

## **An Analytical Comparative Evaluation of Vertical Mattress Suture and Subcuticular Suture Skin Closure Techniques in Inguinal Hernia Repair Cases**

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### **Abstract:**

**Aim:** To compare subcuticular and vertical mattress suture techniques in inguinal hernia repair.

**Methodology:** Current study is a prospective study conducted at Upgraded Department of General Surgery, D.M.C.H, Darbhanga, Bihar from January 2019 to December 2019 . Patients with inguinal hernia repair were taken as study population. After inguinal hernia repair, the outer wound was sutured with two types of materials in two different groups. The first 30 participants received subcuticular suture technique and another 30 participants received the traditional vertical mattress suture technique. Postoperative pain was evaluated by using the Visual Analog scale which was calibrated from 0-10. The pain score was observed during the day of surgery, the first postoperative day, third post-operative day and seventh postoperative day on suture removal. Complications were observed until suture removal.

**Results:** The majority of participants were in the age group of 51- 60 years in both groups. The common comorbid condition in both groups was Type II DM. The duration taken for closure of the wound by subcuticular suture ( $405.76 \pm 37.74$  seconds) was higher compared with vertical mattress ( $168.56 \pm 38.43$  seconds) and this result was significant. The post-operative pain score was almost the same in both groups and it shows non-significant values. There was no difference in cosmesis score in vertical mattress ( $1.81 \pm 0.49$ ) and subcuticular suture ( $1.92 \pm 0.84$ ) on seventh post-operative day by using Modified Hollander score. On the fourth week of post-operative day, the cosmesis score was significantly better in subcuticular stitches ( $71.23 \pm 2.95$ ) compared with vertical mattress stitches ( $69.73 \pm 2.44$ ).

**Conclusion:** In the present study, there was no significant difference in post-operative pain and time taken for closure was less with vertical mattress. Hence, we conclude that there is no superiority of subcuticular suturing over vertical mattress suturing in case of inguinal hernia repair surgeries.

**Keywords:** Inguinal Hernia, Suture, Subcuticular, Mattress.

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## Introduction

An aesthetically poor scar can have a negative impact on the overall quality of life causing considerable distress, loss of self-esteem and unhappiness [1, 2]. The outcome of the surgical skin closure is influenced by the indication for the procedure, the location of the surgical site and the associated intraoperative or post-operative complications. The technique of closure should be quick, easy, cost effective and simple, while maximizing wound cosmetics and patient satisfaction. The ultimate goal of any skin closure technique is to produce skin approximation and adequate healing with minimum wound complications like pain, infection, scarring and keloid formation.

There are many techniques available for inguinal hernia repair; skin closure remains limited to two main techniques, either by using removable skin staples or skin sutures. The most commonly used methods for skin closure after surgery are metal staples or sutures. Both methods act to hold the skin edges together while healing occurs [3]. The purpose of suturing is wound closure. Ideally, suturing should approximate the wound edges so that final scar is aesthetic and functional [4]. Surgeon should approximate the wound with minimum tension on skin and handling the tissues gently.

Inguinal hernias have clearly defined structural features that are more durable than sutures and that allow evaluation of the tension that potential repair imposes [5]. To increase wound eversion, vertical mattress sutures are primarily used. Additionally, vertical mattresses eliminate dead space and provide strength all around the wound. Age-related skin inversion and the requirement to evert the skin for correct apposition are advantages of vertical mattress sutures in the elderly population. This method aids in maintaining suitably everted skin without excessive tension along suture lines [6].

The subcuticular suture was developed to lessen wound infection and speed up recovery. A single, brief locking stitch is all that is needed to secure the repair distally after using the standard subcuticular approach to close the incision. The ends of the suture are clipped flush with the skin after being passed through the wound and emerging from the skin distal to the apex. This method is quick and easy. It benefits from being completely subcuticular and from not having bulky knots or loose suture ends that could poke through the skin or result in stitch abscesses. Additionally, it prevents penetrating the suture material, maintaining the strength of the suture [7]. The advantage of subcuticular sutures in young patients is as the skin in this age group is comparatively soft and supple, and this technique helps in good cosmetic appearance and also good healing tendencies of the people of this age group [8]. So, this study was an attempt to compare subcuticular and vertical mattress suture techniques in inguinal hernia repair.

## Methodology

Current study is a prospective study conducted at Upgraded Department of General Surgery, D.M.C.H, Darbhanga, Bihar from January 2019 to December 2019. Patients with inguinal hernia repair were taken as study population. Simple random sampling technique was used. A semi-structured questionnaire was used in this study.

**Inclusion criteria:** Patients with reducible inguinal hernia and patients willing to give informed written consent.

**Exclusion criteria:** Patients with another type of hernia and inguinoscrotal swellings and patients with an inguinal hernia with urinary complications.

**Vertical mattress suture method:** 3-0 Nylon suture material was used for the vertical mattress closure. The needle is

first entered away from the edge of the cut, travels into the dermal tissue, and then emerges through the skin on the other side, also away from the edge of the wound. The far-far, near-near system is employed in the vertical mattress suture. The direction of the Suture loop is reversed, and the needle was turned 180 degrees in the needle holder (backhanded). The epidermal/dermal edges, which became approximated when the knot was knotted, are nibbled on upon recovery. The suture's loop closes and everts the wound's edges in this near-near section [9].

Subcuticular suture method: 3-0 monocryl suture material was used to perform subcuticular closure. By inserting a needle through the margin of one wound, it is started. The needle is inserted horizontally into the top dermis with the opposing edge everted. On alternate sides of the wound, this is repeated. It is finished by either looping through the final loop of the other side or tying it with leftover material over the wound [10].

Data was collected in the inpatient department of surgery among patients admitted for inguinal hernia repair. A clinical examination was carried out with their informed written consent. After inguinal hernia repair, the outer wound was sutured with two types of materials in two different groups. The first 30 participants received subcuticular suture technique and another 30 participants received the traditional vertical mattress suture technique. The time taken for closure was recorded during the surgery using a stopwatch. Postoperative pain was evaluated by using the Visual Analog scale

which was calibrated from 0-10. For no pain was recorded as 0 and the state of worst pain was recorded as 10. The pain score was observed during the day of surgery, the first postoperative day, third post-operative day and seventh postoperative day on suture removal. Complications were observed until suture removal.

Wound cosmesis score: On seventh day of surgery, wound cosmesis score was assessed by using the modified Hollander Cosmesis scale consists of 6 clinical variables as step-off borders, edge inversion, contour irregularities, excess inflammation, wound margin separation, and good overall appearance. The scores of the variables were added to produce a final cosmetic score. Each variable receives a value of 1 if it is present in the wound, making a score of 0 ideal and a score of 1 or higher sub-optimal. Wound cosmesis is evaluated on the fourth- and eighth-week wound grading is carried out using a visual analog scale from 0 to 100.

## Results

This study recruited 60 patients for inguinal hernia repair who were admitted to the department of surgery. The majority of participants were in the age group of 51-60 years in both groups. The common comorbid condition in both groups was Type II DM. There was no meaningful difference in age group among both groups. The duration taken for closure of the wound by subcuticular suture ( $405.76 \pm 37.74$  seconds) was higher compared with vertical mattress ( $168.56 \pm 38.43$  seconds) and this result was significant.

**Table 1: Baseline characteristics of the patients.**

Variables		Subcuticular suture N (%)	Vertical mattress suture N (%)
Age (years)	41-50	6 (20)	9 (30)
	51-60	15 (50)	12 (40)
	61-70	9 (30)	8 (26.7)
	71-80	0	1 (3.3)
Comorbid	Nil	20 (66.7)	21 (70)

	Hyper tension	3 (10)	2 (6.7)
	Type II DM	6 (20)	5 (16.7)
	HT & Type II DM	1 (3.3)	2 (6.7)

**Table 2: Comparison of duration taken for skin closure and age in vertical mattress and subcuticular sutures.**

Variables	Sub cuticular (N=30)	Vertical mattress (N=30)	P value
Age	51.47±9.49	53.67±9.04	0.842
Duration for skin closure	405.76±37.74	168.56±38.43	0.001

The post-operative pain score was almost the same in both groups and it shows non-significant values. The mean scores were  $7.9 \pm 0.97$  and  $7.7 \pm 0.96$  among vertical and subcuticular stitches respectively during day 0. The mean scores were  $6.4 \pm 1.83$  and  $6.9 \pm 1.24$  among vertical and subcuticular

stiches respectively during day 1. The mean scores were  $4.3 \pm 1.37$  and  $4.5 \pm 1.37$  among vertical and subcuticular stitches respectively during day 3. The mean scores were  $2.7 \pm 1.58$  and  $2.4 \pm 1.72$  among vertical and subcuticular stitches respectively during day 7.

**Table 3: Postoperative pain score.**

Variables	Sub cuticular (N=30)	Vertical mattress (N=30)	P value
Day 0	$7.9 \pm 0.97$	$7.7 \pm 0.96$	0.123
Day 1	$6.4 \pm 1.83$	$6.9 \pm 1.24$	0.348
Day 3	$4.3 \pm 1.37$	$4.5 \pm 1.37$	0.782
Day 7	$2.7 \pm 1.58$	$2.4 \pm 1.72$	0.577

There was no difference in cosmesis score in vertical mattress ( $1.81 \pm 0.49$ ) and subcuticular suture ( $1.92 \pm 0.84$ ) on seventh post-operative day by using Modified Hollander score. On the fourth week of post-operative day, the cosmesis score was significantly better in subcuticular stitches

( $71.23 \pm 2.95$ ) compared with vertical mattress stitches ( $69.73 \pm 2.44$ ). There was no difference in cosmesis score in vertical mattress ( $81.43 \pm 1.81$ ) and subcuticular suture ( $81.82 \pm 2.35$ ) in the eighth week post-operative day.

**Table 4: Cosmesis score.**

Variables	Subcuticular (N=30)	Vertical mattress (N=30)	P value
Modified Hollander Score	$1.92 \pm 0.84$	$1.81 \pm 0.49$	0.472
4 weeks post- operative	$71.23 \pm 2.95$	$69.73 \pm 2.44$	0.003
8 weeks post- operative	$81.82 \pm 2.35$	$81.43 \pm 1.81$	0.098

There was no significant difference in complications. Wound separation was observed in 10% of cases in both stitches. 3.33% of cases with mattress stitches and 6.67% of subcuticular stitches reported with purulent discharge. Rest of them remains uncomplicated.

**Table 5: Complications of suture techniques**

Complications	Subcuticular (N=30)	Vertical mattress (N=30)
Nil	25 (83.3%)	26 (86.7%)
Wound separation	3 (10%)	3 (10%)
Purulent discharge	2 (6.67%)	1 (3.33%)

## Discussion

Wound closure by suture helps in healing by primary intention thereby decreasing the chance of infection and unnecessary dressing. Sutures are used to keep tissues in place until enough healing has taken place to produce endogenous wound strength. The method of closure should be quick, simple, affordable, and successful while maximizing the cosmetic of the wound and patient outcomes. In the present study, the duration taken for closure of the wound by subcuticular suture ( $405.76 \pm 37.74$  seconds) was higher compared with vertical mattress ( $168.56 \pm 38.43$  seconds) and this result was significant. Deepa Joshi et al [11] in their study, have concluded that time taken for 3 mattress suture was significantly less than subcuticular sutures in caesarean sections. This result is also comparable to Holmgren G et al [12] where 3 sutures for skin closure reduced time of caesarean section. Karia J and colleagues [13] and Shwetha B R et al [14] in their study concluded that subcuticular stitches are complicated and time consuming.

In present study, the post-operative pain score was almost the same in both groups and it shows non-significant values. But Deepa Joshi et.al [11] in their study has assessed the severity of pain by visual analog scale and concluded that mattress suture group was associated with significantly lesser degree of pain when compared to subcuticular group. A similar study done by Ibrahim MI and colleagues concluded that subcuticular stitches in Caesarean section was associated with significantly more post-operative pain as against interrupted sutures [15]. The

results in the present study is in contrast to the study by Deepa Joshi et.al and Ibrahim MI et.al. Krunal Patel et.al [16] in their study of comparison between interrupted vertical mattress suture versus skin stapler versus subcuticular suture for skin closure in clean surgery have found that VAS score was high in stapler group as compared to subcuticular group and Vertical mattress group. They have found that pain VAS scores in subcuticular and vertical mattress groups were comparable and there is no significant difference which supports our present study.

There was no difference in cosmesis score in vertical mattress ( $1.81 \pm 0.49$ ) and subcuticular suture ( $1.92 \pm 0.84$ ) on seventh post-operative day by using Modified Hollander score. On the fourth week of post-operative day, the cosmesis score was significantly better in subcuticular stitches ( $71.23 \pm 2.95$ ) compared with vertical mattress stitches ( $69.73 \pm 2.44$ ). Deepa Joshi et.al [11] in their study has compared cosmesis after one month of surgery and no statistically significant difference was found in two groups. Nylon mattress sutures faired equally well with subcuticular sutures. In study by Anate M [17] and colleagues' appearance of wound and scar were better in absorbable subcuticular group as compared to interrupted non absorbable suture.

Study by Karia J [13] also had results favoring better cosmesis in subcuticular group as compared to mattress group. Geeta S. Ghag et.al [18] has found in their study of comparing stapled vs subcuticular vs simple interrupted closure of inguinal hernia incision that the best cosmetic appearance of skin was with subcuticular

followed by simple interrupted and comparatively worst with stapler. In another prospective randomized trial performed by Brown JK et al [19] where they compared subcuticular suture to skin adhesive, observed that there was no difference in cosmetic outcome in subcuticular suture and skin adhesive and subcuticular stitch provided adequate skin apposition for proper healing.

### Conclusion

In the present study, there was no significant difference in post-operative pain and time taken for closure was less with vertical mattress. Hence, we conclude that there is no superiority of subcuticular suturing over vertical mattress suturing in case of inguinal hernia repair surgeries.

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