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An Observational Study of Skin Closure by Conventional Suture Verses Stapler in Clean Surgical Wound

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Surgical wounds; Staplers; Sutures; Discomfort

1. Abstract

1.1. Background: Suture application is the technique of choice for the approximation of skin margins in surgical wounds. The same procedure as when applying staplers is faster and brings better cosmetic results. A comparative study was conducted between conventional suture and skin closure of surgical wounds using a stapler to investigate the advantages and disadvantages of these techniques. The aim was to study the time duration needed to close surgical wounds, the aesthetic result, postoperative complications like surgical site infections, post-operative pain, etc and patient compliance.

1.2. Methods: We conducted a single centre, observational longitudinal study with 64 patients undergoing surgeries. Patients were divided into 2 groups, stapler and conventional suture techniques, with 32 patients each. Data for time to skin closure, aesthetic outcome, postoperative complications, and patient compliance were collected for both groups for comparison.

1.3. Results: It was found that the incidence of complications in case of patients with wound closure done by stapler was less as compared to those with conventional suturing techniques. The duration of wound closure was less in stapler group and the incidence of surgical site infections was also reduced. The stapler group also had better cosmetic results and less pain in the post operative period and while suture removal.

1.4. Conclusions: Closure of skin with stapler is a faster method. Patient's compliance with stapler closure is better. It produces cosmetically acceptable scar and less discomfort or pain during its removal.

2. Introduction

The act of sewing is as old as Homo sapiens. In Sushrutas Samhita 600 BC mentions sewing material made from animal sinew, plaited horse hair, plant fibers and leather strips. This text describes triangular, round, curved and straight needles in detail.

Suture application is the technique of choice for approximating the edges of the skin in surgical wounds. However, stitches have the disadvantage that they require more time and are applied with a cosmetically worse scar. So, to overcome these disadvantages, the use of automatic skin closure stapling equipment has become more popular recently.

Most devices are disposable and relatively expensive, but their cost is offset by savings in operating time and a potential increase in the scope of operations. There is evidence that a stapler causes significantly less damage to wound defenses compared to less reactive ones, non-absorbable suture materials.

Therefore, a comparative study was conducted between the application of conventional suture and skin closure with a stapler in a post-surgical wound to compare the advantages and disadvantages of the techniques in order to study the time required to close the surgical wound with a stapler, the aesthetic outcome after surgery complications. and patient compliance in order to determine a better method compared to others and also to determine the total cost using sutures and staples in our institution.

3. Methods

We conducted a single centre, observational longitudinal study with 64 patients undergoing surgeries. Patients were divided into 2 groups, stapler and conventional suture techniques, with 32 pa-

tients each.

Study Design - Observational longitudinal study.

Study Setting - Department of General Surgery, NKPSIMS & LMH, Nagpur, a tertiary care academic hospital.

Study Population - Patients from postoperative cases from department of surgery.

Source of Data - The present study is a prospective study consist of 64 cases admitted in our hospital, during the study. Total 64 cases for the purpose of study were selected randomly to receive 32 patients each in either staples or conventional sutures for skin wound closures.

Inclusion Criteria - Inclusion criteria included patients undergoing elective surgery, with clean wounds

Exclusion criteria - Exclusion Criteria were

• Patients having lacerated wounds with skin loss

• Patients having raised blood sugar, HIV infection or with co morbidities

• Patients with age less than 18 years.

Data Collected -

• During operation- from operating surgeon

• From patients - postoperatively.

4. Results

This study was conducted with 64 patients who underwent elective or emergency, open surgeries. Among the 64 patients, 32 patients were randomly selected for conventional suture technique and 32 patients underwent wound closure by stapler.

Among both the groups, the youngest patient was aged 19 years and the eldest was 75 years. The age wise distribution in the study is shown in Table 1. The most common g group in the study was between 31-40 years of age.

There were 50 males and 14 females in this study, out of which 27 males has undergone for stapler suture and 23 males has undergone for conventional suture. Out of 14 females, 5 females has undergone stapler suture and 9 has for undergone conventional suture. Gender distribution I shown in Table 1.

In the study, it was observed that stapler suturing takes less time for wound closure than conventional suture. There is significant difference over suture closure. This is shown in Table 2.

The study shows that the incidence of surgical site infection is more in case of conventional group than stapler group. Surgical site infection was found in 2 patients in stapler group and 5 patients in conventional group .It was observed that number of patients undergoing stapler suture are less prone to surgical site infection than conventional suture. Results are shown in Table 3.

Comparison of pain during post operative period was done according to Likert scale, ranging from 0-10 where 0 was denoted as No hurt and 10 as Hurts worst. So, more patients with pain were found in conventional group as compared to stapler group (Table 4).

Comparison of pain at the time of suture removal was done according to Likert scale ranging from 0-10 where 0 was denoted as No Hurt and 10 as Hurts worst. So, more patients with pain were found in conventional group as compared to stapler group. This is shown in Table 5.

On comparing the suture scar in both the groups, no difference was found as our study considered limited follow up. Because of limited duration of study and follow up, significant scarring was not seen (Table 6).

Patients satisfaction was also considered in our study, considering the pain and cosmetic results for both the groups, 28 patients were fully satisfied from stapler group and 24 patients from conventional group. 4 patients were found unsatisfied from stapler group due to presence of secondary site infection, pain during wound closure, pain at the time of suture removal and 8 patients from conventional group as there are more chances to develop secondary site infection, pain in conventional suture (Table 6).

Table 1: Age & Gender distribution in study groups

Age group	No. of patients in Stapler group		No. of patients in conventional suture group	
(years)	Male	Female	Male	Female
>10 - 20	0	0	0	1
21 - 30	3	2	3	2
31 - 40	11	0	5	0
41 - 50	7	2	4	2
51 - 60	5	1	4	3
61 - 70	1	0	6	1
71 - 80	0	0	1	0

Table 2: Duration of closure

Duration of closure (min)	No. of patients in Stapler suture	No. of patients in Conventional suture
0 - 2	**2**	**0**
>2 – 4	**0**	**0**
>4 – 6	**30**	**0**
>6 – 8	**0**	**0**
>8 – 10	**0**	**17**
>10 - 12	**0**	**0**
>12 - 14	**0**	**0**
>14 - 16	**0**	**6**
>16 - 18	**0**	**0**
>18 - 20	**0**	**9**

Table 3: No. of surgical site infection

Surgical site infection	No. of patients in Stapler suture	No. of patients in Conventional suture
Yes	2	5
No	30	27

Table 4: Comparison of pain during post operative period

Pain scale	No. of patients in Stapler suture	No. of patients in Conventional suture
0	0	0
1	0	0
2	2	0
3	1	1
4	0	3
5	0	2
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0

Table 5: Comparison of pain at the time of suture removal

Pain scale	No. of patients in Stapler suture	No. of patients in Conventional suture
0	0	0
1	1	0
2	2	0
3	1	1
4	0	4
5	0	3
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0

Table 6: Satisfaction of patient

	No. of patients in Stapler suture	No. of patients in Conventional suture
Satisfied	**28**	**24**
Unsatisfied	**4**	**8**

5. Discussion

Skin approximation in wound closure is the final step in all surgical procedures. With advances in science and technology, skin closure methods have improved significantly over time. Skin closure is important in postoperative recovery, early discharge of patients. Faster methods of skin/wound closure would allow the anesthesia team to wean the patient from anesthesia in less time, thereby reducing postoperative morbidity and mortality.

Basic goals of tissue repair of surgical skin incisions are, rapid recovery of strength and minimum tissue damage with minimal inflammation and good scar. Many factors including the choice of suture material and its placement affects those goals.

The main aim of the study is to compare the two techniques of wound closure i.e., stapler suture and conventional suture in various aspects. With the advancing technological era, the techniques for wound closures in surgeries needs to be improved to minimize the complications like SSI, Post operative Pain, etc.

In our study, it was found that incidence of complications were low in wound closure done by stapler as compared to wound closure one by conventional suture techniques. In the study by Sagar S. Kathare et.al.[2] it was found that Stapler technique is more convenient, saves time and costs effective, routine staple removal is less painful in comparison to remove stitches, so staplers were very popular operators and resulted in substantial and valuable saving time for wound closure.

In the study by Pinky Rabha, et.al,[1] it was found that approximating the edges of the skin with a stapler is a faster way to close surgical wounds. Patient compliance in stapler wound closure with a cosmetically acceptable scar, less discomfort and pain during removal was better as compared to the application of conventional suture material. However, there were no significant postoperative complications in either group.

In the study by Ketan Vagholkar, et. al.,[7] it was found that the approximation of the skin clamps has a contrast suture approximation. Shorter operating time, less pain, very few wound complications and excellent surgical results gentle scar method leading to better patient satisfaction staple skin approximation the most recommended closure method.

In this study, it was found that the stapler is more convenient and less time consuming than conventional as it takes less duration of closure, less time for wound healing, low incidence of surgical site infection, less pain during post operative period and at the time of removal of suture, less scarring in follow up outcome.

6. Conclusion

In our study, it was found that stapler suture is more convenient than conventional suture, as it takes less duration of closure, less effects on wound healing concerning surgical site infection, less pain during post operative period and at the time of removal of suture, less scarring in follow up outcome. The patient satisfaction concerning cosmetic outcome and compliance was better in case of stapler suturing. The observations of our study are found to be similar to the previously published studies.

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