

# Tack fixation versus nonfixation of mesh in laparoscopic transabdominal preperitoneal hernia repair

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## Context

Laparoscopic transabdominal preperitoneal (TAPP) repair of inguinal hernia is traditionally performed by fixing the mesh to the abdominal wall by spiral tacks. However, mesh fixation might not be necessary as there is little space for the mesh to migrate; besides, tack fixation predisposes to postoperative pain.

## Aim

The present study aimed to compare mesh fixation versus nonfixation regarding postoperative pain and recurrence rates.

## Settings and design

This study was a prospective, controlled, randomized study.

## Patients and methods

In total, 60 patients with inguinal hernias were divided into two equal groups, were compared regarding mesh fixation versus nonfixation by TAPP technique, and followed-up for up to 12 months for postoperative complications, pain, and recurrence.

## Statistical analysis

Continuous variables are expressed as means and SDs. Categorical variables are expressed as frequencies and percentages.

## Results

There was significant reduction in postoperative pain and chronic pain in patients without mesh fixation in comparison with patients with mesh fixation and early return to work. There was no significant difference between the two groups regarding postoperative complications and recurrence rates.

## Conclusion

Mesh nonfixation reduces the incidence of postoperative pain and chronic pain in patients undergoing TAPP repair without increase in postoperative complications or recurrence rates.

## Keywords:

laparoscopic hernia repair, mesh nonfixation, postoperative pain, transabdominal preperitoneal

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## Introduction

Laparoscopic repair of inguinal hernia was first described by Ger *et al.* [1].

Nowadays, laparoscopic inguinal hernia repair is performed with placement of a mesh into the preperitoneal space. It can be carried out by transabdominal preperitoneal (TAPP) approach or by totally extraperitoneal (TEP) approach. The TAPP approach was first reported by Arregui *et al.* [2]. It involves laparoscopic access into the peritoneal cavity to place a mesh in the preperitoneal space after reduction of the hernia sac. The TEP hernia repair was first described by McKernan and Laws [3]. This approach requires preperitoneal dissection and placement of a mesh in the preperitoneal space TEP without entering the abdominal cavity [4].

However, mesh fixation is thought to help in increasing postoperative pain and the risk of nerve injury, with the

most commonly injured nerves being the femoral branch of the genitofemoral nerve and the lateral cutaneous nerve of the thigh [5].

The factors causing postoperative pain include inguinal nerve irritation by the mesh or tacks, inflammatory reactions around the mesh, or simply fibrosis in the inguinal region incorporating the inguinal nerves. It may also be caused by local tissue inflammatory reactions against the foreign material, bioincompatibility, and reduction in abdominal wall compliance. Nonfixation of the mesh can reduce pain; however, it is theoretically a predisposing factor for hernia recurrence due to the risk of mesh displacement [6].

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The aim of this study was to compare the effect of mesh fixation and nonfixation on postoperative pain and recurrence rates in patients undergoing TAPP inguinal hernia repair.

### Patients and methods

This study was a comparative, prospective, randomized clinical trial. For this study, 60 male patients having primary unilateral inguinal hernias aged more than 18 years and not having any contraindication for general anesthesia or laparoscopic surgeries, scheduled for laparoscopic TAPP hernia repair, were included.

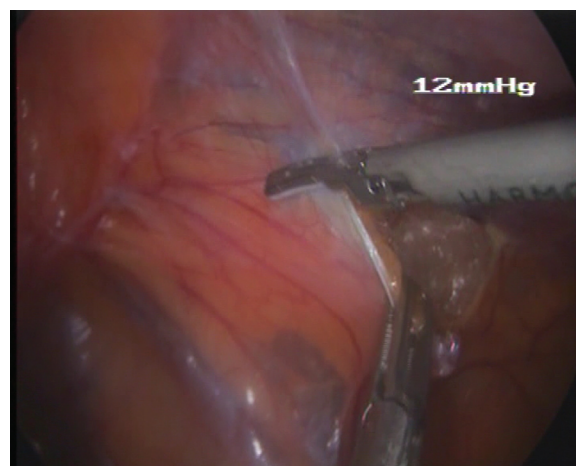
The present study took place from June 2012 to May 2015 with a minimum of 12 months of follow-up for each patient. The patients were randomly allocated by closed envelope into two groups (each containing 30 patients) with standardization of the surgical technique and the team that carried out the procedure. Among these 60 patients, 30 patients were operated upon with mesh fixation with spiral tacks (Protack; Covidien–Medtronic, Dublin, Republic of Ireland), and 30 patients were operated upon with no mesh fixation.

The patients were recruited from the outpatient clinic. Complete detailed history was obtained from all patients, and a complete physical examination was carried out, including scrotal ultrasound with duplex and abdominal ultrasound to eliminate any possible causes of recurrence. An informed consent was obtained from the patients for participation in this study according to the Ethical Committee of the Faculty of Medicine, Ain Shams University.

### Surgical technique

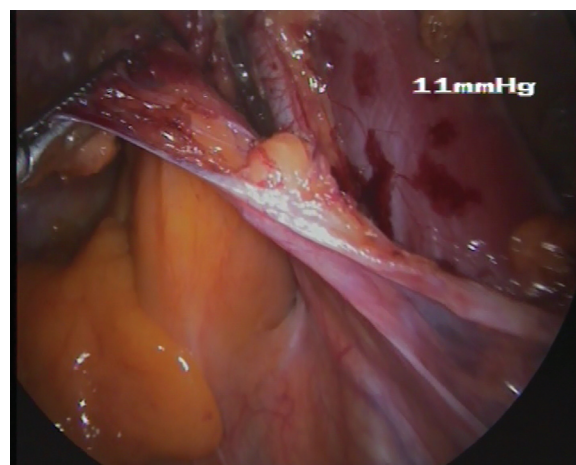
All patients were subjected to general anesthesia. Pneumoperitoneum was established by carbon dioxide at 14 mmHg. A 10-mm trocar was then placed at the umbilicus. Next, one 10-mm trocar and one 5-mm trocar were inserted laterally on the right and left sides, respectively. The hernia sac was identified, and the peritoneum was incised from above the anterior superior iliac spine till the lateral leaflet of the medial umbilical ligament using a harmonic scalpel (Ethicon, Johnson and Johnson Co., Somerville, New Jersey, USA) (Fig. 1). The peritoneum flaps were then dissected upwards and downwards from the spermatic cord structures (Fig. 2). The sac was reduced, and then the mesh (Prolene Mesh; Ethicon, Johnson and Johnson Co.) was inserted of size 10×15 cm, taking into consideration the following aspects: to cover the region of the internal ring, the inferior epigastric

Figure 1



Opening of the peritoneum by a harmonic scalpel.

Figure 2



Elevation of peritoneal flaps.

vessels, and the medial compartment to guard against recurrences (Fig. 3). All meshes were of the same size – 10×15 cm. In the mesh fixation group, the mesh was fixed by spiral tacks (Protack; Covidien–Medtronic) into the Cooper's ligament, medial and lateral to the epigastric vessels with avoidance of tacks in the triangle of doom and triangle of pain (Fig. 4). In the mesh nonfixation group, the mesh was not fixed (Fig. 5). The peritoneum was closed by continuous absorbable sutures (vicryl 3/0) (Fig. 6).

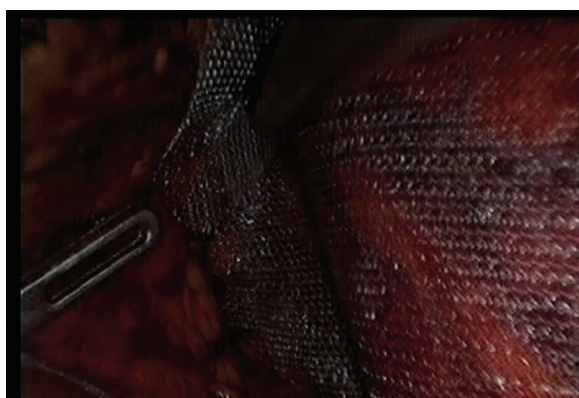
The patients were followed-up in the postoperative period for any complications such as seroma formation, mesh infection, occurrence of obstructions or adhesions, and postoperative pain. The pain was scored according to Numeric Rating Scale where 0=no pain and 10=extremely painful. The pain is scored in the first 24 h postoperatively and after 1, 3,

Figure 3



Insertion of mesh to cover areas medial and lateral to the inferior epigastric vessels.

Figure 4



Mesh is being fixed by spiral tacks.

6, and 12 months. The duration of hospital stay and the time required to return to normal physical activity were recorded. The patients were followed-up for 1 year for any signs of recurrence.

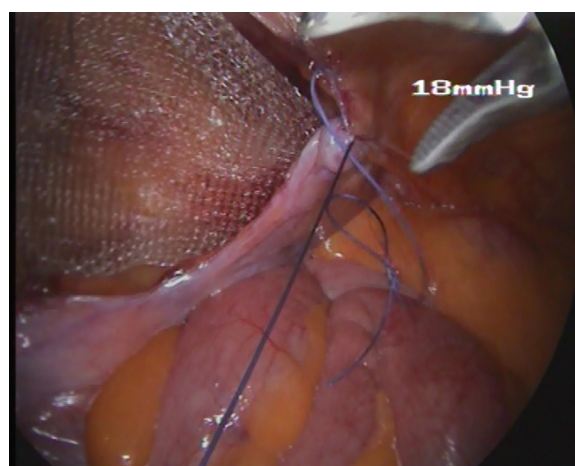
## Results

### Patients' demographics

All the patients were males, with a mean age of  $37.133 \pm 9.558$  years (range: 22–55 years) in the mesh fixation group (group A). In the mesh nonfixation group (group B), the mean age was  $38.700 \pm 9.969$  years (range: 21–55 years). The  $P$  value was 0.537 by  $t$ -test, which was statistically nonsignificant.

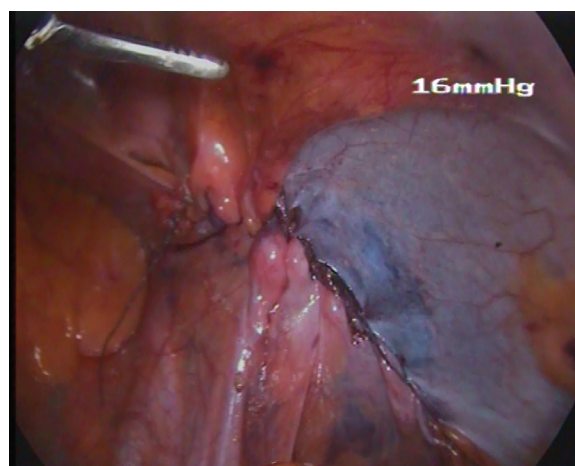
In group A (30 patients), six (20%) patients had direct hernias, whereas 24 (80%) patients had indirect hernias. In group B (30 patients), seven (23.3%) patients had direct hernias, whereas 23 (76.7%) patients had indirect hernias. The  $P$  value was 0.754 by  $\chi^2$ -test, which was statistically nonsignificant.

Figure 5



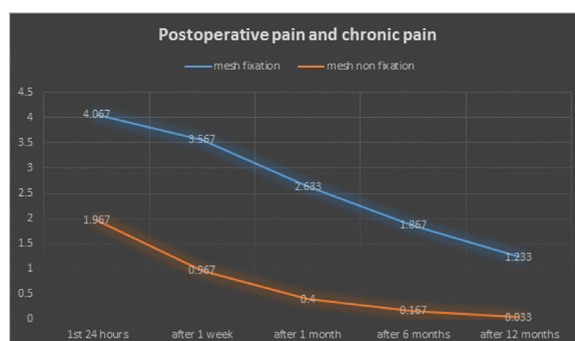
Starting closure of the peritoneum without mesh fixation.

Figure 6



Peritoneum after closure by vicryl 3/0.

Figure 7



Graphic representation of the difference in postoperative and chronic pain between the two groups.

### Operative time

In group A, the mean operative time was  $74.633 \pm 10.434$  min (range: 55–92 min). In group B, the mean operative time was  $72.533 \pm 8.341$  min (range:



55–89 min). The *P* value was 0.393 by *t*-test, which was statistically nonsignificant.

#### Postoperative complications

In group A, two (6.7%) patients developed seroma, which was managed conservatively, whereas none of the patients developed infection, adhesion, or obstruction.

In group B, three (10%) patients developed seroma, which was managed conservatively, one (3.3%) patient developed mesh infection (which was managed conservatively with intravenous antibiotics), and none of the patients developed adhesions or intestinal obstruction.

The mean hospital stay for group A was  $1.9 \pm 1.689$  days and for group B  $1.4 \pm 0.498$  days.

The difference between the two groups regarding postoperative complications was statistically nonsignificant.

#### Postoperative pain, chronic pain, and return to work

The patients' pain was evaluated using Numeric Rating Scale where 0=no pain and 10=extreme pain. The ranges then were divided into mild pain (1–3), moderate pain (4–6), and severe pain (7–10).

In group A, the first 24-h postoperative pain had a mean of  $4.067 \pm 1.112$ , whereas in group B the value was  $1.967 \pm 0.765$ .

With respect to the follow-up, the pain in group A after 1 week was  $3.567 \pm 1.331$ , after 1 month  $2.633 \pm 1.520$ , after 6 months  $1.867 \pm 1.613$ , and after 12 months  $1.233 \pm 1.501$ . The pain in group B after 1 week was  $0.967 \pm 0.765$ , after 1 month  $0.4 \pm 0.563$ , after 6 months  $0.167 \pm 0.379$ , and after 12 months  $0.033 \pm 0.183$ . There was a statistically significant decrease in postoperative pain and chronic pain in group B than in group A (Fig. 7).

The patients in group A returned to work after  $7.867 \pm 2.662$  days and in group B after  $5.033 \pm 1.189$  days.

#### The rate of recurrence within 1 year

The rate of recurrence in group A was 0% (no patients) and in group B 3.3% (one patient). This was considered statistically nonsignificant.

## Discussion

The laparoscopic approach has become an attractive alternative to open repair for inguinal hernia for many

patients and surgeons. There is abundant literature that emphasizes that laparoscopic inguinal hernia repair provides excellent results [4].

In laparoscopic hernia repair, several anchoring techniques were used since the early 1990s, such as staples, tacks, and sutures, but any mechanical anchoring adds to the risk of inducing temporary or permanent pain or can even damage sensitive structures such as nerves and vessels [7].

The need for mesh fixation to prevent recurrence of hernias following laparoscopic preperitoneal inguinal hernia repair (TAPP) is controversial [8].

The aim of this study was to determine the effect of fixing a mesh versus nonfixation on the incidence of postoperative and chronic pain and the risk of hernia recurrence within 1 year.

There were no statistically significant differences between the two groups regarding age, type of hernia, operative time, and postoperative complications. Patients in the mesh nonfixation group had significant reduction in pain scores in the first 24 h postoperatively with mean  $\pm$  SD of  $1.967 \pm 0.765$  in comparison with the patients in the mesh fixation group with mean  $\pm$  SD of  $4.067 \pm 1.112$  and in the follow-up period after 1 week, 1, 6, and 12 months with mean  $\pm$  SD of  $0.967 \pm 0.765$ ,  $0.4 \pm 0.563$ ,  $0.167 \pm 0.379$ , and  $0.033 \pm 0.183$ , respectively, in comparison with patients in the mesh fixation group of  $3.567 \pm 1.331$ ,  $2.633 \pm 1.520$ ,  $1.867 \pm 1.613$ , and  $1.233 \pm 1.501$ . Most of the studies compared mesh fixation versus nonfixation during TEP hernia repair. In a meta-analysis carried out by Sajid *et al.* [6], five clinical trials by Koch *et al.* [8], Garg *et al.* [9], Li *et al.* [10], Moreno-Egea *et al.* [11], and Parshad *et al.* [12] were assessed comparing the postoperative pain and chronic pain using the TEP technique, similar to the study conducted by Koch *et al.* [8], which reported pain in the mesh fixation group to be  $1.9 \pm 2.3$  and in the mesh nonfixation group to be  $1.1 \pm 1.6$  in the postoperative period. Moreover, in the study conducted by Parshad *et al.* [12], the postoperative pain was  $2.92 \pm 2.38$  and  $2.28 \pm 1.81$ , respectively, which was considered to have no statistical significance between the mesh fixation and nonfixation groups regarding pain with the TEP technique, whereas the studies carried out on the TAPP technique was concentrated on the recurrence rate, similar to the study carried out by Smith *et al.* [13] who concluded that there was no significant difference between mesh fixation and nonfixation regarding the recurrence rate as concluded by the present study where

the recurrence rate was 0% in the mesh fixation group versus 3.3% in the mesh nonfixation group; however, they did not report the postoperative or chronic pain scores among the two groups.

## Conclusion

The TAPP hernia repair is considered to be preferred by many surgeons, and the mesh can be placed without fixation with marked reduction in the incidence of postoperative pain and chronic pain due to nerve injury or trapping without significant increase in the recurrence rates.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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