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## RESEARCH ARTICLE

### TRANSABDOMINAL PRE-PERITONEAL (TAPP) MESH WITH EXTERNAL FIXATION (ABDELHAMID TECHNIQUE) VERSUS LICHTENSTEIN FOR REPAIR OF RECURRENT INGUINAL HERNIA

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#### ABSTRACT

**Purpose:** Which is more convenient ABDELHAMID technique or Lichtenstein.

**Background:** Hernia recurrences are mostly due to excessive tension, abnormal scared tissue, and inadequate repair or over looked hernias. In Lichtenstein repair A mesh was inserted along the posterior wall without disturbing the old repair. While in transabdominal pre-peritoneal (TAPP) with external fixation the mesh was applied away from the scared old repair in the preperitoneal space

**Methods:** This is a retrospective study for 100 patients done years ago at Al Hayat Hospital Jeddah, KSA, Bani-Suef University Hospital and Bani Suef Health Insurance Hospital. The study design and data collection were between 9 -2015 and 9 – 2016. We reported the patients for duration of operation, hospital stay, cost, recurrence and return to work.

**Results:** The mean operative time in TAPP with external fixation was 80 min while in Lichtenstein repair was 65 min. The cost was less in Lichtenstein repair while long of stay (LOS) was the same. Recurrence was 2% in TAPP with external fixation on the other hand it was 4% in Lichtenstein repair. Patients returned back to work after 5 days in TAPP with external fixation and after 9 days in Lichtenstein repair.

**Conclusion:** TAPP with external fixation is associated with longer operative time and higher cost but the incidence of recurrence is much less while return to work was earlier in TAPP with external fixation advocating to be used as a primary option in recurrent inguinal hernia repair.

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#### INTRODUCTION

Recurrence is the most common long term complications of inguinal hernia repair. Approximately 50 percent of hernia recurrences do not present until at least five years after the original hernia repair. Additional 20 percent recurrences may not present for 15 to 25 years (Read and Gilbert, 2004). Hernia recurrence following inguinal hernia repair is usually caused by the breakdown of a repair performed with tension along the fascial suture lines. This break down may occur because of incomplete dissection, poor tissue quality due to long standing large hernia, systemic co morbidity such as obesity, steroid use and COPD can influence wound healing and can affect recurrence rate (Garavello et al., 2001). An unacceptable recurrence rate and prolonged post operative pain and recovery time after tissue repair along with our understanding of the metabolic origin of inguinal hernia's lead to the concept of

tension free hernioplasty with mesh, the mesh is placed in front of the transversalis fascia, such as with the Lichtenstein tension free hernioplasty, or behind the transversalis fascia in the pre-peritoneal space, such as during the Nyhus, Rives, Read, Stoppa, Wantz and Kugel procedures (Amid, 2005). There are four causes of hernia recurrence. These include excessive tension on the repair, abnormal scared tissue, and inadequate repair or over looked hernias. Tension free repair with mesh provide additional reinforcement for at least three of these four problems (Zoslt and Csiky, 2001). Many studies have shown that LIHR gives similar results in terms of recurrence as compared with OHR but with the added advantage of a reduced chance of post operative pain, lower risk of wound infection, and an earlier return to activity (Fingerhut et al., 2006). Following the laparoscopic revolution, LIHR has become one of the most common laparoscopic operations. Several studies have demonstrated a definite advantage over open repair with regard to reduced post-operative pain (Wellwood et al., 1998; Wright et al., 1996; Millikan et al., 1994), and an earlier return to work and normal activities (Kiruparan and Pettit, 1998;

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Brooks, 1994; Seid and Amos, 1994). However, at present the best method for laparoscopic hernia surgery remains unclear, i.e., whether mesh implantation with a central incision, and reconstruction of the deep inguinal ring is superior to a non-incised mesh implant (Schmedt *et al.*, 2005). No influence on postoperative complaints or complications has been demonstrated using different mesh fashioning methods and fixation alternatives (McCormack *et al.*, 2005). Cost has been a major point of criticism in the argument against the laparoscopic approach, particularly in terms of disposable items, of which a stapling device is the most expensive (Ridings and Evans, 2000). It is not necessary to secure the mesh from the interior during laparoscopic TAPP inguinal hernia repair. Exterior mesh fixation allows a reduction in size of ports required and a considerable reduction in cost. (Abdelhamid, 2011) In addition to much reduction in the cost as we did not use stapler nor tucker, external fixation is safe easy to learn, external fixation is associated with no groin pain compared to internal fixation and much less incidence of impulse of cough making this technique more acceptable to the patients. (Abdelhamid *et al.*, 2016)

## Patients

This is a retrospective study for 100 patients done years ago at Al Hayat Hospital Jeddah, KSA, Bani Suef University Hospital and Bani Suef Health Insurance Hospital. The study design and data collection were between 9 -2015 and 9 - 2016. Included in the study were patients with recurrent unilateral inguinal hernia both direct and indirect. Bilateral recurrent hernias were excluded from the study. There were 50 patients with recurrent inguinal hernias went TAPP with external fixation and 50 patients with recurrent inguinal hernias went Lichtenstein repair. We reported the patients for duration of operation, hospital stay, cost, recurrence, and return to work.

## Operative technique

The patient is placed in the supine position. The groin is prepared in the usual fashion. Before the incision, a bolus dose of a second generation cephalosporin is given intravenously. After incising the skin, (including the scar) subcutaneous tissue, and external oblique aponeurosis, the spermatic cord is elevated from the posterior wall of the inguinal canal. In direct hernias, the hernial sac is identified, dissected to the internal ring and opened to allow examination of its contents. The sac is ligated and its distal portions left open to prevent formation of a hydrocele (Sakorafas *et al.*, 2001). In cases where there was anterior transposition of the cord, it was dissected first then the external oblique aponeurosis dissected and opened to reach the posterior wall. In direct hernias, the aim was to imbricate its contents with non absorbable sutures, irrespective to its site, and whether it was associated with previous mesh repair or not. It was a little bit easy to do this in cases associated with tissue repair but a little bit difficult with mesh repair. Regarding the mesh no attempt was made to disturb the old mesh and the new one is applied over it, with over lap over the pubic tubercle and behind the cord. A polypropylene mesh (3 x 5 inch) is trimmed to fit the floor of the inguinal canal, and its apex is first sutured to the pubic tubercle using a No. 3-0 Prolene suture. The same continuous suture then sutures the lower border of the mesh to the free edge of the inguinal ligament, if could be identified otherwise the mesh is not suture, (in most) after an opening is made into its lower edge to accommodate the spermatic cord. The continuous suture extends up just medial to the anterior

superior iliac spine. Interrupted Prolene sutures then suture the two edges of the mesh together around the spermatic cord. The infero-medial corner of the mesh is then attached well overlapping the pubic tubercle. The mesh is then anchored to the conjoined tendon in some cases to rectus sheath by interrupted sutures (Prolene 3-0). After meticulous hemostasis, a closed suction drain is placed beneath the external oblique aponeurosis, especially in large inguinal hernias, where an extensive dissection was performed during the plastic reconstruction. The aponeurosis of external oblique is then closed using absorbable sutures (Vicryl No. 2) (Goldstein, 1999). Regarding post-operative care to the patient, prophylactic antibiotic is usually given for 48- 72 hours post-operatively. In high-risk patients (i.e. obese patients), low molecular weight heparin is usually administered to prevent deep venous thrombosis the night before surgery and its administration is continued during the hospitalization of the patient. Surgery is usually performed under general anaesthesia. The patient is mobilized about six hours after surgery. Post-operative analgesia consists in the administration of NSAIDS. The usual duration of hospitalization was 2 days. When a closed suction drainage was used, it is removed the day of discharge.

## TAPP with external fixation

A pneumoperitoneum is created using a Verres needle, and an intra-abdominal pressure of 15 mm Hg is maintained. The 10 mm trocar in infra-umbilical position is inserted. The telescope is then inserted and the intraabdominal cavity explored. Two 5 mm trocars are inserted lateral to each rectus muscle, at the same level as the umbilical trocar.

**Step 1:** Creating the peritoneal flap. The repair is initiated. The laparoscope is pointed toward the afflicted inguinal canal. The peritoneal defect or hernia is identified. The other inguinal canal is inspected. If an asymptomatic hernia sac is found on the other side, the patient is excluded from the study. The lateral umbilical ligament is located as well as the inferior epigastric artery and vein. A peritoneal incision is. The incision is extended from the lateral aspect of the inguinal region to the lateral umbilical ligament as high as possible to maximize exposure of the region.

**Step 2:** Exposing the inguinal structures Cooper's ligament is exposed as well as the inferior epigastric vessels and the spermatic cord. It is essential to expose the uncovered abdominal wall meticulously (without peritoneum) and remove all fatty layers.

**Step 3:** Dissecting the hernia sac the indirect inguinal hernia sac should be dissected carefully from the spermatic cord. Particular care should be taken not to dissect lateral and inferior to Cooper's ligament, as the iliac artery and vein will enter the femoral canal at this site.

**Step 4:** Inserting and anchoring the mesh before inserting the mesh, its mid-point is anchored bilaterally to two prolene threads that are tied with the knots towards the back, to be facing the abdominal wall when it is pulled using the port closure device. The threads are pulled, first obliquely just medial to the anterior iliac spine, second lateral to midline, pulled then tied in place.

**Step 5:** Closing the peritoneum the peritoneum is closed while reducing the pressure with vicryl 2/0. For post operative pain relief, injection of diclofenac sodium 75 mg i.m. is given post-operatively in the recovery room to all patients (Abdelhamid, 2011).

## RESULTS

The mean operative time in TAPP with external fixation was 80 min while in Lichtenstein repair was 65 min. The cost was less in Lichtenstein repair while long of stay (LOS) was the same. Recurrence was 2% in TAPP with external fixation on the other hand it was 4% in Lichtenstein repair. Patients returned back to work after 5 days in TAPP with external fixation and after 9 days in Lichtenstein repair. Table (1)

**Table 1. Comparison between the two interventions**

| Mean of                          | TAPP with external fixation | Lichtenstein |
|----------------------------------|-----------------------------|--------------|
| Duration of operation in minutes | 80                          | 65           |
| Cost in \$                       | 1800                        | 500          |
| Hospital stay in nights          | 1                           | 1            |
| Recurrence                       | 1/50 2%                     | 2/50 4%      |
| Return to work in days           | 5                           | 9            |

## DISCUSSION

Recurrent inguinal hernia accounts for 10-15% of inguinal hernia repairs, yet the most appropriate treatment remains controversial (Richards *et al.*, 2004). There is little available evidence on the optimal management of recurrent inguinal hernia, particularly if the original procedure involved use of mesh (Bay Nielsen *et al.*, 2001). Posterior wall weakness is the corner stone in hernia recurrence and the indirect hernias observed were mostly due to missed sacs., in contrast to the direct recurrences, the indirect recurrences probably represent hernias over looked at the primary operation. (Kehlet *et al.*, 2000) An increased risk of re-recurrence after a recurrent repair, most probably these re-recurrences were due to using scared tissue in the repair, tension repairs or it may be due to technical difficulty encountered during re-operation in second recurrence. The finding of a disproportionate higher number of re-recurrences among the re-operations, On the basis of increased incidence of re-recurrence after previous repair, dealing with recurrent hernia deserved further attention with regard to choice of operative technique. (Kehlet *et al.*, 2000) It was illogic to do re-construction by using those same tissues which have already failed one or more times previously. Such tissues were scarred, less vascular and indurated. The high failure rate of recurrent inguinal hernia repair 20% and higher are against using those less desirable tissues (Choy *et al.*, 2004). As the posterior wall is the most important layer in the repair and cannot be repaired with ease in open surgery, LIHR is the golden solution for this. The main cause of recurrence in the indirect hernia case was mostly due to unoverlapping the mesh behind the cord and partly may be due to incomplete herniotomy. Small mesh application as a plug mostly was the cause of recurrence, this finding goes hand in hand with Garavelle *et al.* (2001) who stated that mesh or plug dislocation was the most frequent cause of recurrence, followed by a failure of the internal ring re-construction and loss of the pubic stitch. The same was for Choy *et al.* (2004) who found most recurrences were due to inadequate dissection leading to missed hernias or sub-optimal mesh placement, this could be

attributed to insufficient medial extension of the mesh or early disruption of the suture line as stated by Benfatto *et al.* (2002). It was simple to do cord dissection with little bleeding whether it was anterior to the external oblique aponeurosis or in its normal lay posterior to it, others (Lichtenstein *et al.*, 1993) mentioned that this lead to damage to an already compromised cord. Again preperitoneal repair offer an easy option. Placing mesh behind the transversalis fascia, although a sound concept, requires extensive dissection, on the other hand TAPP with external fixation offer a safe option.

Stapling the mesh is not necessary in most cases, thus resulting in a remarkably low cost. Again external fixation of the mesh is superior as it is associated with fixation and at the same time low cost (Abdelhamid *et al.*, 2016). The issue of mesh fixation in laparoscopic repair of inguinal hernia repairs remains unsolved. The need for fixing the mesh arises from the fear of increasing recurrence rates. However, specific complications have emerged as a result of mesh fixation. Avoiding stapling of the mesh helps in decreasing complications and operative costs without affecting recurrence rates. (Kapiris *et al.*, 2009) In addition to much reduction in the cost as we did not use stapler nor tucker, external fixation is safe easy to learn, external fixation is associated with no groin pain compared to internal fixation and much less incidence of impulse of cough making this technique more acceptable to the patients (Abdelhamid *et al.*, 2013) As all our operations done through the same team under the same circumstances with the same facilities comparison between the TAPP with external fixation (Abdelhamid technique) versus Lichtenstein could come to a faire out come. Regarding the length of operation, the mean time of TAPP with external fixation of the mesh was 80 minutes while that for Lichtenstein was 65 minutes, this is in favors of Lichtenstein especially that most of the patients subjected for hernia repair almost elderly, so it is not preferable to be subjected to long time of anesthesia with abdominal insufflations in case of TAPP Cost of operation is of utmost importance especially in developing countries, the cost for TAPP with external fixation (Abdelhamid technique) after omitting the use of a 12mm trocar and the use of a fixing device (tuckar or stapler) still much higher than Lichtenstein (1800\$ against 500\$). Although in our technique there is much reduction in cost comparing it with traditional TAPP with mesh fixation (Abdelhamid *et al.*, 2016)

Fibrin glue (Tissocol) is an effective method for mesh fixation during TAPP (Bay Nielsen *et al.*, 2001). External fixation has the advantage of being fixed well. TAPP repair is a technically demanding laparoscopic technique, but once mastered, is safe and effective with a high degree of patient satisfaction (Kehlet *et al.*, 2000). By all criteria of success—recurrence, recovery, long term symptoms and economics—LIHR using our method, is the winner. In our study we omitted the use of the disposable 12 mm trocar and the use of any hernia tucker, which are the most expensive components in the cost of TAPP hernia repair (Abdelhamid, 2011). Stapling the mesh is not necessary in most cases, thus resulting in a remarkably low cost. Again external fixation of the mesh is superior as it is associated with fixation and at the same time low cost. (Abdelhamid *et al.*, 2016) Long of stay was the same for TAPP with external fixation (Abdelhamid technique) and in Lichtenstein, but return to work was much higher in Lichtenstein as it was 9 days compared to 5 days in our technique. This in favor of our technique and in general for TAPP. A model that takes into account the additional equipment cost and time cost related to laparoscopic surgery, as patients return to work earlier.

Unfortunately, this analysis showed that an early return to work does not offset the additional costs associated with laparoscopic hernia repair (Voyles *et al.*, 2002). One of the most important factors in hernia surgery is defining recurrence rate. In our technique it was 2% versus 4% in Lichtenstein, this is in favor of our technique.

Olmi *et al.* (2006) stated that their experience demonstrates that fibrin glue (Tissocol) is an effective method for mesh fixation during TAPP, yet our method has the advantage that the mesh is fixed well to the anterior abdominal wall from the inside. Moreover, the mesh can be manipulated to change its position, in contrast to glue, which, once fixed, cannot be manipulated. Also, some degree of tension can be applied to our mesh. For the treatment of recurrent inguinal hernias, which are developed after use of conventional (nonmesh) methods, the first choice should be given to the laparoscopic method, especially for young, physically active, nonobese patients, and if there are any contraindications for the laparoscopy, the Lichtenstein approach should be recommended (Demetrashvili *et al.*, 2016) Laparoscopic TAPP repair is associated with faster recovery, less pain, less post operative complication better cosmetic result as compared to open Lichtenstein repair (Choudhury and Khan, 2016) It is to be concluded that TAPP with external fixation is associated with longer operative time and higher cost but the incidence of recurrence is much less while return to work was earlier in TAPP with external fixation advocating to be used as a primary option in recurrent inguinal hernia repair. If there are any contraindications for the laparoscopy, Lichtenstein surgical intervention would be highly recommended in such cases

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