

Original Research Article

One inch incision-mesh plug repair versus laparoscopic trans-abdominal preperitoneal repair of the primary indirect inguinal hernia: a prospective comparative study

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ABSTRACT

Background: Management of inguinal hernia by minimally invasive incision and minimal dissection with optimal outcomes remains an unmet need for general surgeons. The most common hernia repair procedures are Lichtenstein hernioplasty and laparoscopic hernia repair; TAPP and TEP. The modification of mesh plug repair (MPR); one inch incision-MPR (OI-MPR); could achieve optimal outcomes comparable to that of laparoscopic hernia repair. The objective of the study was to assess OI-MPR approach for management of primary indirect inguinal hernia and its outcomes in comparison to laparoscopic TAPP repair.

Methods: During the period from September 2017 to March 2019, 63 patients with indirect inguinal hernia were selected randomly to one of two groups; group-A included 35 patients underwent one inch incision-mesh plug repair (OI-MPR), group-B included 28 patients underwent laparoscopic TAPP.

Results: The mean operative time of group-A was 31.74 ± 4.74 min which was significantly shorter than that of group-B (81.22 ± 7.44 min). The mean hospital stay duration in group-A was 0.57 ± 0.18 day and in group-B, it was 1.18 ± 0.39 day. The patients of group-A returned to normal physical activities earlier than the patients of group-B. The duration of postoperative pain was shorter and less severe in group-A than that of group-B. Regarding complications, there was no statistically significant difference found between both groups.

Conclusions: One inch incision-MPR is a simple, feasible and cost-effective approach with low morbidities and low burden on the patients and the healthcare facilities.

Keywords: Inguinal hernia, Mesh plug repair, TAPP, Hernia repair

INTRODUCTION

The hernia is one of the most common diseases that human beings have endured, and its repair is considered an ancient issue.¹ The hernia was mentioned in the ancient Egyptian Papyrus of Ebers as a swelling that bulges during cough.² Inguinal hernia represents the most common abdominal wall hernias.³ It can be classified into indirect and direct hernias which include 50% and 24% of all abdominal wall hernias, respectively.⁴ Indirect hernia is common in the young and direct hernia in old

patients.³ Surgical treatment is the main stem of the repair of this disorder.⁵ Inguinal hernia repair has passed through many eras.² It has been evolving from tension tissue repair by reconstruction of the posterior wall of inguinal canal introduced by Bassini followed by Shouldice, to tension-free mesh repair (Lichtenstein and mesh plug) and recently, laparoscopic TAPP and TEP groin hernia repair.⁶ However, the ideal surgical procedure is still debatable and challengeable.⁷ Since the tension-free mesh repair has been evolved, many innovative and new mesh-based techniques have been

introduced.⁸ The Lichtenstein tension-free is the most popular hernioplasty technique attributable to its simplicity, short operation time, low recurrence rate and more appropriate for patients with major co-morbidities as it can be performed under local anaesthesia.⁹ However, the procedure is blamed for more chronic inguinal pain and a longer time to come back to work.¹⁰ Laparoscopic hernioplasty (TAPP and TEP techniques) has advantages of less postoperative pain, shorter hospital stay, less period of recovery, and more beneficial in bilateral and recurrent hernias than open hernioplasty.^{6,10} Laparoscopic hernioplasty is a more tricky procedure than open mesh techniques as it entails long learning curve and operative time. It is also associated with increased incidence of hematomas, infections, adhesions, and organ injuries.^{10,11} Mesh plug repair is one of the new tensionless mesh-based techniques.¹² It is recommended by Update of European Hernia Society as an alternative to Lichtenstein procedure.¹³ It requires minimal dissection and insertion of a mesh in the defect of the hernia.¹⁴ It is relatively simple with shorter operative time and optimal outcomes in comparison to other techniques.¹³ Complications of MPR involve mesh shrinkage, migration and chronic inguinal pain.⁸ Most the postoperative complications of open methods such as hematoma, numbness and chronic pain are due to long inguinal incision and great dissection.¹⁵ In this study, minimal dissection of MPR, and minimal invasive incision like the laparoscopic repair were utilized, which guaranteed rapid recovery, early resume of the normal activities, and optimal outcomes.

Objective

This prospective comparative study was designed to assess OI-MPR approach for the management of primary indirect inguinal hernia and its outcomes in comparison to laparoscopic TAPP repair.

METHODS

During the period from September 2017 to March 2019, 63 males with primary unilateral indirect hernias presented to the General Surgery Department, Benha University Hospital, for hernia repair. Patients were selected randomly to one of two groups; group-A included 35 patients who underwent one inch incision-mesh plug repair (OI-MPR), group-B included 28 patients who underwent laparoscopic transabdominal preperitoneal hernia repair (TAPP). Both approaches and their adverse events were explained to each patient. Written consent was taken from each patient. The variables assessed were age, type of hernia, risk factors, associated co-morbidities, American Society of Anesthesiology (ASA) score, type of anaesthesia, operative time, duration of hospital stay, time to recommence normal daily activities and return to work, cosmesis, early and late postoperative complications including recurrence rates at 18 months follow-up, and acute and chronic postoperative pain. The severity of postoperative pain was assessed by visual analog scale

(VAS) 0-10; whereas (0) indicated no pain and (10) indicated worst pain.

Study design

It was prospective comparative study.

Inclusion criteria

Age >18 years. Uncomplicated primary unilateral indirect inguinal hernia. Patients tolerated general and spinal anaesthesia.

Exclusion criteria

Age <18 years. Patients with huge or complicated indirect inguinal hernia. Patients with both direct and indirect inguinal hernias. Known bleeding and coagulation disorders.

Operative procedures

All patients of the group-A were anaesthetized by the spinal anaesthesia, while those of the group-B were anaesthetized by the general anaesthesia. At the induction of the anaesthesia, a prophylactic antibiotic dose; ceftriaxone 1gm was administered to all patients of both groups. Skin preparation was achieved using a 10% povidone iodine.

Operative steps of one inch incision-MPR

One inch transverse skin incision was performed at the level of the internal inguinal ring. The superficial fascia was sharply dissected to expose the external oblique aponeurosis, through it the inguinal canal was entered, and the spermatic cord was dissected to reach the indirect sac which was dissected, transfixed, and excised (Figures 1, 2). The posterior wall of the inguinal canal was assessed to detect any associated direct hernia. All patients of group-A had not any direct hernia. A hand-made cone-like piece of a synthetic polypropylene mesh 4×8 cm was prepared and folded to form a plug. This plug was positioned into the preperitoneal space through the internal inguinal ring. The plug was fixed to the crura of the ring with two interrupted polypropylene 0 sutures (Figure 3). Proper hemostasis was undertaken and the external oblique aponeurosis, subcutaneous tissue, and skin layers were closed in an anatomical manner without placement of a subcutaneous drain (Figure 4).

Operative steps of laparoscopic TAPP

The Foley's catheter was placed before surgery. The patient was placed in the supine position. The monitor was placed at the foot of the operative table. The surgeon stood on the opposite side of the inguinal hernia. The pneumoperitoneum was established using a Veress needle. Once a suitable pneumoperitoneum (14 mmHg) was achieved, the patient was positioned in the steep

Trendelenburg position (10° – 20°) to allow the intestines to move away from the operative field. A 10mm supraumbilical trocar was inserted for the 30-degree laparoscope, and the laparoscopic abdominal exploration was performed. Other two lateral 5-mm trocars were inserted as working ports in the midclavicular plane at the level of the supraumbilical port; on the right and the left side; 5-7 cm apart. The defect of the hernia and the Mercedes-Benz sign were located. The Mercedes-Benz sign is formed of the inferior epigastric vessels, the spermatic vessels, and the vas deferens. The hernia sac was dissected through the creation of a peritoneal flap extending from medial umbilical ligament to slightly medial to the anterior superior iliac spine (Figure 5). The blunt dissection was excavated inferiorly and medially to identify space of Retzius and Cooper's ligament. A small indirect hernia sac was completely dissected and reduced to the peritoneal cavity, while a large sac was partially dissected and excised and its distal end was left open to avoid hydrocele formation and the peritoneal defect was closed to avoid internal herniation (Figure 6). A piece of 10×15 cm of polypropylene mesh was employed to cover the whole myopectineal orifice (Figure 7). The mesh was fixed medially to Cooper's ligament, and laterally above the iliopubic line using tacks with the mesh upper border one inch above the internal inguinal ring. The peritoneal flaps were closed followed by suturing of the port-sites (Figure 8).

In the recovery room, all the patients of group-B received IM diclofenac potassium injection (75 mg), while those of the group-A received analgesics after spinal anaesthesia recovery. Subsequently, all the patients of both groups received paracetamol 1gm tab. twice daily and the pain was assessed using VAS on successive postoperative days.

Follow-up

Follow-up was by visiting the outpatient clinic in the first week, the first month, the 6 months and the 18 months and by the mobile telephony.

Statistical analyses

Software (SPSS, Version 26.0 for Windows, SPSS Inc, Chicago, IL) was used for the univariate, bivariate, and stratified analyses of the data. Qualitative variables were analyzed by constructing contingency tables with Pearson χ^2 test or Fisher exact test when conditions for the former were not met. Analysis of variance was used for multiple comparisons of quantitative variables. Differences were considered significant at $p \leq 0.05$.

RESULTS

During the period from September 2017 to March 2019, 63 male patients presented to the General Surgery Department, Benha University Hospital, for inguinal hernia repair.

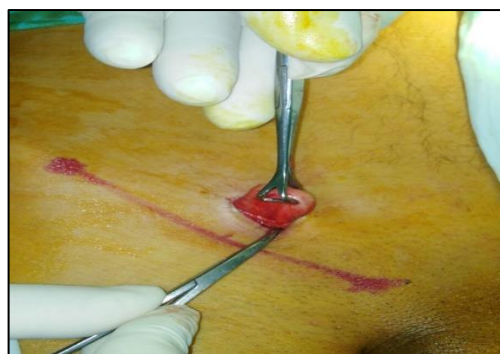


Figure 1: Dissection and delivery of the spermatic cord through one inch incision.



Figure 2: Neck of the sac indicated by the inferior epigastric vessels.



Figure 3: Fixation of the mesh plug to the internal ring pillars.

They were randomly allocated into two groups. Group-A; 35 patients who underwent one inch incision-mesh plug repair (OI-MPR) procedure, and group-B; 28 patients who underwent TAPP procedure. The ages of the patients ranged from 18 years to 56 years. The mean age of group-A (\pm SD) was 33.11 ± 10.37 years, and that of group-B was 33.43 ± 10.44 years. The entire patients of both studied groups had primary unilateral indirect inguinal hernia; 37 patients on the right side (58.7%) and 26 patients on the left side (41.8%). The most common risk factors of inguinal hernia affecting the patients of both studied groups were family history (9.5%), smoking (9.5%), chronic constipation (7.9%), heavy work (6.3%),

cough (4.8%), and benign prostatic hyperplasia (4.8%). Associated comorbidities were diabetes mellitus (6.3%), systemic hypertension (6.3%), and COPD (1.6%). According to American Society of Anesthesiologists Classification (ASA Class); 50 patients were ASA 1 and 13 patients were ASA 2 (6 patients in group-A, and 7 patients in group-B); whereas ASA 1 represents a normal healthy patient and ASA 2 represents a patient with mild systemic disease.



Figure 4: Skin closure without a drain.

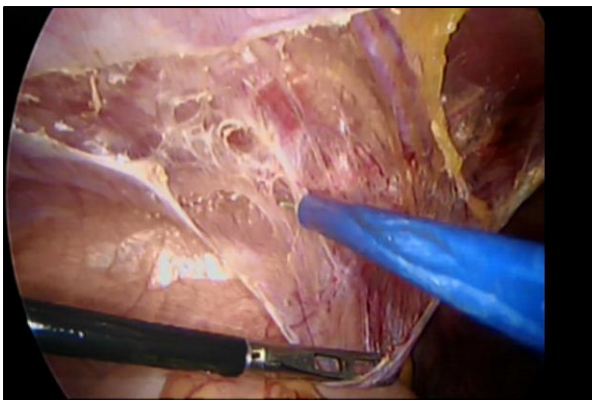


Figure 5: Creation of the peritoneal flaps.

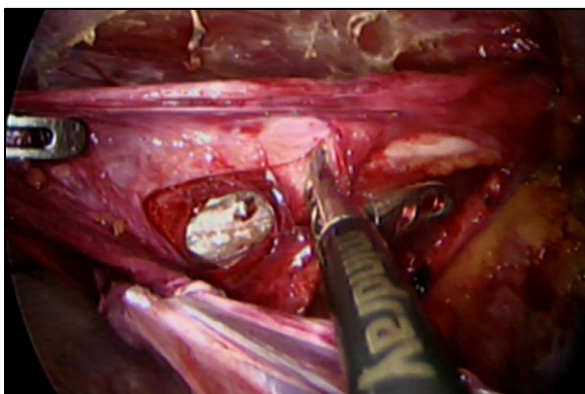


Figure 6: Dissection of the sac off the spermatic cord.

The mean operative time of group-A was 31.74 ± 4.74 min which was significantly shorter than that of group-B

(81.22 ± 7.44 min). The duration of hospital stay was significantly shorter in group-A than group-B; the mean hospital stay duration in group-A was 0.57 ± 0.18 day and in group-B, it was 1.18 ± 0.39 day.

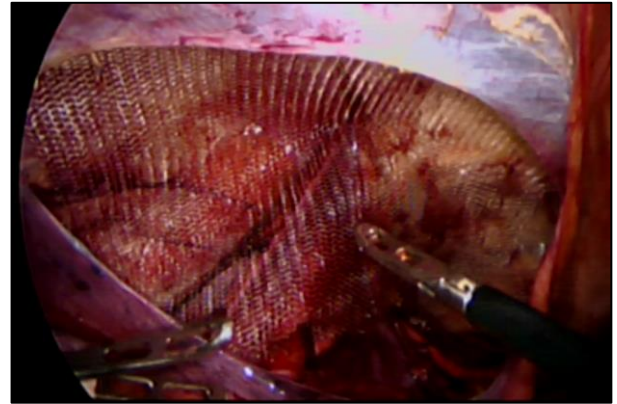


Figure 7: Covering the entire myopectineal orifice by polypropylene mesh.

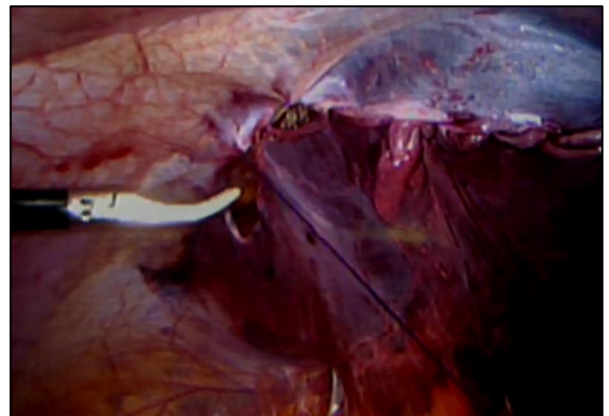


Figure 8: End of the procedure by closure of the peritoneal flap.

The patients of group-A returned to normal physical activities earlier than the patients of group-B; the mean was 1.23 ± 0.43 day for group-A and 2.75 ± 0.59 days for group-B which was statistically significant. The difference between both groups regarding return to work was significantly earlier in group-A (the mean was 8.77 ± 0.88 days) than in group-B (the mean was 9.86 ± 1.48 days). Although the duration of postoperative pain was shorter (the mean was 3.29 ± 1.81 days) and less severe in group-A than that of group-B (the mean was 3.71 ± 2.49 days), it was statistically insignificant. The severity of pain was assessed by VAS score; on the first postoperative day and at the end of the first postoperative week; the mean VAS of the group-A was 4.0 ± 1.14 and 0.17 ± 0.17 respectively, and that of group-B was 4.79 ± 1.32 and 0.32 ± 0.95 respectively.

By evaluation of the postoperative complications; early and late; there was no statistically significant difference found between both groups. Early postoperative

complications of group-A included urinary retention (3 patients; 8.6%), hematoma (2 patients; 5.7%), seroma (2 patients;5.7%), orchitis (1 patient; 2.9%), scrotal edema (2 patients; 5.7%), cord edema (2 patients; 5.7%), and wound infection (1 patient; 2.9%), while that of group-B

included urinary retention (1 patient; 3.6%), hematoma (3 patients; 10.7%), seroma (1 patient; 3.6%), orchitis (2 patients; 7.1%), scrotal edema (1 patient; 3.6%), cord edema (3 patients; 10.7%), and wound infection (3 patients; 4.8%).

Table 1: Patients' demographic data and hernia characteristics of both studied groups.

	Group- A (35)		Group- B (28)		Total (63)		Statistical test (st t)	P value
	Mean	±SD	Mean	±SD	Mean	±SD		
Age (years)	33.11	10.37	33.43	10.44	33.25	10.32	0.12	0.91
Duration of post-op pain (day)	3.29	1.81	3.71	2.49	3.48	2.13	0.79	0.43
VAS 1st post-op day	4.0	1.14	4.79	1.32	4.35	1.27	2.54	0.014*
VAS at end of 1st w	0.17	0.71	0.32	0.95	0.24	0.82	0.72	0.47
Operative time (min.)	31.74	4.74	81.22	7.44	53.29	25.45	31.88	<0.001**
Return to normal activity (day)	1.23	0.43	2.75	0.59	1.9	0.91	11.93	<0.001**
Return to work (day)	8.77	0.88	9.86	1.48	9.25	1.30	3.62	0.001**
Hospital stay (day)	0.57	0.18	1.18	0.39	0.84	0.42	8.22	<0.001**
	N	%	N	%	N	%	test	
Side of the hernia								
Right	20	57.1	17	60.7	37	58.7	X ² =0.08	0.78
Left	15	42.9	11	39.3	26	41.3		
Risk factors								
No	21	60.0	15	53.6	36	57.1	FET= 5.46	0.51
Smoking	2	5.7	4	14.3	6	9.5		
Heavy work	1	2.9	3	10.7	4	6.3		
Family history	5	14.3	1	3.6	6	9.5		
Cough	2	5.7	1	3.6	3	4.8		
Chronic constipation	2	5.7	3	10.7	5	7.9		
BPH	2	5.7	1	3.6	3	4.8		
Co-morbidities								
No	30	85.7	24	85.7	54	85.7	FET= 1.11	1.0
Systemic hypertension	2	5.7	2	7.1	4	6.3		
Diabetes mellitus	2	5.7	2	7.1	4	6.3		
COPD	1	2.9	0	0.0	1	1.6		
ASA								
1	29	82.9	21	75.0	50	79.4	X ² = 0.59	0.44
2	6	17.1	7	25.0	13	20.6		
Type of anesthesia								
General anesthesia	0	0.0	28	100	28	44.4	X ² = 59.02	<0.001**
Spinal anesthesia	35	100	0	0.0	35	55.6		
Cosmesis								
Satisfied	9	25.7	17	60.7	26	41.3	X ² = 7.86	0.005**
Very satisfied	26	74.3	11	39.3	37	58.7		

Table 2: Comparison between the studied groups regarding postoperative complications.

	Group A (35)		Group B (28)		Total (63)		Statistical test (FET)	P value
	N	%	N	%	N	%		
Early complications								
Urinary retention	3	8.6	1	3.6	4	6.3	0.08	0.62
Hematoma	2	5.7	3	10.7	5	7.9	0.07	0.65
Seroma	2	5.7	1	3.6	3	4.8	0.0	1.0
Orchitis	1	2.9	2	7.1	3	4.8	0.04	0.58
Scrotal edema	2	5.7	1	3.6	3	4.8	0.0	1.0

Continued.

	Group A (35)		Group B (28)		Total (63)		Statistical test (FET)	P value
	N	%	N	%	N	%		
Cord edema	2	5.7	3	10.7	5	7.9	0.07	0.65
Wound infection	1	2.9	2	7.1	3	4.8	0.04	0.58
Late complications								
Numbness and paraesthesia	2	5.7	1	3.6	3	4.8	0.0	1.0
Hernia								
Recurrence	0	0.0	0	0.0	0	0		
Port site	0	0.0	1	3.6	1	1.6		
Plug migration	0	0.0	0	0.0	0	0		
Chronic pain (mild)	1	2.9	2	7.1	3	4.8	0.04	0.58

Late postoperative complications of group-A included sensory disorders in the form of numbness and paraesthesia in the groin which affected 2 patients (5.7%) in group-A and 1 patient (3.6%) in group-B. Chronic inguinal pain was the main complaint in the first 3 months of follow up affecting 1 patient (2.9%) of the group-A and 2 patients (7.1%) of the group-B. The intensity of the pain on VAS score was mild then faded away after administration of local steroid injections. There was no recurrence reported in both groups after 18 months of follow up. Port-site hernia was reported in 1 patient (3.6%) of group-B. There was neither testicular atrophy nor mesh migration recorded in both groups.

By evaluation of the patients' satisfaction, 9 patients (25.7%) of group-A were satisfied while 26 patients (74.3%) of the same group were very satisfied regarding cosmesis. In the group-B; 17 patients (60.7%) were satisfied while 11 patients (39.3%) were very satisfied.

DISCUSSION

Management of inguinal hernia by minimally invasive incision and minimal dissection with optimal outcomes of low recurrence rate and early resume of the normal physical activities remains an unmet need for general surgeons. The open tension-free techniques; mesh-based repairs such as Lichtenstein hernioplasty and mesh plug repair (MPR) are the most common and worldwide acceptable procedures with optimal results and low recurrence rate.¹⁶ Laparoscopic hernioplasty; TAPP and TEP, provoked new horizons and gained popularity due to gratified results comparable to the open techniques.¹⁷ The optimal outcomes of inguinal hernia repair could be achieved by tailoring and individualizing the procedure regarding the patient's general condition, the presentation of the hernia, and the experience of the surgeon. Open mesh-based hernioplasty procedures are more appropriate for old patients and those with serious co-morbidities; while laparoscopic repairs are more convenient for patients with recurrent hernias and bilateral hernias.⁶ In the surgical literature, most the comparative studies of hernioplasty procedures are between the laparoscopic hernia repair and Lichtenstein hernioplasty. Most of these

studies concluded that laparoscopic hernioplasty procedures are higher and more preferable than Lichtenstein procedure regarding the duration of hospital stay, return to normal activities and to work, severity and duration of pain, patients' satisfaction, and cosmetic outcomes.^{15,18,19} In the present study, two hernia repair techniques were compared; laparoscopic TAPP technique and one inch incision-mesh plug repair (OI-MPR). Huge hernia and groin hernias other than indirect inguinal hernias were excluded from this study. There were 35 patients were subjected to one inch incision-mesh plug repair (OI-MPR); group-A, and 28 patients were randomly allocated to both groups. When the patients' demographic data and hernia presentations were analyzed, there were no significant differences found between both groups of this study (Table 1). Regarding the operative time, duration of hospital stay, resume of the normal activities, return to work, duration and severity of postoperative pain; one inch incision- mesh plug repair (OI-MPR) achieved outstanding results in comparison to laparoscopic TAPP procedure. The mean operative time of group-A was 31.74±4.74 min which was significantly shorter than that of group-B (81.22±7.44 min). These results are compatible with other studies; Zhao et al²⁰ reported that the mean operative time of MPR was 31.9 min. while the mean operative times of laparoscopic TAPP procedure in Shah et al and Faisal et al studies were 84.25 min and 76.07 min respectively.²⁰⁻²² Laparoscopic hernia repair is technically difficult particularly if the peritoneal adhesion exists. It also requires a long learning curve which explains long operative time.⁷ The surgeon learning curve is an important factor in laparoscopic hernia repair for improvement of its outcomes.²³ The mean operative time can be shortened down to 47.3 minutes as reported in Helmy et al study.²⁴ The simplicity, minimal incision and dissection, side by side with stress-free and speedy insertion of the mesh plug are the main contributors to the short operative time of the OI-MPR. Parallel to those aforementioned advantages; OI-MPR was undertaken by spinal anesthesia with a fast recovery of the patients which shortened the duration of hospital stay, resume of the normal physical activities and return to the work. The duration of hospital stay was significantly shorter in

group-A than group-B; the mean hospital stay duration in group-A was 0.57 ± 0.18 day and in group-B, it was 1.18 ± 0.39 day. In group-A; the patients left the recovery room half an hour after the operation due to minimal effect of both anaesthesia and the procedure on the patients' general conditions, while in group-B; the patients took an extended time in an ambulatory facility due to general anesthesia and longer time of the operation. Modified Barthel index for physical activities was applied to determine the duration of the resume of the normal physical activities of the patients of both groups.²⁵ The patients of group-A returned to normal physical activities and became self-dependents earlier than the patients of group-B; the mean was 1.23 ± 0.43 day for group-A and 2.75 ± 0.59 days for group-B which was statistically significant. The difference between both groups regarding return to work was significantly earlier in group-A (the mean was 8.77 ± 0.88 days) than in group-B (the mean was 9.86 ± 1.48 days). The mean time to return to work in group-A was shorter when compared to the results of Millikan et al study.⁸ Dambraskas et al reported that the mean time to return to work in laparoscopic repair was 14 days.²⁶ Postoperative pain is considered the second most important endpoint and outcome measure in inguinal hernioplasty after the recurrence rate.^{5,24} Its incidence varies widely; 10% to 12% of patients suffer from different levels of chronic pain after inguinal hernia repairs.²⁷ Several studies have concluded that Laparoscopic hernia repair is less painful in acute and chronic phases than open repair, which might be attributed to its advantages of minimal access and dissection.^{23,28,29} Chronic postoperative pain after inguinal hernia repair has been defined by the International Association for the Study of Pain (IASP) as groin pain lasting 3 months after hernioplasty.³⁰ Postoperative pain is multifactorial with many risk factors.¹⁴ In open techniques, the pain is due to extensive dissection and injury or entrapment of groin nerves; whereas in laparoscopic techniques, it is most likely caused by parietal peritoneum dissection.⁷ In the present study, the duration of acute postoperative pain was shorter (the mean was 3.29 ± 1.81 days) and less severe in group-A than that of group-B (the mean was 3.71 ± 2.49 days), the mean VAS of the group-A on the first postoperative day and at the end of the first postoperative week; was 4.0 ± 1.14 and 0.17 ± 0.17 respectively, and that of group-B was 4.79 ± 1.32 and 0.32 ± 0.95 respectively. Chronic inguinal pain was the main complaint in the first 3 months of follow up affecting 1 patient (2.9%) of the group-A and 2 patients (7.1%) of the group-B. This finding might be attributed to the modification that has been undertaken in the present study on the standard MPR which requires long incision 5-7 cm inguinal incision by reducing the inguinal incision to one inch length, as well as the mesh is inserted preperitoneal without onlay mesh to avoid entrapment of the groin nerves. So, this approach; OI-MPR gained additional advantages of minimal incision and minimal dissection as like as laparoscopic hernioplasty. This finding is compatible with the findings of other studies as Hayashi

et al, Millikan et al and Gossetti et al studies.^{1,8,13} Recurrence rate of the primary inguinal hernias after the introduction of mesh-based tensionless repairs has been reduced to approximately 1%.⁸ Several studies reported no significant difference was found in the recurrence rates between the laparoscopic and open mesh repairs.^{10, 15,19} Rutkow, and Robbins reported recurrence rate less than 1% after their MPR procedure.¹² Millikan et al study revealed that MPR can succeed less than a 0.1% recurrence rate.⁸ Although there was no recurrence in both groups of the present study, long-term follow-up is required for accurate assessment of recurrence rate. Recurrences can occur even 5 years after hernioplasty.¹ In the present study, other early and late postoperative complications were minor, and statistically significant differences between both groups could not be found. In order to rank the complications, the Clavien-Dindo Classification was applied which consists of 5 grades.³¹ The entire complications of this study were classified under grade I, except one patient expressed port-site hernia (grade IIIb) which was managed surgically. Early postoperative complications of group-A included urinary retention (3 patients; 8.6%), hematoma (2 patients; 5.7%), seroma (2 patients; 5.7%), orchitis (1 patient; 2.9%), scrotal edema (2 patients; 5.7%), cord edema (2 patients; 5.7%), and wound infection (1 patient; 2.9%), while that of group-B included urinary retention (1 patient; 3.6%), hematoma (3 patients; 10.7%), seroma (1 patient; 3.6%), orchitis (2 patients; 7.1%), scrotal edema (1 patient; 3.6%), cord edema (3 patients; 10.7%), and wound infection (3 patients; 4.8%). Hematoma and seroma; both considered the third outcome measure of the hernioplasty after recurrence rate and pain. Their incidences are variable with great heterogeneity among several studies comparing open and laparoscopic repairs.^{10,15,18} This heterogeneity may be due to a small amount of superficially-positioned hematoma and seroma could be easily recognized in open procedures versus laparoscopic procedures where some deep-positioned hematoma and seroma might be passed unnoticed.⁷ In the present study, the hematoma was low in group-A because of meticulous hemostasis, minimal incision and dissection, and closure of the wound in layers obliterating dead space. The incidence of wound infection was high in group-B (4.8%) despite of prophylactic antibiotics, this is might be related to associated hematoma. Urinary retention was high in group-A (8.6%) due to spinal anesthesia, which was managed by Foley's catheter. Regarding other late complications; only one patient returned to the outpatient clinic with port-site paraumbilical hernia which was managed surgically. There was neither testicular atrophy nor mesh migration recorded in any of both groups. Although laparoscopic hernia repair has many advantages, the presented approach; OI-MPR can achieve a great satisfaction of the surgeons and the patients. One inch incision-MPR is a simple approach characterized by a short learning curve, cost-effective, no necessity for special surgical equipment and supplies, technically easier, can be undertaken by regional anesthesia, shorter operative time; 30min.,

shorter hospital stay, earlier return to normal physical activities and work, less postoperative pain, low morbidities and recurrence rate less than 0.1%. One of the shortcomings of this approach is the incomplete exploration of the inguinal region due to small incision with the consequences of missing associated direct hernia. So, this approach should be tailored for patients with inguinal hernia types 1, 2, and 3 according to Gilbert classification of groin hernia.

CONCLUSION

One inch incision-MPR is a simple, feasible and cost-effective approach with low morbidities and low burden on the patients and the healthcare facilities.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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