

BILATERAL-ENFORCEMENT OF DEEP INGUINAL RING IN BILATERAL INGUINAL HERNIA BY OPEN PRE-PERITONEAL INSERTION OF MESH

By

**EISSA ABDEL HAMED IBRAHIM^{1*}, ALAA EISSA GIRGIS²,
MOHAMED IBRAHIM MONIER MOHAMED³, ABDORABOH E. M. HAMMAD⁴
AND HASSAN ABD ELWANIS⁵**

Consultant of General Surgery, Military Medical Academy^{1,2,4,5}, Cairo, 11291,
Department of General Surgery, Faculty of Medicine, Ain Shams University³, Cairo
11566, Egypt (*Correspondence: eissa.abdelhameed@gmail.com; Eissa-
1961@yahoo.com, **docmohamedmonier@gmail.com)

Abstract

A protrusion of part of the contents was of the abdominal wall inguinal region. The study evaluated outcome of this procedure immediate and long term result of open preperitoneal repair. A total of 40 Military Male patients suffered from inguinal hernia were admitted to department of surgery, Kobry El-Kobba Military Hospitals from the years 2020-2022. There ages ranged in from 22 up to 60 years, with a mean average of 30 years. The patients underwent successful surgical intervention by preperitoneal mesh repair. The variations in this surgical technique included the operating time, hospital stay, postoperative pain, postoperative complications, recurrence incidence and patients' satisfaction. The postoperative ranged from six months up to 24 months follow up with average mean of one year.

Keywords: Egypt, Patients, Inguinal Hernia, Bilateral, Preperitoneal, Mesh.

Introduction

An inguinal hernia is an opening in the myofascial plain of the oblique and transversalis muscles that can allow for herniation of intraabdominal or extraperitoneal organs, which can be divided into indirect, direct, and femoral based on location. Most patients present with a bulge or pain in groin caused by a defect of abdominal wall and comprise inguinal and femoral hernias (Berndsen *et al*, 2019). Risk factors for hernia development were smoking, chronic obstructive pulmonary disease, obesity, pregnancy, peritoneal dialysis, collagen vascular disease, and previous open appendectomy, or even genetic (Fitzgibbons and Forse, 2015). Groin hernias are easily diagnosed on physical examination in men, but ultrasonography is often needed in women, which also helps when a recurrent hernia, surgical complication after repair, or other cause of groin pain was suspected (Ramanan *et al*, 2014). Magnetic resonance imaging has higher sensitivity and specificity than ultrasonography for diagnosing occult hernias if clinical suspicion is high despite negative ultrasound findings. Herniography, which involves injecting contrast media into the hernia sac, may be used in the selected patients (Shakil *et al*, 2020).

About 70% of femoral hernia repairs occurred in women, but the commonest subtype of groin hernia in men and women the indirect inguinal hernia-inguinal hernias are five time more common than femoral hernias (Johnson *et al*, 2004). Apart from adults, an inguinal hernia is one of the commonest pediatric surgical presentations in a primary care setting, presents in multiple ways, ranging from an emergency such as a strangulated hernia to a less urgent reducible hernia (Yeap *et al*, 2020).

Bilateral preperitoneal is a technically difficult procedure to learn and requires the surgeon to be familiar with unfamiliar anatomy but it has the advantage of direct access to posterior defects and non-violation of peritoneal cavity.

The preperitoneal approach for bilateral abdominal wall hernia i.e. bilateral inguinal hernia; the abdominal wall reinforcement is obtained by a large pre-peritoneal inlay prosthetic mesh. The procedure is therefore ideally suited for the management of bilateral hernias and recurrent hernias resulting from a weakness of the abdominal wall, especially bilateral and multiple hernias are known to be at high risk for failure after conventional repair.

Stoppa *et al.* (1975) first described a technique aimed at eliminating hernias of the groin by reinforcing the peritoneum with a giant polyester mesh. By using (G.P.R.V.S.) for recurrent inguinal hernias, recurrence rate of 0-5.9% were reported (Van-Damme, 1985). Later the procedure becomes known as giant prosthetic reinforcement of the visceral sac or G.P.R.V.S. popular in America and Europe (Stoppa, 1995), but there are no prospective data from Egypt

Patients 10% underwent hernia repair were presented with recurrent inguinal hernia and 7.5% with bilateral inguinal hernia (Cunningham *et al.*, 1996). Long term follow up shows that 15-30% of all hernia repairs will fail and 60% of this recurrence will cause symptoms (Beet *et al.*, 1997).

Clinical presentation and indication for surgery: A detailed history for the most common symptom of inguinal hernia was a groin mass that protrudes while standing, coughing or straining, which sometimes described as reducible while lying down (Hammoud and Gerken, 2022). The pain is thought to be due to compression of the nerves by the sac, causing generalized pressure, localized sharp pain, or referred pain referred pain may involve the scrotum, testicle or inner thigh (Charles *et al.*, 2019). Other possible causes of hernia include: femoral hernia, femoral artery aneurysm, athletic pubalgia, hydrocele, spermatocele, undescended testicle, retractile testicle, epididymitis, swollen lymph node, scrotal masses, lipoma, and tumors, both malignant & benign (Cleveland Clinic, 2022).

The patient should be examined in a standing position to increase the intra-abdominal pressure with the groin and scrotum fully exposed inspection is performed first with the goal of identifying an abnormal bulge along the groin or within the scrotum if an obvious bulge was not detected, palpation is performed to confirm the presence of the hernia (Condon and Nyhus, 1971). Physical examination helped distinguish direct vs. indirect inguinal hernias. Inguinal occlusion

test entails the examiner blocking the internal inguinal ring with a finger as the patient is instructed to cough. A controlled impulse suggests an indirect hernia while persistent herniation suggests a direct hernia. Transmission of cough impulse to the tip of finger implies an indirect hernia, while an impulse palpated on the dorsum of the finger implies a direct hernia (Ralphs, 1980). External groin anatomy is difficult to assess in obese patients, making the physical diagnosis of inguinal hernia challenging, a further challenge to physical examination the identification of a femoral hernia (Charles *et al.*, 2019).

In ambiguous diagnosis, radiologic examinations may be used as an adjunct to history and physical examination imaging in obvious cases is unnecessary. The commonest radiologic modalities include ultrasonography (US), computed tomography (CT), and magnetic resonance imaging (MRI) each technique has certain advantages over physical examination alone (Miller *et al.*, 2014). But, each modality is associated with potential limitations (Charles *et al.*, 2019). Surgical repair of hernias can be performed open, laparoscopic, or with robotic assistance, surgical repair is the definitive treatment of inguinal hernias, the most common reason for elective repair is pain. Incarceration and strangulation are primary indications for urgent repair. Symptomatic hernias must be operated on electively, and mild symptomatic one be operated on the electively and minimally symptomatic or the asymptomatic hernias underwent watchful waiting (Fitzgibbons *et al.*, 2006).

The study aimed to evaluate the effect of preperitoneal enforcement of deep inguinal ring on, recurrence, operative time, hospital stay, postoperative pain and complications and provide guideline for its utilization.

Materials and Methods

This study was conducted in Kobry El-Kobba Military Hospitals, among 40 Military Male patients (aged 22 to 60 years) who underwent preperitoneal repair of bilateral inguinal hernia from 2020 to 2022. They

were 2 patients had a unilateral recurrent hernia with a contralateral primary hernia and 38 patients among 80 inguinal hernias were selected for bilateral preperitoneal reinforcement of deep inguinal ring. A single surgical team performed all operations. All patients underwent a careful clinical history, pre-operative investigation included chest radiography, INR, ECG, liver, renal, CBC was done and pelvic abdominal US.

General examination: Include weight, vital sign, chest heart and abdominal examination, local examination to inguinal region to evaluate size, type (direct, indirect or femoral hernia) and scare of previous operation.

Operative technique: After the surgical confirmed diagnosis in the Outpatient Clinic, the patients were informed about the surgical technique and suitable anesthesia according to Military Medical Ethical Rules, which agreed with the Ethical Guidelines Declaration of Helsinki (6th Revision, 2008), and then written consent was obtained.

The lower abdomen and upper thigh was prepared and draped in the customary fashion. The skin was prepared by antiseptic solution and draped, lower abdominal transverse skin incision "incision" two finger above symphysis pubis, transverse incision was made at external oblique openurosis and dissected it from rectus abdominal muscle with a lower abdominal midline incision through the linea alba and the fascia transversals' (peritoneum not open) access was gained to the preperitoneal and perversion space. Landmark in dissection, inferior epigastria vessels, dissection peritoneum beneath it and taking it up with rectus abdominal muscle, external iliac vessel laterally "external celiac artery and vein" and elevator muscle caudally. Dissection of the cord; dissection of vase difference and its vessel and slinging this structure by rubber tape and then dissection of the sac from deep inguinal ring and transfexion ligation of it; left and right side was done left side, sling the cord, dissection of sac from it and pre-

pared the side for mesh insertion. On the right abdominal side the same thing was done. Transfixion ligation of the sac was done at narrowing part and complete excision of sac in indirect inguinal hernia, reduction of sac without excision as in direct inguinal hernia.

Preparation of periperitoneal space for insertion of mesh, two type of mesh was used prolene mesh in 35 patients and ProGrip parietex mesh in 5 patients (10cm x 15cm) mesh was used; the mesh was slits in the middle and cord was inserted between limb of the mesh, the mesh was covered myopectineal area "covered all hernia orifice direct, indirect and femoral orifice" iliac fossa and up to pelvic flower and slits was closed by interrupted suture in prolene mesh and fixed to rectus abdominal muscle by 2 suture without suture was used in ProGrip mesh and slits was closed by overlap two limb of mesh over each other. Two cords were slinging by rubber sling for insertion of mesh after excision of sac.

Insertion of mesh in preperitoneal space covering myopectineal orifice, slits of mesh directed up ward and suturing slits of mush by interrupted suture if prolene mesh was used but in ProGrip mesh not need to suturing it. The same procedure was done to left side. Procedure ended by removing rubber sling and insertion of suction drain in-front of mesh (between mesh and peritoneum), right drain in front of left mesh and left drain inserted in front of right mesh. The intra-abdominal pressure pushes and fixes the mesh against abdominal and pelvic wall, the mesh cover all inguinal and femoral hernia orifices. Wound was closed in customary fashion, the drain was removed when the output of drain 30ml serous fluid (4 days) and follow up the patient at outpatient clinic.

Postoperative: Analgesia, antibiotic, drain was removed 3-5 days postoperative mean 4 days. Operative time, postoperative hospital stay and postoperative complication were noted, patients were followed by physical examination in outpatient clinic after a week up to 6 weeks and every month for one year.

Results

There were 40 military male patients mean age 30 years, who underwent a preperitoneal enforcement of deep inguinal ring in bilateral inguinal hernia. No comorbidity was found, one patient had two recurrent in left side (left inguinal region) prior hernia repairs and size of deep ring about 15 cm. The defect size was documented in patients with a greatest diameter of 5-15cm (mean 7±2). Type of mesh was reported in all patients, 35 patients was repaired by polypropylene mesh and 5 patients by ProGrip polypropylene, suction drains were placed between peritoneum and mesh blood in drains about 200cc in first day and stopped in second day, no blood transfusion done. All patients take perioperative I.V. antibiotic were discharged

on oral antibiotic. Mean operative time was 50 minute (ranged 40-70) median post-operative hospital stay was 4 days (average 2-7 days), as the verbal pain intensity ranged from mild to moderate pain.

There were no postoperative death, six patients developed clinically significant hematomas and seroma not required evacuation except in two patients required aspiration of sarcoma. Two patients developed mild chest infection, four developed superficial wound infection without abscess and one patient had deep wound infection. No testicular atrophy, vascular injury lilac vessel injury without significant deep venous thrombosis.

Details were given in tables (1 & 2) and figures (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, &11).

Table I: Clinically post-operative complications of patients (n=40)

Clinical complications	Number of patients
Recurrent "mainly unilateral recurrent"	3 patients
Superficial wound infection	4 patients
Deep wound infection	1 patient
Chest infection	2 patients
Serum and hematoma of inguinal canal "cord"	6 patients
Mortality	0
Deep Venous thrombosis	0
Arterial-venous injury	0
Testicular atrophy	No
Time off work	14 day's

Table 2: Hernia factor and hernia recurrence among 40 male Military Patients

Hernia factor	Recurrence	No recurrence
	3-unilateral recurrence	37 patients
Size of hernia (cm)	10-15 cm	7-9 cm
Size of deep ring in cm	One deep ring 15 cm, 2 deep ring 7-10 cm	7-5 cm
Patient showed recurrence prior repair	1 showed scar at left inguinal region (inguinal repair)	No
Incorceration	No	No
Adhesions	No	No

Discussion

Tension free mesh repair of a primary inguinal hernia is the procedure of choice. This can be achieved by preperitoneal enforcement of deep inguinal ring by insertion of mesh. The ideal surgical procedure for repairing bilateral inguinal hernia should have a low recurrence rate, short hospital stay and minimal morbidity. Rather, the general surgeon should be familiar with anatomy of pre-peritoneal plane, iliac vessels, testicular vessels, deep inguinal ring, inferior epigastric vessels, type of mesh, and orientation of vertical slits in upper border of two

mesh and position of mesh around spermatic cord.

Preperitoneal plane dissection: Separation of sac from the cord; and insertion of mesh. Preperitoneal hernioplasty with a prosthesis composed of the prolene and ProGrip prolene mesh. The repair was anatomic, sutureless, tension-free and the absolute weapon to eliminate all types of all groin hernias.

No other technique produces better results for the repair of bilateral groin hernias either-indirect, direct, femoral and even recurrent hernia and prevention of an incisional hernia through the lineal Alba by approxi-

mation of two meshes in midline and by Pfannenstiel procedure external oblique aponeurosis don't disturb in midline. Closed suction drainage eliminates seroma, hematomas and decrease infection.

The mesh can then be applied between the parietal peritoneum and surround the parietalized cord element "vas deferens and spermatic vessels" after dissection of the peritoneal sac without attempt to close the hernia defect. The intra-abdominal pressure pushes and fixes the mesh against the abdominal wall and pelvic wall.

The recurrence after preperitoneal hernioplasty in bilateral inguinal hernia is inconceivable especially with ProGrip mesh. Nevertheless, they occur in our study the most recurrence can be attributed to technical errors, size of deep inguinal ring and displacement of mesh is the most cause of recurrence (Bauer *et al*, 2002).

The overall success of a preperitoneal hernia repair is defined by the incidence of a recurrent hernia. The mesh infection and abscess formation were associated with a high hernia recurrence rate (60% vs. 8%), aggressive efforts must be taken for prevention, early detection and treatment of this complications (Heartsill *et al*, 2005). Rives-stoppla approach reported mesh infection rates of 3.5-5% (Sidhu and Sharma, 2001).

In the present study, the incidence of a recurrent hernia was 3/40 (1.2%) patients due to displacement of mesh and big size of deep inguinal ring. Mild wound infection was noticed in 4 patients and one deep wound infection and was treated by antibiotic. Both Kunz *et al*. (1993); Amid *et al*. (1994) in laparoscopic preperitoneal hernioplasty showed a significant reduction (P=0.01) in mean length of hospital stay (3.2 versus 4.3 days), which was still considered relatively long as compared to certain British series (Kold *et al*, 1995).

The present study showed a significant reduction in mean operation length and in mean hospital stay (4 days versus 7 days & 50 minutes versus 70 minutes, respectively).

Also, in the present study, verbal pain intensity ranged from mild to moderate pain and improvement on oral analgesia with significant reduction in operating time. This agreed with Rider (1993), Stocker (1994) and Wilson (1995), they reported reduction in operating time off (17 versus 35 days). Champault *et al*. (1997) in laparoscopic preperitoneal hernioplasty, showed a significant improvement in post-operative comfort and analgesic consumption.

Conclusion

Preperitoneal technique for bilateral inguinal hernia repair is an effective and safe technique with less post-operative mortality and morbidity when performed by experienced hands, also in the elderly. Preperitoneal treatment of bilateral inguinal hernias is a difficult procedure that requires an adequate learning curve. Satisfaction of patients who underwent preperitoneal treatment of bilateral inguinal hernia was excellent.

The best short and long term perioperative results depend on careful and blood less dissection of the pre-peritoneal space, meticulous reduction of the hernia sac.

Appropriate mesh size, its position and fixation. The drain was placed in retroperitoneal space between peritoneum and mesh to completely close the retroperitoneal space by peritoneal, fixation of mesh and leaving no gap, and the drains were kept in place until flow less than 30ml/days. The superiority of pre-peritoneal technique in terms of postoperative discomfort, improved pain and early return to work is to be confirmed also in this type of operation and also in elderly.

Recommendations

This surgical technique (preperitoneal repair of bilateral inguinal hernia) proved successful and is indicated for the elderly patients and those with risk of recurrence in bilateral inguinal hernia.

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Explanation of figures

Fig. 1: Transverse lower abdominal incision (Pfannenstiel incision) a- Flap of external oblique aponeurosis done showed right & left pyramidalis, linea alba and rectus abdominus muscle, b- Dissection of rectus muscle and open transverse fascia without peritoneal opening to gained preperitoneal space.

Fig. 2: Land-mark in pre-peritoneal dissection. **A:** inferior epigastric vessels clearly seen, **B:** External iliac vessels seen “artery and vein”

Fig. 3: Left side dissection of cord at level of deep inguinal ring. a: Dissection of cord with its vasa-ferentia, testicular vessels with sac, b: dissection of sac from cord, c: complete dissection of sac from cord and vasa-ferentia, d: transfixation ligation of sac and excision.

Fig. 4: Dissection of cord from deep inguinal ring. a: Dissection of vasa-ferentia, testicular vessels and sac at deep inguinal ring, b: Dissection of sac from testicular vessels and vasa-ferentia, c: Complete separation of sac from previous structure up to fundus of sac, d: Open sac and identification by insertion of forceps inside, e: Transfixation ligation of sac.

Fig. 5: Bilateral direct inguinal hernial sac showing fundus in both sac and sling cord.

Fig. 6: Preparation of mesh for insertion, every side use one mesh 10x15cm, mesh not cross midline

Fig. 7: Two cords slinging by rubber sling

Fig. 8: Insertion of mesh. **A:** Right side insertion of mesh showing one limb of mesh pass to opposite side to cord i.e. one limb lateral to cord and other limb medial to cord, **b:** Lateral limb cover iliac fossa-iliac vessel up to deep inguinal ring and lower posterior aspect of anterior abdominal wall above inguinal ligament, **c:** Lower border of mesh up to levator ani muscle, **d:** Keep mesh flat not wrinkled, **f:** Crossing medial limb over cord inserted over lateral limb (no suture done), if ProGrip mesh used but suturing done in prolene mesh.

Fig. 9: Complete insertion of mesh showed medial and lateral limb in place.

Fig. 10: Insertion of two drains.

Fig. 11: 4 days after removal of drain,



