

# SUTURE VS TACKS: MESH FIXATION TECHNIQUE IN IPOM

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## Abstract:

**Introduction:** Ventral wall hernia repair is one of the common procedures being performed today. Ventral hernias occur in approximately 0.5 – 1% of population. Laparoscopic ventral hernia repair (LVHR) has been introduced to practice in the early 1990's by Karl Leblance. In this techniques, the mesh is placed in the intra-peritoneal position and is fixed to surrounding intact peritoneal wall. The most frequently used methods of fixation are Tacks, with or without trans-fascial abdominal sutures and suture alone.

**Methods:** We conducted a prospective randomised single centre study comparing different mesh fixation techniques for laparoscopic abdominal wall hernias in a parallel group design in Government Medical College, Jammu over a period of two years. All patients between 15 and 80 years of age who required non- urgent laparoscopic surgery for abdominal wall hernias were included. The patients were randomised to three different mesh fixation techniques.

**Results:** In our study, maximum number of patients were in the age group of 36-45 years (42.2%). There were 26 females and 19 males in our study with female to male ratio of 4:3. Severity of pain was compared between three groups in pre operative and post operative period at 3 weeks and 3 months using visual analogue scale from 1 to 10. When compared between two groups at a time using student paired-*t* test, the difference in VAS score was statistically insignificant.

**Conclusion:** Our randomised study compared three different mesh securing techniques using Absorbable sutures, Non Absorbable sutures and Tackers and could not find any pain reducing advantage of one technique over the other two.

**Keywords:** ventral hernias, ventral wall hernia repair, laparoscopic repair if ventral hernias, IPOM, IPOM Plus

## INTRODUCTION

Ventral wall hernia repair is one of the common procedures being performed today. Ventral hernias can be divided into primary hernias and incisional hernias[1]. Ventral hernias occur in approximately 0.5 – 1% of population. 2-11% of laparotomy wounds develop incisional hernias. Around 10% of ventral hernias undergo incarceration and need emergency laparotomy[2]. Laparoscopic ventral hernia repair (LVHR) has been introduced to practice in the early 1990's by **Karl Leblance**[3]. Laparoscopic repair has gained wide acceptance as an alternative to open repair. It is now accepted that only relatively small (less than 3 cm) incisional hernias should be repaired via primary tissue approximation with sutures alone. The clinical merit of laparoscopic approach lies behind its advantage of lesser wound morbidity, shorter hospital stay, low recurrence rate and early return to normal activity[4]. In the era of minimal invasive surgery, new techniques are being developed to repair ventral and incisional hernias by laparoscopy. In applying these techniques, the mesh is placed in the intra-peritoneal position and is fixed to surrounding intact peritoneal wall. Adequate fixation is obligatory to stabilise the position of mesh while tissue in-growth occurs. Proper fixation must avoid loosening of the mesh and must prevent contact of adhesive non protective side of the mesh with the viscera.

The most frequently used methods of fixation are Tacks, with or without trans-fascial abdominal sutures and suture alone [5]. It is widely accepted that the method of mesh fixation plays a major role in the development of postoperative pain. Mechanical mesh fixation with helical tacks may cause irritation to the peritoneum and muscle injury: on the other hand transfascial suture fixation may lead to tissue ischemia and nerve entrapment[6]. The main causes of hernia recurrence are mesh rupture, mesh slippage and mesh shrinkage. These factors could be atleast partly prevented by appropriate mesh fixation technique[4].

## METHODS

We conducted a prospective randomised single centre study comparing different mesh fixation techniques for laparoscopic abdominal wall hernias in a parallel group design in Government Medical College, Jammu over a period of two years. The study was conducted from November 2018 to November 2020. All patients between 15 and 80 years of age who required non- urgent laparoscopic surgery for abdominal wall hernias were included. Patients less than 15 years of age and more than 80 years of age, with chronic cough, ascites, active abdominal infection or who required urgent surgery were excluded.

The patients were randomised to three different mesh fixation techniques. In group **AS**(absorbable suture), mesh was secured using absorbable sutures (vicryl). Absorbable sutures were placed alternatively at 2–3 cm intervals along the mesh margin. The mesh was rolled up and inserted into the abdomen through a 10-mm trocar. After the mesh was positioned in the abdominal cavity, the suture ties were pulled through the abdominal wall using a suture passer and the threads were knotted smoothly with the knots buried in the subcutaneous tissue after reduction of the intra abdominal pressure to 8 mmHg.

In group **NS**(non-absorbable suture), mesh was secured using non-absorbable suture (Mersilk). Sutures were placed in the same way as in group **AS**.

In group **DC**(double crowning), mesh was secured using absorbable spiral tacks. Four nonabsorbable sutures were placed at four corners and passed through the abdominal wall to facilitate positioning of the mesh. Thereafter, the perimeter of the mesh was fixed to the posterior fascia at locations not more than 2 cm apart using the AbsorbaTak device. Another circle of Tacks was used inside it around the hernial opening.

### FOLLOW UP

All patients were scheduled to return for an outpatient visit 3 weeks, 6 weeks, 3 months, 6 months and 2 years after surgery. The primary outcomes measure in the study were the presence and severity of postoperative pain as determined by scores on a visual analogue scale (VAS; range 0–10) obtained preoperatively (baseline) and during the outpatient visits upto 6 months and presence or absence of recurrence upto 2 years.

### RESULTS

In our study, maximum number of patients (36.45%) were in the age group of 36-45 years (42.2%). In group **DC**, mean age was  $43.60 \pm 9.657$ , in group **AS**, mean age was  $47.20 \pm 9.344$  and in group **NS**, mean age was  $42.80 \pm 9.291$ . The age ranged between 29 and 70 years in all the three groups. The difference in age of patients compared between any two groups was not significant ( $p > 0.05$ ). There were 26 females and 19 males in our study with female to male ratio of 4:3.

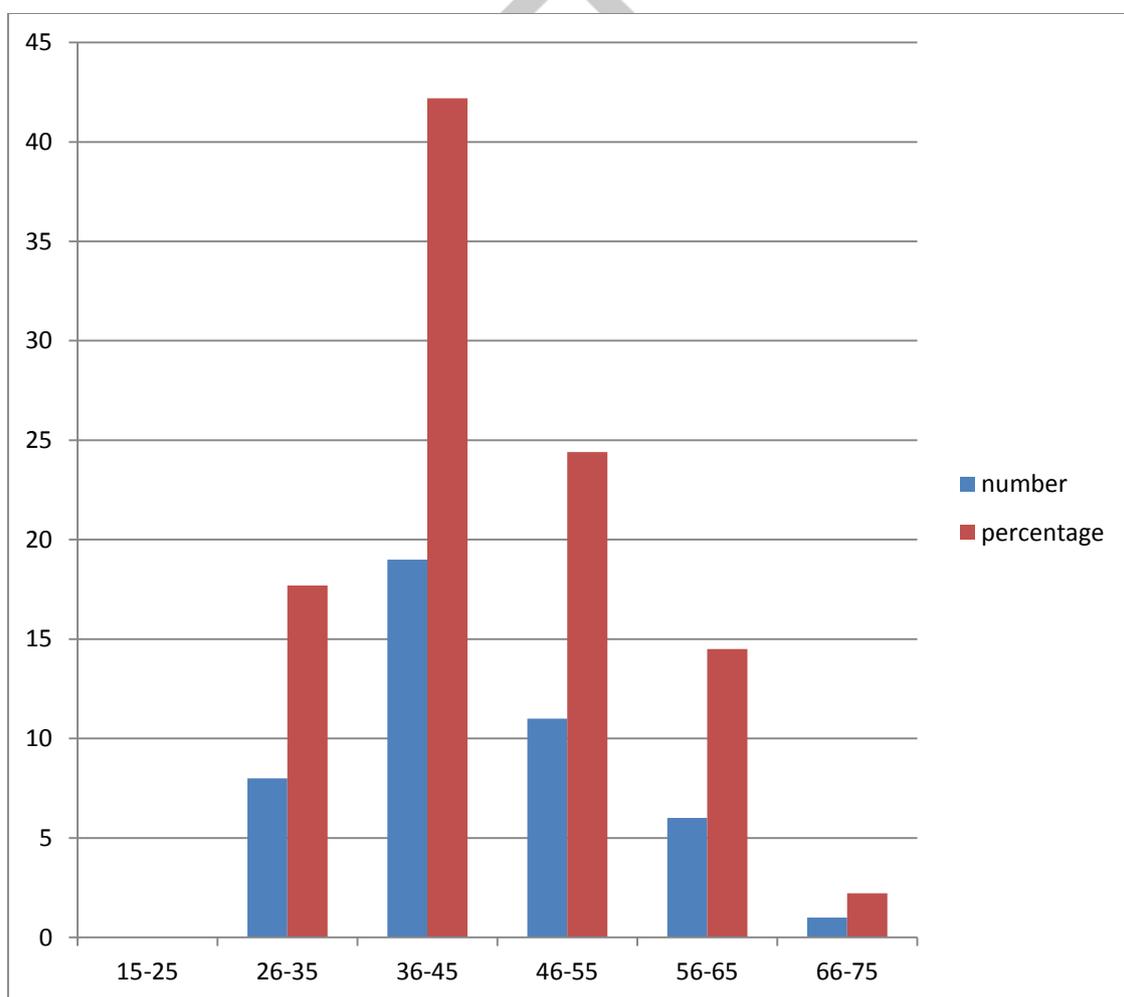


Figure 1: Age distribution of patients.

In our study, 77.8% of patients were having incisional hernia, 22.2% of patients were having primary hernia. Among incisional hernias, 10 patients were allocated to **DC** group, 13 patients to **AS** group and 12 patients to **NS** group. Among primary hernias, 5 patients were allocated to **DC** group, 3 to **AS** group and 2 to **NS** group.

When Post operative hospital stay in days was compared using paired student-*t* test between **DC** and **AS** group, and **DC** and **NS** group, the difference was statistically significant ( $p < 0.05$ ). However when compared between **NS** and **AS** group, the difference was statistically insignificant ( $p > 0.05$ ).

In group **DC**, the mean intra operative time was  $2.25 \pm 0.5373$ hrs, in group **AS** mean intra operative time was  $4.4167 \pm 0.71478$ hrs and in group **NS**, mean intra operative time was  $4.3333 \pm 0.50982$ hrs. When the valves were compared, difference between **DC** and **AS** groups and **DC** and **NS** groups was statistically significant ( $p < 0.05$ ). However difference between **AS** and **NS** groups was not statistically significant ( $p > 0.05$ ).

**PAIN**

In our study, severity of pain was compared between three groups in pre operative and post operative period at 3 weeks and 3 months using visual analogue scale from 1 to 10.

Table 1: pre-operative pain (VAS score from 1 to 10)

technique of mesh fixation	Number	Mean	Std. Deviation	P value
DC	15	2.27	.704	.350
AS	15	1.80	.414	
DC	15	2.27	.704	.556
NS	15	2.40	.507	
AS	15	1.80	.414	.217
NS	15	2.40	.507	

The pre operative mean VAS score in DC group was  $2.27 \pm 0.704$ , in AS group was  $1.8 \pm 0.414$  and in NS group was  $2.4 \pm 0.507$ . When compared between two groups at a time using student paired-*t* test, the difference in VAS score was statistically insignificant as shown in table.

Table 2: PAIN AT 3 WEEKS (USING VAS FROM 1 TO 10)

technique of mesh fixation	Number	Mean	Std. Deviation	P value
DC	15	4.93	.961	.420
AS	15	4.67	.816	
DC	15	4.93	.961	.826
NS	15	5.00	.655	
AS	15	4.67	.816	.228
NS	15	5.00	.655	

The mean post operative VAS score at 3 weeks in DC group was  $4.93 \pm 0.961$ , in AS group was  $4.67 \pm 0.816$  and in NS group was  $5 \pm 0.655$ . When compared between two groups at a time using student paired-*t* test, the difference in VAS score was statistically insignificant as shown in table.

Similarly when pain at 3 months and 6 months was compared between two groups at a time using student paired-*t* test, the difference in VAS score was statistically insignificant.

**RECURRENCE**

In our study of 2 years, no recurrence of hernia was found in any patient at 2 years. However four patients developed seroma. Two patients were from NS group and one patient each of AS and NS groups.

In our study, there was no mesh infection, no wound infection and no mesh migration.

**DISCUSSION**

The laparoscopic repair of ventral and incisional hernias has advanced great distances in the field of biomaterials since 1993. Since the introduction of laparoscopic ventral hernia repair, there has been an ongoing dispute over the optimal method of fixation of mesh against the abdominal wall. In this study we used the standard composite mesh and fixed it using absorbable sutures or non-absorbable sutures or two circles of Tacks. Sutures pass through all layers of fascia and muscle of the anterior abdominal wall, while tackers secure the mesh to innermost millimeters of peritoneal cavity.

In our study, age of patients across the three groups ranged from 29 to 70 yrs. The mean age of patients in DC, AS and NS was 43.60, 47.20 and 42.80 years respectively. **Wassenaar E et al**[7] studied 172 patients and subjected them to three different mesh securing techniques. The mean age of patients in years in DC, AS and NS groups were 51.6, 54.7 and 52.4 respectively.

In our study female predominance of ventral wall hernias was observed with female : male ratio of 4:3. **Nguyen SQ et al**[8] in a study of 50 patients found the female to male ratio of 2.3 : 1. **Bangash A et al**[9] studied 90 patients with ventral wall hernia with more male patients as compared to female patients (male : female = 2 : 1. In our study, most hernias were incisional hernias (77.8%) and only 22.2% of patients were having primary hernias.

Anecdotally, pain is worse after repair with sutures than tacks. This has been theorised to local muscle ischemia resulting in pain post-operatively after using sutures. Convincingly, in our study the pain scores at 3 weeks and 3 months showed no statistical differences among three groups.

**Nguyen et al**[8] could not find any difference in mean pain scores at 1 week, 1 month, and 3 months in suture and tack group. **Wassenaar et al**[7] also found no significant difference between three mesh fixation techniques with respect to VAS score at 2 weeks, 4 weeks and 3 months. However **Carbajo et al**[10] reported a higher rate of post-operative pain after laparoscopic repair of ventral wall hernia in patients where two circles of tacks were used to secure the mesh as compared to patients where sutures were used. **Bageacu et al**[11] also observed sever pain in patients in which tacks were used as compared to those where sutures were used to secure the mesh. Our study showed beyond doubt that using tacks for securing mesh was quicker than when using sutures. The mean intra operative time (in hours) in DC group was  $2.25 \pm 0.5373$ , in AS group it was  $4.4167 \pm 0.7148$  and in NS group it was  $4.3333 \pm 0.5098$ . **Muysoms F et al**[12] in his study of 74 patients found significant shorter operating time in patients where mesh was secured with tackers only (74 min) as compared to patients where both sutures and tacks were used (96 min). In

our study mean hospital stay in days was 3, 6.07 and 6 in DC, AS and NS group. Clearly, difference was significant when DC was compared with NS or AS group, and insignificant between NS and AS group.

In our study no recurrence was found at 6 months in any patient. **Bangash A et al**[9] found a recurrence rate of 6% in each tacker and suture group at 1 year. **Wassenaar E et al**[7] found in his study a recurrence rate of 10%, 10% and 11.1 % in DC, AS and NS group. In our study no major complications like wound infection, mesh infection, mesh migration or seroma formation was found in mean follow up of 6 months.

## CONCLUSION

Our randomised study compared three different mesh securing techniques using Absorbable sutures, Non Absorbable sutures and Tackers and could not find any pain reducing advantage of one technique over the other two. No recurrence in any patient was noted. However mesh securing with tacks clearly showed reduced intra operative time and reduced hospital stay as compared to suture securing techniques. Development of new mesh-fixation methods may be required to address the issue of pain after LVIHR. Our study was limited to follow up of 2 years which does not allow to generalise the results over whole population.

**Funding:** none

**Conflict of interest:** The authors declare that they have no conflict of interest.

**Ethical Approval:** Obtained.

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