Laparoscopic Repair of Inguinal Hernias Using an Intraperitoneal Onlay Mesh (IPOM) Technique–Early Single Centre Experience

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ABSTRACT

Inguinal hernia repair is one of the most frequently performed operations in the field of general surgery. Laparoscopic repair of inguinal hernias is usually achieved by totally extraperitoneal (TEP) or transabdominal preperitoneal (TAPP) techniques. The intraperitoneal onlay mesh (IPOM) could be an interesting alternative as it is much easier to perform and faster to execute. This technique is subject to correct selection of indications and to demonstration of its safety. ***Aim of the study:*** *To assess feasibility and safety of IPOM technique in repair of inguinal hernias.* ***Materials and methods:*** *From January 2013 to January 2014 we performed 15 laparoscopic inguinal hernia procedures on 15 selected patients (15 males of mean age 37 years) who were enrolled in a prospective trial. All patients were treated using the laparoscopic IPOM technique. Patients were checked one month, three months, six months and nine months post-operatively.* ***Results:*** *A mean operative time of 35.5 minutes. A mean follow up of 7.6 months, with average hospital stay of one day. In the early postoperative period one patient deveoped urine retentionn and required urethral catheterisation for 12 hours, and two patients had scrotal oedema with complete reolution in one week. We had no conversions or mortality. Pain was assessed 24 hours, 48 hours postoperatively and on the 7th postoperative day. Pain was mild in 14 patient (93.3%) and moderate only in one patient(6.6%) with marked improvemnet of pain on the second postoperative day and no pain on the 7th postopertaive day.* ***Conclusion:*** *Laparoscopic IPOM technique may be a feasible, safe and effective procedure in the treatment of inguinal hernias. IPOM repair has in fact been shown to be fast and easy technique, with the chance to use it in unilateral, bilateral and especially in recurrent ingunial hernias.*

INTRODUCTION

Inguinal hernia repair is one of the most frequently performed operations in the field of general surgery. Following the advance in laparoscopic surgical techniques and equipments, laparoscopic surgery using synthetic mesh was introduced as one of the method for inguinal hernia repair.

Common methods for such repairs could be classified under three broad categories: Totally Extraperitoneal (TEP) repair, Transabdominal Preperitoneal (TAPP) repair and the Intraperitoneal Onlay Mesh (IPOM) repair[(1)]**.** Nowadays, among them, TAPP and TEP have become the most common procedures to repair inguinal hernias [(2)]**.**

The ideal method of hernia repair should cause minimal discomfort to the patient, both during the surgical procedure and in the postoperative course. It should be technically simple to perform and easy to learn, should have a low rate of complications and recurrence, and should require only a short period of convalescence [(3)].

Intraperitoneal onlay mesh (IPOM) was introduced in 1991 and was immediately successful because it was easier to perform compared to TAPP and TEP. The mesh is usually placed in the retroperitoneum and clipped into position. Many authors state that the learning curve for TAPP and TEP techniques may be a serious issue because of their difficulty [(4, 5)]. The IPOM technique could be an interesting alternative as it is easier and faster.

The introduction and availability of new composite meshes and the use of new methods of prosthesis fixation, made us reconsider IPOM technique, which can be within the reach of any laparoscopic surgeon. This study was undertaken to assess the outcomes (IPOM) hernia repair.

Aim of the study:

To assess feasibility and safety of IPOM technique in repair of inguinal hernias.

MATERILAS AND METHODS

From January 2013 to January 2014 we performed 15 laparoscopic inguinal hernia procedures on 15 selected patients (15 males of mean age 37 years) in Kasr Al Ainy teaching Hospital, Faculty of Medicine, Cairo University who were enrolled in a prospective trial. All patients were treated using the laparoscopic IPOM technique. The patients were checked one month, three months, six months and nine months post-operatively.

The inclusion criteria were adult males with inguinal hernia. The exclusion criteria were complicated or recurrent inguinal hernia. All patients gave their informed consent prior to surgery.

Patients' demographics, perioperative course and outpatient follow-up records were reviewed. The following data collected prospectively was reviewed: age, gender, duration of operation, intraoperative complications, postoperative complications and recurrence. Variables are presented as mean and standard deviation.

Surgical technique

The patient lies on his back, with a slight anti-trendelenburg tilt, arms along the sides. The surgeon stands opposite the hernia, the assistant faces him. The scrub nurse is beside the surgeon with the instrument stand. The laparoscopy tower was at the patients' feet.

A 10 mm trocar was inserted into the peritoneal cavity through the umbilical cicatrix by open Hasson technique, through which 30-degree telescope was introduced, and a pneumoperitoneum of 14 mmHg is induced. The other two 5 mm trocars were inserted under direct vision lateral to the rectal sheath along the transverse umbilical line, watching out for the inferior epigastric vessels. After the abdominal cavity was explored, we confirmed hernia defects and examined contralateral inguinal area.

The contents of the sac, if present, were carefully reduced into the peritoneal cavity with nontraumatic graspers. The sac was left in situ without ligation or incision at the internal ring.

A 15×12 cm sized Proceed mesh (Ethicon, Somerville, NJ, USA) was rolled and passed through the 10 mm trocar into the peritoneal cavity, and then the mesh was manipulated to lie flat against the posterior inguinal floor to cover the *myopectineal orifice of Fruchaud*, with the collagen film on the inside and unfolded so that the non-adhesive side faces the bowel. Several endoscopic tackers (Protack®, Covidien Inc, Mansfield, MA) were used to secure the mesh to the Cooper ligament and to anterior abdominal wall, avoiding tacking below iliopubic tract, where lies the so-called triangle of doom and triangle of pain, an average of five tackers were used to fix the mesh superiorly. Several stitches were done on inferior border of the mesh with peritoneum to fix the lower edge of the mesh **Figure 1**.

Data were statistically described in terms of mean standard ± deviation (± SD), median and range, or frequencies (number of cases) and percentages when appropriate. Comparison of numerical variables between the study groups was done using Student *t* test for independent samples. *p* values less than 0.05 was considered statistically significant. All statistical calculations were done using computer program SPSS ***(Statistical Package for the Social Science; SPSS Inc., Chicago, IL, USA) release 15 for Microsoft Windows (2006)***.

RESULTS

Between January 2013 and January 2014, a total of 15 laparoscopic IPOM inguinal hernia repairs in 15 male patients were performed. All of them had unilateral inguinal hernia (10 right and 5 left). Mean age was of 37 years, with no previous history of abdominal operations. Patients' demographics and hernia site are shown in **table 1.**

A mean operative time of 35.5 minutes (range 20-55 mins). A mean follow up of 7.6 months (range 6-9), with average hospital stay of one day. In the early postoperative period one patient developed urine retention and required urethral catheterization for 12 hours, and two patients had scrotal oedema with complete resolution in one week. We had no conversions or mortality.

Regarding the postoperative pain assessment, as shown in **table 2** using the numeric pain rating scale, the pain was assessed 24 hours, 48 hours postoperatively and on the 7th postoperative day. Pain was mild in 14 patient (93.3%) and moderate only in one patient(6.6%) with marked improvemnet of pain on the second postoperative day and no pain on the 7th postopertaive day.

Table 1. Patient demographics and hernia sites

Variable	Number
Number of patients	15
Number of hernias	15
Age (years, mean)	37
Gender	
Male	15
Female	0
Site of hernias	
Right	10
Left	5
Bilateral	0
Type of hernia	
Indirect	14
Direct	1
Pantaloon	0
Femoral	0

Table 2. Numeric pain rating scale

Pain grading	Number
24 hours	
No pain (0)	0 (0%)
Mild pain (1-3)	14 (93.3)
Moderate pain (4-6)	1(6.66)
Severe pain (7-10)	0 (0%)
48 hours	
No pain (0)	0
Mild pain (1-3)	5 (100 %)
Moderate pain (4-6)	0
Severe pain (7-10)	0
7th day	
No pain (0)	15 (100%)
Mild pain (1-3)	0
Moderate pain (4-6)	0
Severe pain (7-10)	0

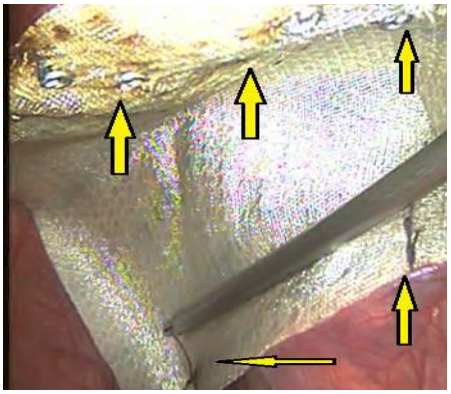

Figure 1: The mesh after fixation

DISCUSSION

Nowadays laparoscopic surgery has become the gold standard procedure in many surgical fields. Likewise, after decades of experience in laparoscopic hernia surgery, this method has gained worldwide acceptance and has become the first choice for inguinal hernia repair in many centers. [(2)]

Many reports have demonstrated that laparoscopic repair is associated with a lower incidence of postoperative pain and permits more rapid recovery of normal physical activity than conventional repair [(6)] In addition, laparoscopic approach allows viewing the entire myopectineal orifice and repairing any unexpected hernias and more specifically in case of recurrent hernia. It also allows reducing risk of spermatic cord damage and chronic pain [(7)].

However, laparoscopic repair has the disadvantages of increased cost, lengthier operation, steeper learning curve and higher recurrence and complication rates early in a surgeon's experience [(8)].

In the early periods of laparoscopic hernia repairs, extraperitoneal (TEP) repair, transabdominal preperitoneal (TAPP) repair and intraperitoneal onlay mesh (IPOM) repair had been performed generally. But recently, TEP and TAPP are being performed widely because IPOM has shown relatively high recurrence rate and complications such as small bowel obstruction and formation of fistula [(9)].

Laparoscopic inguinal hernia repair takes longer duration than open mesh repair, the important issues regarding operative time center on surgeon experience, clinical relevance, and cost [(10)]. This study showed a mean operative time of 35.5 minutes which is quite faster than TAPP and TEP techniques and, and can even be shortened more in the future as the tarining progresses in this technique.

Our data, after 7.6 months follow-up regarding postoperative pain, hospital stay, complications and recurrence, together with short term resumption of regular physical activity show the efficacy and safety of this technique. The results are better than those of TAPP, TEP and [(11,12,13,14)] also considering there is no dissection of peritoneal structures, that mesh fixation is less traumatic and the procedure is easily reproducible and within junior laparoscopic surgeons' reach.

In our study, there was no fatal intraoperative complications, with avergae hospital stay of one day. In the early postoperative period one patient deveoped urine retentionn and required urethral catheterisation for 12 hours, and two patients had scrotal oedema with complete reolution in one week. We had no conversions, recurrence or mortality.

On the other hand in TAPP and TEP techniques, due to the wide dissection of preperitoneal space, are rather more complicated procedure requiring a long learning curve with a higher risk of morbidity **(15).** In addition, the IPOM has same advantage to other laparoscopic techniques in terms of postoperative pain and faster recovery.

We haven't had the chance to re-explore any patient underwent laparoscopic IPOM technique for inguinal hernia to detect any complications related to the dual layer mesh but in a previous study,they have had the opportunity to reexplore 21 patients who have undergone a laparoscopic IPOM repais. These patients were reexplored while performing a laparoscopic surgical procedure for a condition other than inguinal hernia, they found no adhesion in 10 patients (47.6%), Flimsy omental aedhesions to edge of mesh in 6 patients (28.5%), Moderately dense adhesions, where adhesions were taken down to obtain exposure in 4 patients (19%) and Severe adhesions, nondissectable bowel and omentum in one patient (4.8%) **(16).**

Cost analysis comparing laparoscopic and open hernia repair is a complex task. Some studies showed emphasized that Laparoscopic hernia repair may not be more expensive than open repair in terms of direct hospital costs or where a difference exists, this is relatively small. Social costs due to quicker recovery and return to employment show clear advantages for the laparoscopic repair and although not currently evaluated in detail, the reduction in chronic groin pain after laparoscopic repair is likely to lead to savings in both direct hospital costs and societal costs **(17).**

In this study, although, the dual layer mesh used in the IPOM technique is much more expensive than polyprolene mesh used in the TAPP technique, some of the expenses were reduced by the significant short time of operation in IPOM technique and the more or less ,the less complication rates.

To conclude, the results of this study as well as the meta-analysis of the series presented in the literature, indicate that the intraperitoneal onlay mesh repair may be a feasible, safe and effective procedure in the treatment of inguinal hernias. The intraperitoneal onlay mesh repair has in fact been shown to be faster and easier than the other more commonly performed laparoscopic hernioplasties, with the chance to use it in unilateral, bilateral and especially in recurrent ingunial hernias where the dissecion of the pretoneal fold (TAPP and TEP) may be a long and tedious procedure with some potential serious comlications compared to the simple IPOM technique. However, the limited cases and the short follow-up ask for randomized prospective long-term studies to definitely ascertain the true incidence of recurrence and therefore the effectiveness of this procedure which is not yet popular in the field of hernia surgery.

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