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# Use of Fascial Closure Needle Versus Staples for Mesh Fixation in Laparoscopic Transabdominal Preperitoneal Hernioplasty

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## Abstract

### Background

Recently, it is being suggested in the literature that postoperative pain after TAPP is mostly attributed to the use of staples in mesh fixation .This study aims to compare the value and cost effectiveness of using facial closure needle versus the use of staples in the fixation of prosthetic meshes in laparoscopic tinguinal hernia repair (TAPP).

### Methods

Sixty male patients suffering from inguinal hernia with a mean age 22.7 years ranging from 18 to 30 years were enrolled in this study mesh fixation using fascial closure needle was done in 30 cases and using staples in another other 30 cases. Full physical assessment for the patients was performed and any postoperative complications such as early or late post-operative pain or burning sensation, hyperesthesia, wound infection, seroma, hematoma or recurrence were recorded.

### Results

The mean duration of intervention for fascial needle fixation cases was 43.4 minutes while for stapled cases the mean duration of intervention was 40 minutes. The mean recovery time to normal physical activity was 7.5 days for fascial needle fixation cases and was 9.1 for stapled cases. In stapled patients, one case of recurrence occurred, 2 cases showed hematoma and by the end of the 1st month after the operation, 2 cases had suffered lateral thigh pain, while at the end of the 6th month after the operation 5 cases had suffered chronic inguinal pain. In cases with fascial needle fixation no recurrence had occurred, while 1 case showed subcutaneous port hematoma and one case was reported with inguinal discomfort at the end of the 1st month after the operation and at the end of the 6th month after the operation, no cases had pain

### Conclusion

From the above results, we can conclude that the use of fascial needle closure for mesh fixation in TAPP is better than the use of staples, not only because it is associated with lower incidence of postoperative complications (i.e. postoperative pain and recurrence) but also because its associated with lower costs allowing better availability for all patients

**Keywords:** Trans abdominal inguinal hernia repair; Post operative pain after TAPP

## Introduction

The most common type of hernias presented worldwide is inguinal hernia. In addition, inguinal hernia repair is one of the most common procedures performed in general surgery [1].

Currently, total extraperitoneal (TEP) and transabdominal preperitoneal (TAPP) are the two most employed laparoscopic approaches for inguinal hernia repair [2]. TAPP repair is generally considered an easier approach and has the advantage in providing the opportunity to perform diagnostic laparoscopy [3]. One of the most common complications after TAPP is postoperative pain in which its severity can be influenced by several factors including, the age of the patient, the presence of complications and individual tolerance [4]. Recently, it is being suggested in the literature that postoperative pain after TAPP is mostly attributed to the use of staples in mesh fixation [5]. In addition, these staples are very costly especially in the developing countries. Therefore, we aimed to explore the use of fascial needle closure instead of staples for mesh fixation. This study aims to compare the value and cost effectiveness of using facial needle closure versus the use of staples in the fixation of prosthetic meshes in laparoscopic TAPP repair of inguinal hernia.The following parameters were evaluated for both fascial needle closure and staples mesh fixation: operative technique, operating time, intraoperative and postoperative complications, postoperative pain and response to medical treatment, postoperative recovery, recurrence and cost effectiveness.

## Patients and Methods

Sixty male patients suffering from inguinal hernia with a mean age 22.7 years ranging from 18 to 30 years were enrolled in this study. These patients were admitted at the department of general surgery at El Demrdash Hospital at Ain Shams University in Cairo, Egypt from January 2014 to December 2015. Approval from the ethical committee of the faculty of Medicine at Ain Shams University was obtained to conduct this study.

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Patients included in our study were diagnosed with uncomplicated unilateral primary inguinal hernia with a small to moderate size hernial sac and had an age range between 18 and 30 year. These inclusion criteria were set to eliminate factors which may affect postoperative outcome such as age, size of the hernia, presence of complications and operative time in bilateral inguinal hernia.

Patients who showed signs or symptoms of complicated hernia (e.g. irreducibly, obstruction or strangulations, peritonitis, bowel perforation), had previous lower abdominal or inguinal canal surgeries, had chronic pain (e.g. diabetic polyneropathy), contraindicated for laparoscopy or general anesthesia (e.g. having major medical co-morbidity such as cardiac patients) or patients who refused the laparoscopic procedure were excluded from our study.Laparoscopic repairs by the TAPP approach was decided after performing complete evaluation for all patients and receiving an informed written consent from each patient. During the operation, patients were placed in supine and Trendelenburg positions on the operating table. Pneumoperitoneum was performed through a veress needle in the umbilicus which was later replaced by a 10-mm optical port. A 5-mm trocar was positioned laterally on the umbilical line and a 10-mm trocar was positioned in the iliac fossa contra lateral to the side of the hernia. Both trocars were placed in the avascular area (Figure 1). At first, diagnostic laparoscopy was performed to exclude any other pathology. An incision in the peritoneal wall was made which started laterally from the superior iliac spine and ended at the medial umbilical fold medially crossing the internal inguinal ring. In cases with direct hernias, the hernial sac was directly isolated and reduced, while in cases with indirect hernias, the preperitoneal Parapubic adipose tissue was carefully dissected medially to expose the horizontal pubic ramus and Cooper's ligament (Figure 2). Proper dissection of the preperitoneal retrovesical tissue permitted easier positioning of the mesh. Lateral dissection and reduction of the hernial sac with exploration of the internal inguinal ring were then performed.After minimal and careful dissection, once the spermatic cord was completely detached from the peritoneal wall, the mesh was placed. The mesh size was 15 cm x 10 cm and it was placed in the preperitoneal space such that its medial edge was in contact with the symphysis pubis covering Cooper's ligament, rested on the inguinal region and extended laterally over the epigastric vessels to make sure that it was covering all the area around the main defect. In 30 cases, the mesh was fixed with staples (traditional TAPP) with 4 clips applied above iliopubic track to avoid nerve injury, in which 2 metal clips were applied at the level of Cooper's ligament and the pubic tubercle. Another 2 clips were applied laterally at the level of the deep inguinal ring medial and lateral to the inferior epigastric vessels. In the other 30 cases, the mesh was fixed using fascial needle in which upper border of the mesh was sutured by 2 stitches, one was medial to the anterior superior iliac spine and one was above and lateral to the symphysis pubis (Figure 3). Both stitches were taken under vision in the avascular area using 10 cm 0 or 1 prolene suture. The free ends of the prolene were exteriorized and tied outside over the skin using the fascial needle (Figure 4). These stitches were to be removed after 2 weeks of the operation. The rest of mesh was applied to cover the entire defect without any further fixation inferiorly. Finally, the peritoneal flaps were closed using continuous and re-absorbable sutures.

Patients were discharged one day after the operation and were instructed to drive only after two days of the operation. Patients were allowed to return to work after ten days of the operation if no pain was felt. Follow up visits were arranged after two weeks and after one, three, six and twelve months from the operation. During each visit, full physical assessment for the patients was performed and any

**Figure 1:** Location of the port.

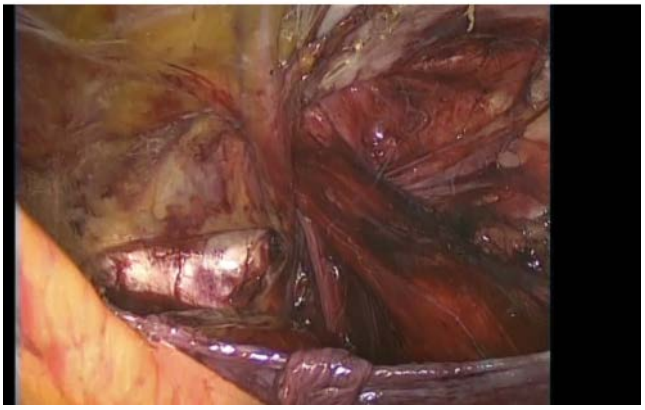

**Figure 2:** Area of exposure and dissection.

postoperative complications such as early or late post-operative pain or burning sensation, hyperesthesia, wound infection, seroma, hematoma or recurrence were recorded.

## Results

Sixty male patients suffering from primary uncomplicated inguinal hernia with a mean age of 22.7 years (ranged between 18 and 30 years) were enrolled in this study. All patients were selected to have closely similar life styles.

The mean duration of intervention for fascial needle fixation cases was 43.4 minutes (ranged between 30 and 100 minutes, while for stapled cases the mean duration of intervention was 40 minutes (ranged between 25 and 90 minutes). All operations were continued via laparoscopy and no intraoperative complications or mortalities occurred.

The mean postoperative hospitalization time in all cases was 1 day. The mean recovery time to normal physical activity was 7.5 days (ranged between 5 and 9 days) for fascial needle fixation cases and was 9.1 days (ranged between 7 and 11 days) for stapled cases (Table 1).

In stapled patients, recurrent hernia was noticed in one case at the 8th months after the operation and it was managed by open hernioplasty, in another 2 cases pelvic hematoma was detected by ultrasound and they were managed conservatively. Moreover, by the end of the 1st month after the operation, 2 cases had suffered lateral thigh pain, while at the end of the 6th month after the operation 5 cases had suffered chronic inguinal pain where 2 of the cases had the pain localized in

| | | Mean | ±SD | Min | Max | P | Sig |
|---|---|---|---|---|---|---|---|
| **Age** | | 22.783 | 4.314 | 18 | 30 | | |
| **Operative time(min)** | Fascial closure needle fixation | 43.467 | 15.883 | 30 | 100 | 0.524 | NS |
| | Staple fixation | 40.9 | 15.128 | 25 | 90 | | |
| **Duration to return to normal life(days)** | Fascial closure needle fixation | 7.5 | 1.196 | 5 | 9 | <0.001* | HS |
| | Staple fixation | 9.1 | 1.296 | 7 | 11 | | |
| **Cost effectiveness in U.S. $** | Fascial closure needle fixation | 30 | 7.056 | 20 | 40 | <0.001* | HS |
| | Staple fixation | 190 | 10.171 | 170 | 200 | | |

Age, Operative time, duration to return to normal life, coast effectiveness*student t test

**Table 1:** Use of Facial closure needle vs staples in lap TAPP.

**Figure 3:** Mesh fixed with two stitches, one was medial to the anterior superior iliac spine and one was above and lateral to the symphysis pubis.

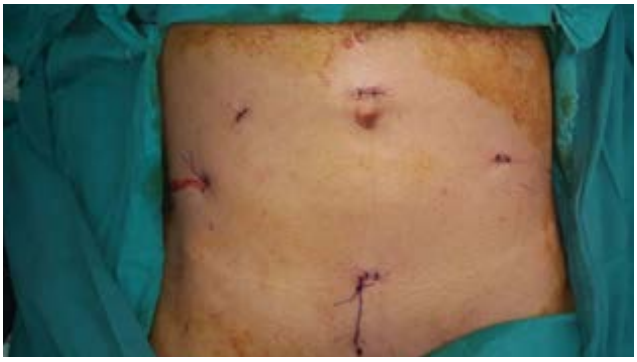

**Figure 4:** Free ends of the prolene were exteriorized and tied outside over the skin.

the lateral aspect of the thigh and 3 cases had the pain localized in the inguinal region. The pain was relieved only by analgesics (Table 2).

In cases in which fascial needle was used for mesh fixation, no recurrence had occurred, while 1 case showed subcutaneous port hematoma which was managed conservatively and one case was reported with inguinal discomfort following intense and prolonged physical activity at the end of the 1st month after the operation, for which analgesics were rarely taken. At the end of the 6th month after the operation, no cases with postoperative neuralgia were reported.

## Discussion

Several factors can indicate the success of groin hernia repair including, minimal complications, reduced operation costs and the fastest recovery and return to normal daily activities [6]. Laparoscopy can be considered more advantageous in the treatment of hernias in comparison to traditional open techniques since it is accompanied by a lower incidence of postoperative pain and allows faster recovery [7]. In conventional TAPP, complications can arise from the use of metal clips in fixing the prosthesis since it can accidentally damage the surrounding nerves and blood vessels. For instance, hemorrhage or painful neuralgia can occur as a result of this potential intraoperative damage [8,9]. The postoperative pain following TAPP hernia repair is primarily caused by damage in the genitofemoral, lateral cutaneous femoral, ilioinguinal and iliohypogastric nerves. However, according to the litterateur, the damage of lateral cutaneous femoral nerve during mesh fixation to the deep inguinal ring, is reported as the most common cause of postoperative pain after laparoscopic surgery as it occurs in 0.1% to 10% of cases [10,11].

In this study, the incidence of early postoperative pain associated with fascial needle mesh fixation was 3.3%. The pain usually occurs after intense and prolonged physical activity and it rarely needed medical treatment. For stapled patients, the incidence of early postoperative pain was 6.6 % and it required medical treatment. Regarding late postoperative pain, by the end of the 6th month after the operation, no pain was reported in any of the cases with fascial needle mesh fixation, while in stapled cases there was 5 cases (16.6%) reported with chronic inguinal pain that persisted for more than six months after the operation and required medical treatment. These results agree with another study [12] that compared between stapling and non stapling mesh fixation procedures. They reported that the incidence of chronic pain which lasted for 3 months or more after the operation was much higher in stapled patients (10%) compared to non-stapled patients (2.3%) where none of the non-stapled patients suffered any pain after 3 months of the operation, while 2.5 % of stapled patients suffered pain that lasted up to 1 year.

In this study, there was no recurrence among cases with mesh fixed using fascial closure needle, while in stapled cases there were 2 cases (6.6%) showed recurrence by the 3rd and 8th months after the operation. In another study [12], the incidence of recurrence in stapled patients was 5.88%, while in the non-stapled patients the incidence of recurrence was 7.72%. These results clearly indicate that fascial needle fixation offer a higher stabilization and strength to the mesh and is therefore associated with a lower incidence of recurrence in comparison to stapled mesh fixation.

In the current study, there was no difference in the mean duration of operation and the postoperative hospitalization time between all cases. However, there was a significant difference in the time needed to return to normal activity between cases with fascial needle mesh fixation and stapled cases where the mean recovery time to normal physical activity for fascial needle fixation cases was 7.9 days (ranged between 5 and 11 days) and was 9.1 days (ranged between 7 and 11 days) for stapled cases.

Pelvic hematoma was detected postoperatively in two cases with stapled fixation which required medical treatment for one month, while there was no postoperative significant complications reported in cases

| | | Fascial closure needle | | Staples | | P | Sig |
|---|---|---|---|---|---|---|---|
| | | N | % | N | % | | |
| **Recurrence** | | 0 | 0.00% | 1 | 3.30% | 1 | NS |
| **Post operative pain** | Early | 1 | 3.30% | 2 | 6.60% | 1 | NS |
| | Late | 0 | 0.00% | 5 | 16.60% | 0.052 | S |
| **Other complications i.e, hematoma formations** | | 1 | 3.30% | 2 | 6.60% | 1 | NS |

**Table 2:** Comparison between uses of fascial closure needle vs staples mesh fixation as regard complication.
*Fisher exact test, **Non significant

with fascial needle mesh fixation. In a study performed by Ceccarelli et al., [13] in which they compared mesh fixation with staples or with fibrin glue, they stated that postoperative complications such as hematoma or seroma were more frequent in the stapled group.

Therefore, avoiding complications associated with stapled mesh fixation such as bleeding, hematomas in Retzius' space, neuralgia and chronic pain will subsequently reduce the costs and duration of hospitalization with early return to normal life [5]. In addition, the costs of mesh fixation using prolene sutures for repair of a unilateral hernia doesn't exceed 20 U.S. dollars, while staples cost around 190 U.S. dollars.

In this study, we can indicate that this new technique for mesh fixation in TAPP gets the advantages of both stapled and non stapled mesh fixation procedures as it minimize risk of chronic postoperative pain, hematoma and seroma which are associated with staples fixation. Additionally, it has minimal incidence of recurrence.

## Conclusion

From the above results, we can conclude that the use of fascial closure needle for mesh fixation in TAPP is better than the use of staples, not only because it is associated with lower incidence of postoperative complications (i.e. postoperative pain and recurrence) but also because its associated with lower costs allowing better availability for all patients, however we recommend to elongate the follow up period for patients to detect any late complications including recurrence.

## Conflict of Interest Statement

No any type of conflict of interest or financial support

## Ethical Approval

An approval from the ethical committee at the faculty of Medicine at Ain Shams University was obtained to this study.

## Informed Consent

Informed consent was obtained from all individual participants included in the study

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