

A COMPARATIVE STUDY BETWEEN SKIN SUTURES AND SKIN STAPLES IN ABDOMINAL SURGICAL WOUND CLOSURE

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ABSTRACT

BACKGROUND

The skin stapling devices have revolutionized surgery for the purpose of rapid closure of abdominal wounds. However, staples have their own drawbacks. In view of this, this prospective study has been undertaken to highlight the outcomes of closure by staples and sutures.

MATERIALS AND METHODS

This proposed study was conducted at Sridevi Medical College, Hospital and Research Centre, Tumkur, Karnataka, over a period of 2 years from October 2009 to September 2011.

RESULTS

Mentioned results were analyzed and compared with the previous studies with regard to speed of closure, cost effectiveness, post-operative pain, post-operative wound dehiscence and acceptance of the scar.

CONCLUSION

It has been found that the use of staples in abdominal surgical wound closure gives faster speed of closure, less postoperative pain, and better cosmetic results. Staples, however, are costlier, and when used in emergency cases, associated with higher rates of wound dehiscence and a less acceptable scar.

KEYWORDS

Skin Staples, Nylon Suture Material, Post-operative Wound Infection, Operative Scar

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BACKGROUND

Any surgical intervention will result in a wound in order to get access to and deal with the underlying pathology. In this situation, the surgeon's task is to minimize the adverse effects of wounds, remove or repair the damaged structures and harness the process of wound healing to restore function.

The principle aims of tissue repair of surgical skin incisions are rapid acquisition of strength and minimum tissue damage, with minimum inflammation and a good scar. Many factors including the choice of suture materials and its placement influence these and of particular relevance is the accurate co-optation of dermal edges; eversion or inversion leads to sub optimal healing.

For many years, sutures have been used to approximate the skin edges, and also to hold the cut tissues together until the wound has healed sufficient enough as to be self-supportive. Throughout antiquity many materials have been

used to approximate the skin edges. Suture technology and suture sterilization have kept pace with advancement in surgical techniques and provided the surgical fraternity a wide range of sutures in different size as fine as 30 microns. Now the surgeon has at his disposal a wide variety of suture materials like natural and synthetic, non-absorbable and absorbable, monofilament to poly filament. However, sutures have the disadvantage of consuming more time in applying and with a cosmetically inferior scar. The use of other methods to approximate the wound edges like stapling devices, glue or adhesive tapes have becoming more popular of late to overcome these disadvantages. At present, cost effectiveness is debatable.

MATERIALS AND METHODS

This proposed study was conducted at Sridevi Medical College, Hospital and Research Centre, Tumkur, Karnataka, over a period of 2 years from October 2009 to September 2011.

The study included 200 patients who underwent abdominal surgeries, including both emergency and elective surgical procedures. All patients with abdominal surgical wounds were included, but excluded from the study were patients with skin infection, patients with post burst abdomen, wounds secondary to burns, all patients with anaemia and diabetes. The patients were allotted alternately into two groups of 100 each. In group 1, abdominal wound

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closure was done (using 2-0/3-0 monofilament nylon) with mattress sutures. In group 2, abdominal wounds were closed with surgical skin stapling device.

The outcome was measured in terms of

1. Speed of closure.
2. Cost effectiveness.
3. Post-operative pain.
4. Post-operative wound dehiscence.
5. Acceptance of the scar.

Results were analysed and compared with the previous studies.

RESULTS

Speed of Closure

Speed of closure was faster with staples. The average duration of closure was 8 minutes in suture group and 60 to 70 sec in staples group. The abdominal wound closure in case of staples group was hence 5 to 7 times faster in comparison to suture group (on an average the length of abdominal surgical wound was 12 to 15 cms).

Postoperative Pain

Post-operative pain assessment was done using visual analog score. Immediate post-operative pain scores were higher with the use of sutures as compared to staples in both elective and emergency cases. 56% of elective cases in whom suture closure was used had a pain score of 3 or higher, compared to only 17.2% in staple closure group. For emergency cases, the figures were 84% for the sutures group and 14.3% for the staples group

Post-Operative Wound Infection and Dehiscence

Post-operative wound infections were marginally higher (almost comparable) in staples group (13.7%) compared to sutures group (12%) in elective cases; but significantly higher in staples group (38.09%) compared to sutures group (16%) in emergency cases.

Cosmetic Results

Cosmetic results were better with staples in elective cases. However when staple closure was used in emergency cases, post-operative wound infection and dehiscence were higher and hence healing was with secondary intention; the resultant scar was thick and cosmetically less acceptable. (scars were compared after 3 months of surgery).

Cost

The average median cost in suture group was Rs. 100/- and in staple group Rs. 310/-. Staple closure was hence thrice as costlier as sutures.





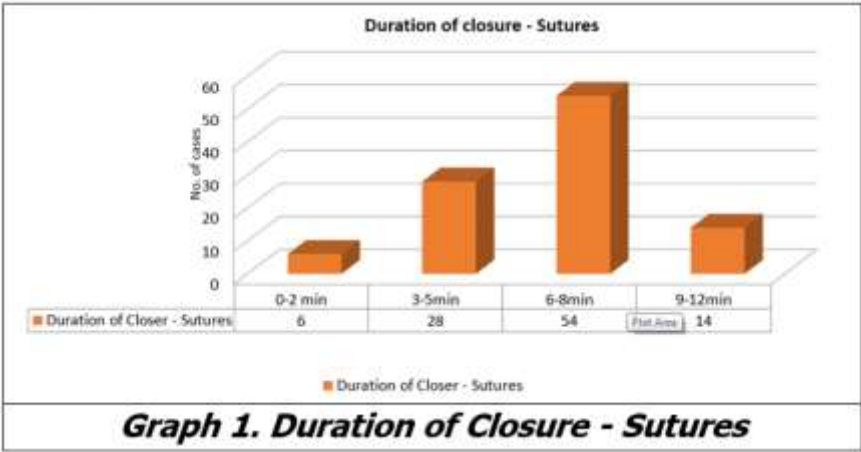
Figure 4. With Wound Infection

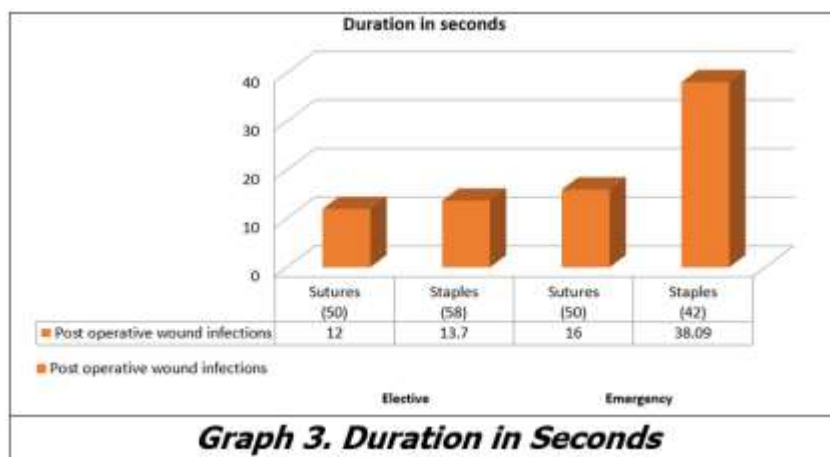


Figure 5. Post-Op 3 Weeks



Figure 6. 1st Week Post-Op





DISCUSSION

Wound closure is a vital step for producing a healthy and strong scar and also for ensuring aesthetically pleasing appearance.

Surgical stapling was developed in 1908 by a Hungarian surgeon, Humer Hultl. The original instrument was massive by today's standards weighing 7.5 pounds. Modifications performed by Von Petz provided a lighter and simpler device, and in 1934 Fredrick of Ulm designed an instrument that resembled the modern linear stapler. In 1958, Ravtich, refined the instruments to their current state and wide spread use today.¹

Staplers are made up of stainless steel. They are virtually inert. They have uniform shape and constant staple depth providing even wound tension. Rectangular shape design minimizes the trauma and minimizes the tissue compression thereby causing minimal tissue reaction and trauma and leads to wound healing with minimum scar.

The development of disposable skin staplers has made this method of wound closure an increasingly popular technique. Skin staplers are quick and easy to use and numerous studies have confirmed the speed and efficacy of stapling compared with suture repair.

Eldrup et al (1981) analysed 137 patients undergoing abdominal or thoracic surgeries, and concluded that the main advantage of using staples was the time saved, as closure with mechanical suture took one third of the time required for the conventional method. On the other hand closure with staples resulted in the major disadvantage of additional expenses, as the cost was forty seven times higher than that of the suture with Dermalon.²

Meiring et al (1982) reported slightly better cosmetic results in a group of 40 patients undergoing laparotomy with an 80% in time saving. They also concluded that the final cost of the stapler was crucial for selecting the method.³

Gatt et al (1985) concluded from a controlled trial of staples for wound closure that the speed and convenience of the skin staples outweigh the extra costs.⁴

Lubowski and Hunt (1985) consider proximate staple closure a suitable and faster method for vertical abdominal wound compared to sutures.⁵

Stockley and Elson (1987) compared the results of closure with staple and nylon sutures found a higher incidence of inflammation, discomfort on removal and spreading of the healing scar with staples. The only advantage of staples was speed of wound closure?⁶

Ranabaldo and Rowe-Jones (1992) compared staple with subcuticular sutures in 48 patients undergoing laparotomy and concluded that the difference in time was significant, nevertheless, the cost was five times greater with staples.⁷

Luiz R Medina dos Santos et al (1995) in their study of 20 patients concluded that the use of skin staplers speed up closure by 80%, with better cosmetic results.⁸

John T Kanagaye, Cheryl W Vance, Linda Chan, and Nancy Schonfeld (1997) at the Children hospital, Los Angeles, USA, reported that staple closure was safe, rapid and cost effective and resulted in a cosmetically acceptable scar.⁹

Iavazzo et al (2011) from a meta- analysis of randomized controlled trials comparing sutures with staples for the management of surgical wounds reported that staples were faster, with fewer wound infections but associated with more pain compared with sutures. Cosmetic results were comparable.¹⁰

In our present prospective study comparing skin sutures and skin staples for abdominal surgical wound closure, it has been noted that though the method of closure by the staples was significantly faster in comparison to sutures, it is met with certain drawbacks such as post-operative infection with wound gaping, and subsequent prolonged duration of hospital stay posing economic burden on patients and doubling the cost factor in emergency infective cases as compared to clean elective cases.

In elective cases, the scar was found to be cosmetically superior with better patient acceptance in staples group in comparison to sutures group. But in emergency cases, due to post-operative wound dehiscence the patient acceptance of the scar was poorer in staples group as compared to sutures group.

The sutures were more cost effective compared to staples; the immediate post-operative pain was comparatively higher in the sutures group.

CONCLUSION

Though the staples cost higher in comparison to sutures, the wound closure time was much less which was statistically significant and in agreement with the literature reviewed. This has a great impact on post-operative recovery as the patient can be weaned off from the anaesthesia faster and thereby reducing overall operating time and hence decreasing post-operative morbidity and mortality.

In terms of patient acceptance of scar, we conclude that staples have good acceptance in clean elective cases and they are met with significant post-operative wound infection in contaminated and emergency cases. Since staples are easier and faster to apply compared to sutures, the study showed that staples form an important surgical armamentarium for wound closure for elective and clean cases.

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