

Comparative study of wound closure with conventional sutures versus skin stapler in uncomplicated open inguinal hernia surgery

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ABSTRACT

BACKGROUND: Skin closure is done with sutures. But if skin stapler is used for skin closure, it produces better cosmetic results. A comparative study between conventional sutures and skin stapler for wound closure in uncomplicated open inguinal hernia surgery was undertaken. The aim was to compare outcome of wound closure with conventional sutures versus skin stapler in terms of wound healing, post operative pain, wound closure time and cosmetic results.

METHODS: This was a prospective comparative study, conducted in 100 patients undergoing surgery for uncomplicated open inguinal hernia. In 50 patients, skin closure was done with sutures (ethilon 2,0) and in other 50 patients, skin closure was done with staplers. Data was collected for time required for skin closure, cosmetic outcome, post operative complication which was analysed using t test for comparison and chi square test for significance.

RESULTS: With skin stapler, there was better wound cosmesis, less post operative pain, less time required for skin closure compared to that of conventional sutures. Only the cost is slightly more of skin stapler compared to sutures.

CONCLUSION: It can be concluded from this study that skin stapler are superior method than sutures for skin closure.

INTRODUCTION

There has been substantial development in the techniques in the surgery which have helped surgeons to reduce the length of the stay of patients in the hospital, and one of the important factor for this is the method of the skin closure. In any type of surgery, the complications related to wound are one of the most common and significant source of morbidity and this can also prolong the stay of the patient or it can cause readmission of the patient again to the hospital.

There is no consensus as to which is the ideal technique and the suture material which can be used for wound closure and that remains to be decided. Multiple studies have been done to compare the sutures and staples but there remains a significant difference in the results.

Skin is the largest and most significant organ of the body and it helps in protecting the internal organs inside the body. Basically, skin closure technique mainly depends upon the procedure performed along with the surgical site where it is performed, as this is related with intraoperative and postoperative complications.

Purpose of any type of skin closure technique is to reduce the tissue loss as much as possible, along with minimum scarring which will be cosmetically acceptable and can lead to faster healing with minimal complications, minimal scarring, minimal pain and the cost incurred. Another important factor to consider is, that the skin is barrier between the internal organs and the environment which is protective and self-repairing in nature. Therefore, it is necessary that skin closure should be performed without any tension and it can retain good vascularity, along with minimum damage and it can be aesthetically acceptable.

There remains a variation in the skin as an organ in the population such texture, thickness, elasticity, speed of healing and tendency of the scar.

Several studies which have been done show that the staplers are superior compared to sutures as they decrease the postoperative pain and are cost effective as well. The main purpose of any skin closure should be to normalise the function and it should be cosmetically acceptable. [1](#), [2](#)

It is possible that in case cosmetically unacceptable scar, it may affect the quality of life of that individual and can cause considerable distress and unhappiness. (3, 4)

Because of this it is important that precaution from infection of surgical wound is necessary as it may lead to hernia or formation of ugly scar.

The present article aims to compare the outcome of wound closure in uncomplicated open inguinal hernia surgery with conventional sutures versus skin stapler.

AIMS AND OBJECTIVES

AIM:

To compare outcome of wound closure in uncomplicated open inguinal hernia surgery with conventional sutures versus skin stapler.

OBJECTIVES:

1. To compare effect on wound healing and post operative pain.
2. To compare cosmetic result.
3. To compare wound closure time.

METHODS AND MATERIAL

STUDY DESIGN:

COMPARATIVE PROSPECTIVE STUDY

SOURCE OF DATA

Patients admitted to surgery department in Krishna Hospital for surgery of uncomplicated inguinal hernia during the period of JANUARY 2021 To JUNE 2022 were taken for study, considering the inclusion and exclusion criteria.

METHOD OF COLLECTION OF DATA: A total of 100 cases were taken for the study. 50 cases were assigned randomly to two group. In group A wound closure was done with conventional sutures and in group B wound closure was done with skin staplers.

FOLLOW UP:

These patients were followed up for wound examination on 7th post operative day. Suture/stapler removal was done on 10- 12th post operative day. After that patient were followed up at the end of 3 months.

INCLUSION CRITERIA

1. Patients undergoing unilateral uncomplicated open inguinal hernia surgery (meshplasty).

EXCLUSION CRITERIA

1. Patients less than 18 years and more than 80 years of age.
2. Patients with complicated inguinal hernia and recurrent hernias.
3. Wound closure with subcuticular sutures.
4. Patients operated for hernia by other methods.

Method:

Thus 50 patients in each study group were studied. Patients were selected for the study after taking careful detailed history, clinical examination, laboratory investigations. The patients eligible for the study were selected, informed and explained regarding the above study and a proper informed, valid, written consent was taken for participation in the study. Patients were kept nil by mouth after 10 pm the previous day of surgery. Parts preparation was done. Wound closure time was noted. Patients were followed-up on 7th post operative day. Suture removal was done on 10-12th post operative day. After that patient were followed up at the end of 3 months. Skin suturing was done with ethilon 2,0 in cases with wound closure with conventional sutures. For those cases where skin stapler was used- skin edges were cleaned with povidine iodine and dried. Staples were removed with help of specially designed extractor. Effect on wound healing, patient acceptance, cost and cosmetic result were assessed. After 3 month of surgery, wound was assessed for width, colour, hypertrophy and overall cosmetic result.

OBSERVATION AND RESULTS

Table 01: age group distribution

Age group	Sutures	Stapler
20-30	3 (6%)	4 (8%)
31-40	8 (16%)	10 (20%)
41-50	15 (30%)	7 (14%)
51-60	9 (18%)	13 (26%)
61-70	10 (20%)	9 (18%)
71-80	5 (10%)	7 (14%)
Total	50	50

Table showing distribution of patients according to age who have undergone skin closure by conventional sutures and skin stapler.

Table 02: Gender distribution:

Gender	Suture	Stapler	Total
Male	47 (94%)	48 (98%)	95 (95%)
Female	3 (6%)	2 (4%)	5 (5%)
Total	50	50	100

Table showing distribution of patients according to sex in both the group

Table 03: Average time for skin closure

Stapler / Suture	Mean (seconds)	Standard Deviation	P value
Stapler	139.7	62.89	0.001
Suture	620.5	230.5	

Table showing average skin closure time by conventional sutures and skin stapler. 620.5 seconds is the average time for skin closure by sutures. 139.7 seconds is the average time for skin closure by stapler. The P value was found to be 0.001. Hence this was statistically significant.

Table 04: Wound cosmesis score

	Wound cosmesis score		P value
	Mean	S.D.	
Stapler	3.49	0.61	0.001
Sutures	2.59	0.84	

Table showing score for wound cosmesis in patients who underwent skin closure by sutures and stapler. The P value was found to be 0.001. Hence this was statistically significant. Skin closure by stapler was found to be cosmetically better than that of skin closure by conventional sutures.

Table 05: average time for closure (sec/cm)

	Average closure time (secs/cm)		P value
	Mean	S.D.	
Staple	8.9	2.1	<0.001
Suture	43.8	5.2	

8.9secs/cm of incision was the average time for skin closure by stapler and 48.3secs/cm was the average time for skin closure by suture. The P value was found to be 0.001. Hence this was statistically significant.

Table 06: Length of incision

Length (cms)	Number of cases		Total
	staple	suture	
0-5 cm	18	27	45
5-10 cm	32	23	55
Total	50	50	100

Table showing distribution of cases according to incision length.

Table 07: Visual Analogue Scale for Post operative Pain

Suture/staple	Visual analogue scale for pain		
	Mean	S.D.	P value
Staple	4.6	0.9	0.001
Suture	7.3	1.48	

Table comparing post-operative pain for patients who underwent skin closure by suture and staplers according to visual analogue scale. The P value was found to be 0.001. Hence this was statistically significant. According to visual analogue scale, patients who underwent skin closure with skin stapler perceived less pain than that of suture group.

Table 08: average time for suture / staple removal

Suture/staple	Average removal time (seconds)		
	Mean	S.D.	P value
Staple	74.4	29.8	0.001
Suture	210.8	88.9	

Table showing average time for suture and stapler removal in seconds . The P value was found to be 0.001. Hence this was statistically significant. Skin stapler required less time for removal than that of time required in seconds for suture removal.

Table 10: Post operative complications

Complication	staple	%	Suture	%	P value
Discharge	3	6%	7	14%	0.028
Scar	1	2%	7	14%	0.033
Nil	46	92%	36	72%	
Total	50		50		

This table shows complications encountered in skin closure with sutures and staplers. Complications in around 8 percent of patients were seen in patients who underwent skin closure by skin stapler. Most common complication in this group was discharge and wound infection. Whereas in the suture group, complications were seen in about 28 percent of patients. Wound infection and discharge was the most common complication among this group.

Table 11: Cost effectiveness of suture/staple in patient prospective

	Stapler	%	Suture	%
Cheap	7	14%	40	80%
Costly	43	86%	10	20%

Table describes the number of patients who feel stapler is costly (86%) whereas 14% patients feel that stapler is cheap. In suture group, 80% patients felt that sutures are cheap and 20% felt that sutures are costly.

DISCUSSION

Sutures are generally cheap tools for closure of the wounds though they can take longer time for the closure and also involves higher chances of needle stick injury to the operating staff compared to the stapler.

Problems faced during the suturing of the wounds are:

1. Needle stick injury to the operator
2. Injury to the blood vessels in the skin may lead to hematoma formation.
3. Stitch abscess

In the present study of total 100 patients 50 patients each were distributed in the suture group and stapler group.

The comparison between the groups was done on the bases of:

1. Post operative wound complications
2. Wound cosmesis (according to wound cosmesis score)
3. Post operative pain (according to visual pain analogue scale)
4. Time consumption
5. Cost

In the present study comparison of stapler and suture was done in the clean inguinal hernia repair. Total 100 participants were included in the study which were allotted in either stapler or suture group with 50 patients each. There was no significant difference found with respect to the age group distribution. In the suture group maximum number of patients were found in the 41-50 years age group with total 30%. 20% patients were present in 61-70 years whereas 18% and 16% were present in 51-60 years and 31-40 years age group respectively.

In the stapler group as well 26% of the total patients were in 51-60 years and 20% in the 31-40 year age group, 18% in 61-70 years, 14% in the 41-50 years age group were present.

The study population was also assessed according to the gender distribution, the majority of the patients found were male with total 95% of the study population and only 5% of the patients were females.

In a study done by Pinky Rabha et al [5](#) for comparison of role sutures and stapler in the abdominal surgeries also included total 100 patients. in each group total 50 patients were distributed who either underwent wound closure with nylon suture or skin stapler.

In the both group the youngest patients was age 25 years to oldest with 65 years of age. The most common group in this study was found to be 35-50 years.

Another study similar to the present study done by Gopal sharma et al [6](#) for comparison of sutures with stapler in the laparotomy procedure found that the age of the patients varied from 16 to 85 years. The mean age of the participants in the suture group and stapler group were 34.12 ± 4.073 and 34.74 ± 4.769 respectively.

Average time taken for skin closure with stapler or suture was also assessed in the present study. the time taken by stapler was significantly lower compared to sutures with mean time 139.7 ± 62.89 seconds and for suture the mean time was 620.5 ± 230.5 seconds. The difference between the skin closure was found to be statistically significant with p value 0.001.

In the Pinky Rabha study the mean duration of time for stapler closure was 60 ± 15.37 seconds and the skin closure time taken using sutures was 219.3 ± 47.72 seconds. This was almost 4 times that of stapler skin closure and the difference was statistically significant with p value < 0.001 .

In the Gopal Sharma study the average time taken for skin closure in suture group was found to be 300 ± 20.78 seconds and for stapler group it was 120 ± 16.50 seconds. This difference between skin closure was found to be statistically significant with p value < 0.05 .

Both these study findings were similar to the present study suggesting that the time taken by stapler was very less compared to sutures group.

In the present study the wound cosmesis score was also assessed. The mean wound cosmesis score in stapler group was 3.49 ± 0.61 and in suture group was 2.59 ± 0.84 . The difference between the mean score between the group was statistically significant ($p < 0.001$).

In the Pinky Rabha study, the cosmesis score was not assessed but it was found that cosmetic appearance was found to be good in 84% of the stapler group, acceptable in 12% and poor in 4% of the study group. In the suture group the appearance was good only in 56%, good in 32% and poor in 12% of the study group. The difference between cosmetic appearance was statistically significant with p value < 0.001 . suggestive highly acceptable nature of stapler compared to sutures.

In the Gopal Sharma study, the appearance of scar among the suture was good in 72%, 20% had average scar with widening or hypertrophy of the scar with itching present when the patients returned for follow up after one month. Compared to suture group, the stapler group had 84% of the cases with good appearance, 12% with average and only 4% had poor scars. The cosmetic appearance was found to be statistically significant with p value < 0.005 .

Compared to present study the cosmetic score was not assessed in both the studies but the results concluded that there was statistically significant difference between stapler and suture cosmetic appearance which was similar to the present study.

The length of incision was divided into two group with 0-5 cm and 5-10 cm in both the groups. Total 18 cases had the incision length in 0-5 cm in stapler group and 32 in 5-10 cm length of incision. Whereas 27 patients had length of incision between 0-5 cm and 23 patients had it between 5-10 cm. In total population, 45 patients had length of incision between 0-5 cm and 55 had between 5-10 cm.

The post operative pain was assessed using visual analogue score. The mean pain score was 4.6 ± 0.9 in the staple group and 7.3 ± 1.48 in the suture group. The difference between pain score was statistically significant with p value 0.001.

In Pinky Rabha study observed that the mean pain score in VAS in the stapler group was 1.44 ± 0.58 whereas in the suture group mean pain score was found to be 4.58 ± 0.88 . the difference between post operative pain was statistically significant, p value < 0.001 .

In Gopal Sharma study in suture group 10% of the patients experience mild postoperative pain, 60% experienced moderate pain and 30% experienced severe pain. In stapler group 8% patients had mild post operative pain, 56% had moderate pain and 36% experienced severe post operative pain. It was found in this study that there was no statistically significant difference between the pain experienced in both the groups.

The removal time of suture and stapler was evaluated in the present study. mean time taken by stapler was 74.4 ± 29.8 seconds and 210.8 ± 88.9 second in the suture group. The difference between time taken for removal of sutures and stapler was statistically significant with p value 0.001.

Post operative complications in the present study were found to be less in the stapler group with total 92% patients did not have any post operative complications. 6% of the stapler group patients had post operative discharge and 2% had scar. Whereas the suture group was found to have 14% of the population with post operative discharge and 14% of the population had scars as complication. Only 72% of the suture group had no post operative complication. The difference between the two groups was statistically significant with p value < 0.05 .

Similar to the present study, in the Pinky Rabha study 5 out of 50 patients in the stapler group had post operative wound infection compared to 7 out of 50 patients in the suture group having post operative wound infection.

In Gopal Sharma study, out of 100 patients, wound infection was present in 20% of the patients. 8% wound infection was present in stapler group and 12% of the patients of suture group had wound infection. This post operative complication was statistically significant with p value < 0.05 .

CONCLUSION

It was found in the study that:

- There was less Wound infection/discharge with stapler group compare to suture group.
- Wound cosmesis was better with stapler group compared to the suture group.
- Post operative pain analysed according to vas scale also showed that that was less post oprative pain in the stapler group.

It can be concluded from our study that skin stapler are superior method than sutures for skin closure.

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