Transabdominal Preperitoneal *versus* Intraperitoneal Onlay Mesh for Laparoscopic Inguinal Hernia Repair in males: A Comparative Study

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ABSTRACT

Background: *Laparoscopic repair of inguinal hernias is usually achieved by transabdominal preperitoneal (TAPP) or intraperitoneal onlay mesh (IPOM) techniques with satisfactory results. Postoperative pain and infection are minimal with quick return to normal activities.* ***Patients and methods:*** *From January 2015 through September 2015, 30 laparoscopic inguinal hernia repairs were done. They were randomly categorized into two equal groups A & B: Group (A) subjected to TAPP repair and Group (B) to IPOM repair. They were followed up for 1, 3 and 6 months post-operatively. Postoperative pain was assessed by numeric pain rating scale; three times in the first week (days 1, 2 and 7) for both groups with significant difference at p <0.05.* ***Results:*** *All patients were males with inguinal hernia with mean age 37 years. The operative time for group A procedures was from 50 to 80 minutes (mean 67.93 min.) and for those of group B from 20 to 55 minutes (mean 35.5). The average hospital stay was one day for both groups. No conversions were required. Postoperative pain (using numeric pain rating scale) in the first and second days was assessed as mild or moderate as follows: group A 39.3%, 6.6%, group B 53.3%, 46.6% respectively. At the 7th day there was no pain in both groups. No mortality were reported.* ***Conclusion:*** *Laparoscopic Intraperitoneal Onlay mesh repair for inguinal hernia in males is faster and easier than techniques particularly in bilateral and recurrent cases.*

Key Words: *IPOM; Laparoscopic hernia; TAPP.*

Abbreviations: *Transabdominal preperitoneal (TAPP); Intraperitoneal onlay mesh (IPOM).*

INTRODUCTION

Following the advance in laparoscopic surgery, inguinal hernia repair in males using synthetic mesh has been launched as a feasible and effective technique. The commonly used methods are IPOM, TEP or TAPP favoring the last two despite their relative complexity[1,2,4,5]. The reported advantages for the 3 methods are their relative simplicity causing minimal postoperative pain with early convalescence and rapid return to work. Recurrences are also low [3]. The introduction and availability of new dual meshes using novel fixation schemes, made IPOM within the reach of standard laparoscopic surgeon and revived its use. This work was conducted to study this issue.

PATIENTS AND METHODS

From January 2015 to September 2015, we performed 30 laparoscopic inguinal hernia procedures for 30 selected patients (30 males with mean age 37 years) in Kasr Al Ainy Hospital, Faculty of Medicine, Cairo University who were inserted in a prospective randomised trial. TAPP technique was performed for 15 patients (group A) and IPOM technique for 15 patients (group B). The patients were followed up for one month, three months, and six months post-operatively.

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

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

Surgical technique

The patient lies in supine position, with a slight Trendelenberg tilt, arms along the sides. The surgeon stands on the contralateral side of the hernia, the assistant faces him. The scrub nurse is beside the surgeon with the instrument stand. The laparoscopy tower is at the patients' feet.

A 10 mm trocar was inserted into the peritoneal cavity through the umbilical cicatrix by open Hasson's technique, through which 30-degree laparoscope was introduced, and a pneumoperitoneum of 14 mmHg is induced. The other two 5 mm trocars were inserted under direct vision laterally to the rectal sheath along the transverse umbilical line, watching out for the epigastric vessels not to be injured. After the abdominal cavity was explored, we confirmed hernia defects and examined the contralateral inguinal area. The contents of the sac, if present, were carefully reduced into the peritoneal cavity with nontraumatic graspers.

In TAPP technique, the peritoneum was incised using scissors with monopolar cautery approximately 2 cm above the upper border of the internal ring and extending medially above the pubic tubercle and laterally 5 cm beyond the internal inguinal ring. The incised peritoneum was grasped along with the peritoneal sac and dissected cephalad with blunt and sharp dissection to create the lower peritoneal flap. At this point the hernia sac was reduced; the sac is grasped and retracted while bluntly sweeping off attachments to the cord structures. This dissection provided an adequate preperitoneal space, and a 10 x 12 cm polypropylene mesh was rolled into a tubular shape and introduced into the abdomen via a 10 mm port and unfurled. The mesh was used to cover the myopectineal orfice of Fruchaud. The mesh was fixed with the abdominal wall by tacks, above the level of the iliopubic tract. Then the peritoneal edges were reapproximated carefully to cover the mesh completely, keeping it away from the bowel.

In IPOM technique, the sac was left in situ without ligation or incision at the internal ring. A 15×12 cm sized dual facing surgical mesh 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 wall to cover the myopectineal orifice of Fruchaud, with the inert side of the mesh on the inside and unfolded so that the non-adhesive side faces the bowel. Several tacks 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, several stitches were done on inferior border of the mesh with peritoneum to fix the lower edge of the mesh.

RESULTS

Between January 2015 and September 2015 we performed 30 laparoscopic inguinal hernia procedures on 30 selected patients (30 males with mean age 37 years) who were inserted in a prospective randomised trial. TAPP technique was performed for 15 patients (group A) and IPOM technique for 15 patients (group B). All of them had unilateral inguinoscrotal hernia. The age of the patients included in this study was ranging from; group A 23-59 years with a mean age 36.07 years and in group B 16-50 years with a mean age 37 years.

A mean operative time of 67.93 minutes (range 50-80 minutes) for group A and of 35.5 minutes (range 20-55 minutes) for group B. There is a significant difference in the mean operative time ($p < 0.001$) between the two groups. The average hospital stay was one day for both groups. In the early postoperative period one patient from group B developed urine retention and required urethral catheterisation, scrotal oedema developed in four patients in group A, and in two patients in group B with complete resolution in one week. We had no conversions to open surgery, no intraoperative complications nor mortalities.

Regarding the postoperative pain assessment, as shown in table 1 using the numeric pain rating scale, the pain was assessed 24 hours, 48 hours postoperatively and on the 7^{th} postoperative day.

At 24 hours post operatively, There was a significant difference between both groups ($P<0.05$), in group B the pain was mild in 14

patient (93.3%) and moderate only in one patient(6.6%) while in group A it was mild in 8 patients (53.3%) and moderate in 7 patients (46.6%). On the 2nd and 7th postoperative days there was an improvement in pain in both groups which was more in group B.

Table 1. Numeric pain rating scale

Pain grading	*Group A (TAPP) N=15*	*Group B (IPOM) N=15*	*P value*
24 hours			
No pain (0)	**0(0%)**	**0(0%)**	
Mild pain(1-3)	**8 (53.3%)**	**14 (93.3%)**	**0.043**
Moderate pain(4-6)	**7 (46.6%)**	**1 (6.66%)**	**P<0.05**
Severe pain(7-10)	**0(0%)**	**0(0%)**	
48 hours			
No pain (0)	**0(0%)**	**0(0%)**	
Mild pain(1-3)	**12(80%)**	**15 (100%)**	**0.149**
Moderate pain(4-6)	**3(20%)**	**0(0%)**	**P>0.05**
Severe pain(7-10)	**0(0%)**	**0(0%)**	
7th day			
No pain (0)	**13(86.6%)**	**15 (100%)**	
Mild pain(1-3)	**2 (13.3%)**	**0(0%)**	**0.246**
Moderate pain(4-6)	**0(0%)**	**0(0%)**	**P>0.05**
Severe pain(7-10)	**0(0%)**	**0(0%)**	

DISCUSSION

After decades of experience, laparoscopic inguinal hernia repair started nowadays to gain worldwide acceptance [(2)]. The unsurpassable features of this new modality were the amazingly low incidence of postoperative pain and rapid patient recovery with short convalescence allowing for early return to work [(6)]. During surgery, this technique allows for a clear and complete exposure of the entire myopectineal hernia orifice, which is the milestone for a successful repair particularly in recurrent cases, avoiding unnecessary injury to the spermatic cord, which is the usual cause for chronic pain in the inguinal region lasting for a long time[(7)]. However, laparoscopic repair has the disadvantages of increased cost, lengthier operation time and steeper learning curve. Higher recurrence and other complications rate as well as prolonged operation time, are reported linked to surgeon's experience [(8,10)]. This is particularly related to IPOM where some cases of small bowel obstruction and fistula formation were reported related to it , making the use of TEP and TAPP more frequent for safety reasons[(9)]. In our study, a continuous effort was paid to minimize dissection of peritoneal structures and in reducing trauma during mesh insertion and fixation, a policy that succeeded in reviving the IPOM procedure and making it more suitable and safe to our patients even for the junior laparoscopic surgeon, because of the rapid learning curve. This goes with the same findings reported by Kingsley et al. in 1998, Memon et al. in 1999, Kapiris et al. in 2001 and Wright et al. in 2002 earlier in the course of this procedure [(11-14)].

In our study we succeeded in reducing post operative complications following IPOM to a minimum compared to the other two procedures : TEP & TAPP, including scrotal edema and urine retention in addition of attaining minimal pain and maximal patient satisfaction, without the need for conversion. Though not carried out in this series, re-exploration following IPOM surgery was reported by Morris et al. about 20 years ago aiming at that time to detect any complications related to the dual layer mesh in IPOM. They reported absence of adhesions in about half of their patients while minimal omental adhesions (that may require dissection) in 47% of their cases. In about 5% the adhesions were tough and non dissectible and mostly involving the omentum and small bowel [(16)]. Six months follow-

up of patients in our study confirmed the superiority of IPOM compared to the two other commonly used procedures TEP & TAPP regarding safety, early and delayed pain, period of hospital stay and early resumption of patients' daily activities. The two latter methods had more incidence of scrotal edema probably related to the wider dissection of the preperitoneal space [(15)]. But all the three techniques have the same advantages of using the laparoscope, with absence of the need for conversion or re-exploration and the complete dearth of operative and postoperative mortality. 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 conventional open repair – exempting IPOM that requires the fixation of a dual mesh - in terms of direct hospital costs. In our study in Cairo University hospitals in Egypt, this is of minor concern on the part of the patient, because the health service is free of charge or under the coverage of health insurance. Social costs due to quicker recovery and return to work and normal daily activities in the three procedures clearly show the superiority of laparoscopic over open repair [(17)].

CONCLUSION

IPOM is a better procedure than TEP & TAPP. It is also faster, easier and is easily reproducible, and after enough experience and rapid learning curve, is easily done by junior laparoscopic surgeons. It is also suitable for bilateral. But to approve this, a larger randomized studies may be required.

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