testing the significance (using null hypothesis)

S. No	No. of patients with complications	No. of patients without complications	Total	Complication rate
Sutures	30	70	100	30%
Staplers	12	88	100	12%
Total	42	158	200	

From the probability distribution table, the P-value for the obtained values is as follows:

- The value of Chi-square for a probability of 0.05 is 3.84, which is less than the calculated value.
- Furthermore, the value of Chi-square for a probability of 0.005 is 7.88, which is less than the calculated value.

However, for the probability of 0.001, the Chi-square value is 10.83, which is more than the actual value [Tables 1-6].

DISCUSSION

- A study conducted by Kanegaye *et al.*, – 1997, USA-studied 88 patients from 13 months to 16 years, attending the emergency department with scalp lacerations. Staples cost 39% less than per wound closure, and the complications reported were none. Stapling was fast than suturing the per wound
- A study conducted by Ritchie and Roke – 1989, Northern Ireland-studied 200 cases with the lacerated wound on scalp. The average speed of repair for staplers is 49 s, and for skin, sutures are 6 min and 20 s. Wound repair by staples is less painful than with skin sutures. There was no significant difference in cost and complications
- A study Brickman and Lambert in 1989 – USA – studied 76 patients with lacerations in scalp, trunk, and extremities. The average time taken for staplers is 30 s. One scalp wound and one leg wound dehisced. Staplers were cost-effective than sutures and compliance was good
- A study by MacGregor *et al*. in 1989, Scotand – 100 patients with lacerated wounds. The mean time for stapler repair is 18.6 s and for suture is 124 s. The cost of repair and the complication rate was almost same. The patient compliance with stapler is good than sutures and no local anesthesia applied for stapling
- A study by Orlinsky *et al*. in 1995, USA – studied patients presenting in the emergency department with lacerations of scalp, trunk, and extremities. The average speed of stapling is 8.3 s/cm wound for staplers and 63.2 s/cm wound for sutures. The cost of wound repair per wound was significantly higher in skin sutures than staplers.
- In this study, the average time taken for skin closure by staplers is 1.84 min per 10 cm of wound and for skin sutures; it is 6.61 min/10 cm of the wound. Complication rates for suturing are 30% and for staplers, it is about 12%.[6-10]

CONCLUSION

- From the *P*-value, it is concluded that staplers are effective in terms of the lower incidence of complication rate at the probability of 0.005
- Staplers consume less time when compared to skin sutures, particularly in major cases and in the emergency which can reduce the duration of anesthesia
- Since staplers, by reducing the complication rate, it is cost-effective
- Compliance for surgeon and patient is also good for staplers
- Apart from gadgets that are used in wound closure, there are other significant factors that contribute to overall complication rates that are 21% in this study (i.e., 6% for skin staplers and 15% for skin sutures)
- The outcome of staplers is cosmetically superior to skin sutures.

REFERENCES

1. Das S. A Concise Textbook of Surgery. 3rd ed. Kolkata: Dr Somen Das; 2010.
2. Brunicardi F, Billiar T, Dunn D, Hunter J, Pollock R. Schwartz's Principles of Surgery. 8th ed. New York: McGraw-Hill Education; 2004.
3. Baker RJ, Fischer JE. Metabolic response to trauma and

infection. In: Mastery of Surgery. 4th ed. Philadelphia, PA: Lippincott Williams and Wilkins; 2002.
4. Kirk RM. Choose well, cut well, get well. In: General Surgical Operation. 4th ed. Edinburgh: Churchill Livingstone; 2000.
5. Russell RC, Williams N, Bulstrode C. Wounds/tissue repair/scars. In: Bailey & Love's Short Practice of Surgery. 24th ed. London: Hodder Arnold; 2004.
6. Farquharson M, Moran B, Hollingshead J. Surgery of skin & subcutaneous tissues. In: Farquharson's Textbook of Operative General Surgery. 9th ed. London: Hodder Arnold; 2005.
7. Townsend CM. Wound healing. In: Sabiston's Textbook of Surgery. 17th ed. Philadelphia, PA: Saunders; 2004.
8. Zabel DD. CSDT. 11th ed. Topic in wound healing.
9. Kumar V, Cotran RS, Robbins SL. Wound healing. In: Robbins Basic Pathology. 7th ed. Philadelphia, PA: Elsevier; 2000.
10. Cuschieri SA. Basic Surgical Skills. 4th ed. London: The Royal College of Surgeons of England;2011.

How to cite this article: Rajkumar S, Kumaar GHH, Rajkumar S, Rajkumar M. Study of Comparison Between Skin Sutures and Skin Staplers: Two hundred Studies. IJSS Journal of Surgery 2020;6(5):5-9.

Source of Support: Nil, **Conflict of Interest:** None declared.