



A prospective study of a modified minimal open preperitoneal (MOPP) mesh hernioplasty for bilateral, complex & recurrent groin hernias.

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Abstract

Background: Primary aim of this study was to assess the effectiveness & outcomes of minimal open preperitoneal (MOPP) mesh hernioplasty in management of bilateral, giant, pantaloon and recurrent groin hernias.

Method: A prospective study of our modified minimal open preperitoneal (MOPP) mesh hernioplasty for treatment of bilateral, giant, pantaloon & recurrent inguinal hernias was conducted in Department of General Surgery, Gandhi Medical College, Bhopal from January 2014 to July 2017. 40 patients with 37 bilateral and 3 unilateral hernias making total 77 hernia sites including 6 recurrent hernias (after Lichtenstein repair) were operated by this approach in our study. Patient demographics, operating time, postoperative complications, pain scores, hospital stay and recurrence rates of patients were evaluated.

Results: Of the 40 patients 11 cases were of complex hernias. Mean operating time was 84.62 (40-135) minutes and average hospital stay was 5.15 (3-9) days. We did not encounter any intraoperative complication. 4 (10%) patients had postoperative complications. One patient developed seroma which resolved spontaneously. Two patient developed superficial wound infection. One patient

developed pain in lower abdomen persisting at 1 months but it didn't required any medication and improved subsequently. No recurrence was observed in our study at 1-3 yrs follow up.

Conclusions: We conclude that minimal open preperitoneal (MOPP) mesh hernioplasty is a safe and effective technique for bilateral, complex and recurrent groin hernias.

Keywords: Inguinal hernia, Groin hernia, bilateral inguinal hernia, open hernia surgery, laparoscopic hernia surgery, minimal open preperitoneal mesh hernioplasty, MOPP, Stoppa's procedure, preperitoneal repair, recurrent inguinal hernia, mesh hernioplasty, giant hernia, complex hernia.

Introduction

While it is well established that for unilateral groin hernias Lichtenstein's mesh hernioplasty is time tested, safe, economical, quick and easy to perform, carries fewer complications & recurrences and has become the gold standard in open tension-free hernioplasties¹⁻⁷. Operating for bilateral inguinal hernias, giant hernias, pantaloon inguinal hernias and recurrent hernia after anterior mesh hernioplasty has always been difficult and challenging for the surgeons. Operating bilateral groin hernias by

Lichtenstein's repair requires 2 incisions, is time consuming and is associated with higher morbidity. In giant hernias & pantaloon hernias the efforts to repair the posterior wall of inguinal canal by conventional anterior repair appears futile and carries a risk for injury to the nerves & cord structures and has a higher recurrence rate. Repair of recurrent inguinal hernia after Lichtenstein hernioplasty is usually a tough operation due to the difficulty of re-operating through dense fibrotic scar tissue in the mesh and carries the risk of seroma, hematoma & testicular vessel injury with the probability of orchidectomy⁸. In all such cases it is discretionary for the surgeon to adopt an alternative and different approach to avoid complications and recurrences.

The concept of posterior or preperitoneal approach to groin hernias was popularized by Llyod Nyhus in the sixties. Jean Rives (1965) proposed placement of prosthesis. Rene E & Stoppa (1967) further moved ahead & promoted reinforcing the visceral sac by bilateral giant nonabsorbable prosthesis in the preperitoneal space. Stoppa^{8, 9} used large Dacron mesh in the shape of a chevron as a bilateral prosthesis. He did not fix the mesh and relied on intraabdominal pressure to hold the mesh in place. He reported a long-term recurrence rate of 0.56% in 1922 primary repairs and 1.1% in recurrent hernias. Wantz¹⁰ advocated use of a diamond-shaped Mersilene prosthesis (Ethicon, Inc., Somerville, NJ) measuring approximately 12 cm x 15 cm for unilateral GPRVS. This rectangular mesh was reported to get displaced medially resulting in recurrent indirect hernias. Preperitoneal approach allows evaluation of all the potential hernia sites. Surgeons appreciated the ease of dissection in the virgin posterior preperitoneal space and realized that placing a large size mesh in this space led to a decrease in incidence of recurrence. Preperitoneal mesh hernioplasty is known not only for effective treatment of groin hernia with low

recurrence rates, but also for the low postoperative morbidity mainly with low rate of severe chronic pain and the good quality of life.

The principals of these operations were used & exploited to popularize and advance minimal access laparoscopic hernia surgeries i.e Transabdominal preperitoneal (TAPP) & Total Extraperitoneal (TEP) mesh hernioplasty. Franklin in 1990, Arregui in 1991 described the TAPP technique (Transabdominal preperitoneal mesh hernioplasty.) In 1992 G. Begin published the strictly extra peritoneal laparoscopic approach (TEP). With the advancements in laparoscopic hernia surgery Stoppa's prodecure for preperitoneal mesh reinforcement became less popular. The initial high recurrence rates of Laparoscopic hernia surgery led to increasing prosthesis size with better methods of fixation. Laparoscopic hernia surgery is feasible in expert hands, but the learning curve for laparoscopic hernia repair is long (200-250 cases), the severity of complications is greater, detailed analyses of cost effectiveness are lacking, and long-term recurrence rates are not known. Laparoscopic approach requires general anesthesia, sophisticated & expensive instrumentation and carries a risk of severe complications like visceral & vascular injuries.

Using a small incision to place a mesh in the preperitoneal space was described as a minimal open preperitoneal (MOPP) technique for groin hernias. The minimal open technique for preperitoneal mesh placement was first described by Franz Ugahary. He was in close contact with R. Stoppa, and G. Wantz and he described the technique using a very short grid iron incision located in the upper part of the groin area, approximately 2-3 cm above the deep inguinal ring. Marc Soler¹¹ later (2001-2011) using the same method performed more than 1000 hernia repairs with 2.3% recurrence, 4% seroma or hematomas and no severe chronic pain. In 2011-15 Marc Soler used a small

incision above the deep inguinal ring to perform similar preperitoneal dissection with an ovoid mesh to easily fit in the preperitoneal space. The minimal open preperitoneal technique enables extensive dissection of cleavable preperitoneal and retro peritoneal spaces to place a large prosthesis. The main steps of his original technique were:

(I) A 3 cm incision above the deep inguinal ring and opening the external oblique aponeurosis to enter the preperitoneal space.

(II) The dissection in the preperitoneal space to reflect the peritoneum from the parietal wall with the use of different sized atraumatic retractors.

(III) The reduction of the hernia sacs. Initially the direct (medial) sac is reduced and then the cord structures are externalized and parietalization of the cord with a reduction of the indirect (lateral) sac is done. Finally the femoral and obturator areas are checked for any other hernia sacs.

(IV) A 15 x 10 cm mesh is place & unrolled in the dissected space. No mesh fixation or suturing on the musculo fascial plane is done.

Since two separate incisions were required for bilateral groin hernias we in our modified technique for minimal open preperitoneal (MOPP) mesh hernioplasty used a single small 5cm transverse incision 2 cms above the pubic symphysis to enter the preperitoneal plane on either side. We initiated this study to assess the efficacy of our minimal open preperitoneal (MOPP) mesh hernioplasty for the management of bilateral, giant, multiple & recurrent groin hernias.

Method

A prospective study of our modified minimal open preperitoneal (MOPP) mesh hernioplasty was done in Department of General Surgery Gandhi Medical College, Bhopal on patients presenting for treatment of bilateral, giant, pantaloons & recurrent inguinal hernias from January

2014 to July 2017. All patients underwent routine investigations and after pre-anesthetic check up were operated by a single surgeon for minimal open preperitoneal (MOPP) mesh hernioplasty. This study was approved by institutional ethical committee and informed consent was taken from patients.

Inclusion criteria

1. All primary bilateral inguinal or femoral hernias.
2. Recurrent hernias after anterior hernioplasty
3. Giant hernias

Exclusion criteria

1. Previous pelvic surgery.
2. Obstructed or strangulated hernias.

40 patients with 37 bilateral and 3 unilateral hernias making total 77 hernia sites including 6 recurrent hernias (after Lichtenstein repair) were operated by minimal open preperitoneal (MOPP) mesh hernioplasty in our study. Patient demographics, co morbidity, hernia sites, type, operation time, intraoperative & postoperative complications, hospital stay and follow up complains were recorded in excel sheet. Visual analogue scale was used for assessment of severity of pain. A descriptive analysis of data collected from case records of these patients was done. Quantitative data was expressed as median and range, while qualitative variables as number (proportions, %). For statistical evaluation chi-square test and t-test were applied.

Operative procedure

All patients were operated under spinal anesthesia and catheterized before surgery. For right sided hernia the surgeon stood on left side and assistant on right side of the patient. A single small 5 cm transverse suprapubic incision was taken about 3-4 cm above pubic symphysis. After incising the anterior rectus sheath the lower flap was made free up to the pubic symphysis. Rectus abdominis muscle was retracted and peritoneum was reflected from

the parietal wall to gain access to the Retzius & preperitoneal spaces. The direct hernia sac if present was reduced at this stage and cooper's ligament and inferior epigastric vessels were identified. Peritoneum was further stripped from the parietal wall upto anterior superior iliac spine. The cord structures converging at internal ring including vas deferens and testicular vessels were identified and looped by an infant feeding tube. The indirect sac was dissected free from the cord structures completely up to about 5-8 cms posteriorly till the vas was seen turning medially. Large indirect sacs were opened, contents reduced, neck of sac was transected circumferentially and peritoneum was suture closed with 3-0 vicryl on round body needle. The distal sac was left open. The dissection in preperitoneal plane & reduction of hernia sacs on either side was facilitated by two narrow blade Dever's retractors & long mixer forceps. Any tear in peritoneum was repaired with 3-0 vicryl. A 15 x 15 cm proline mesh was trimmed medially and placed in a fashion similar to the TEP procedure. The mesh was fixed at 3 points using 2-0 proline sutures.

1. The center of the mesh was fixed to cooper's ligament medial to external iliac vein. Thus covering the indirect, direct and femoral hernia sites adequately.
2. Second suture fixed the mesh to transverse aponeurosis arch medial to inferior epigastric vessels.
3. Medial aspect of mesh was fixed to rectus abdominis in the midline wound.

For the contra lateral side the surgeon and assistant exchanged positions and similar procedure was done through the same incision. No drains were kept and anterior rectus sheath & wound were closed in layers.

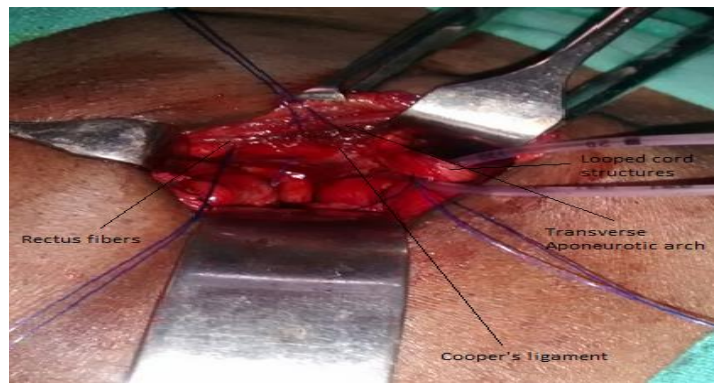


Figure 1: Three point fixation of mesh.

Results: Patient demographics and type of hernia were as per table 1, 2 & 3. There were 38 males and 2 females, mean age 45.25 years (16-77), 3 unilateral & 37 bilateral hernias with a total of 77 hernia sites. 11 of these were complex hernias.

Table 1: Age & gender distribution of patients.

Age group (years)	Male	Female	Total no. of patients
10-20	1	0	01
20-29	3	0	03
30-39	7	0	07
40-49	6	0	06
50-59	8	1	09
60-69	9	1	10
70-79	4	0	04
Total	38	2	40

Table 2: Hernia types.

Type of hernia	Number	Hernia sites
Unilateral hernias		
Giant hernia	01	3
Unilateral recurrent	02	
Bilateral hernias		

• Bilateral direct	15	
• Bilateral indirect	14	
• Left indirect,	03	
Right direct		74
• Right indirect,	01	
left direct		
• Pantaloon	04	
Total	40	77

Table 3: Complex hernias

Complex inguinal hernias	Number
Recurrent inguinal hernias	6
Pantaloon hernias (both direct & indirect component on ipsilateral side present)	4
Giant hernia	1
Total	11

Figure 2: Co morbidity.

Co morbidity	Number of patients
Benign prostatic hypertrophy (Without obstructive symptoms)	6
Chronic coughs, COPD	4
Hypertension, Coronary artery disease	4
Diabetes	3
Obesity	6

Operating time varied from a minimum of 40 minutes to maximum duration of surgery lasting for 135 minutes. Mean operating time was 84.62 minutes.

Figure 3: Duration of surgery.

Duration of Surgery	Number
< 60 mins	06
60-90 mins	20

90-120 mins	12
>120 mins	02

Postoperative pain and need for analgesia was maximum on postoperative day one and two. However most patients could resume activities on third and fourth postoperative days. Pain was mild at the time of discharge.

Figure 4: Mean pain score on visual analogue scale.

Postoperative Day	1	2	3	4	5	6	7	30
Mean pain score	5.2	5.6	4.8	3.2	2.2	2	2	0.125

Early postoperative complications were seen in 4 (10%) patients. 2 (5%) patients had superficial wound infection which was managed by oral antibiotics and resulted in prolongation of hospital stay. One patient developed seroma with some pain which was confirmed by ultrasonography. However no aspiration was required and it resolved spontaneously. Another patient had mild lower abdominal pain persisting for 1 month with some tenderness on deep palpation. Patient didn't required analgesics for it. There was no chronic pain or neuralgia and there was no recurrence in 1- 3 yrs follow up.

Figure 5: Post-operative complications.

Post-operative complications	No. of patients/%	Percent
Superficial wound infection	2 (5%)	5
Seroma	1 (2.5%)	2.5
Pain in lower abdominal wall persisting for one month.	1 (2.5%)	2.5
Total	4 (10%)	10

Duration of hospitalization was 3 - 9 days. Mean hospitalization was 5.17 days.

Figure 6: Hospital stay.

Hospital stay in days	No of patients (40)
3 days	5
4 days	9
5 days	12
6 days	6
7 days	5
> 7 days	3

Discussion

In our study of 40 patients operated by minimal open preperitoneal (MOPP) mesh hernioplasty, no intraoperative complications were seen and 4 (10%) patients had postoperative complications. 1 (2.5%) patient developed seroma which resolved spontaneously. 2 (5%) patient developed superficial wound infection. 1(2.5%) patient developed pain in lower abdomen persisting at 1 months but it didn't required any medication and improved subsequently. Mean score of post operative pain on visual analog scale (VAS) at day 30 was 0.125 and at day 180 it was 0. No recurrence was observed in our study at 1-3 yrs follow up.

Marc Soler¹¹ (2011-15) reported a total of 644 hernias (534 patients) operated by minimal open preperitoneal hernioplasty with a 3 cm incision above the deep internal ring on either sides. The Mean follow up was 711 days. 598 (92.8%) patients were managed as day care cases. The early postoperative complications were bladder retention (2) phlebitis (1) & superficial wound infection (2). Post-operative pain—day 30, N=553; VAS: 0, 452 (81.73%); 1–3, 77 (13.92%); 4–6, 19 (3.43%); 7–8, 5 (0.9%). Chronic pain—at 3 months, N=97; VAS: 0, 77 (79.38%); 1–3, 9 (9.27%); 4–6, 10 (10.30%); 7–8, 1 (1.03%). At 2 years there was no recurrence.

Similar comparable results in terms of low complications and recurrence rates (0- 4.6%) have been reported in many other studies on preperitoneal mesh hernioplasties on a

large number of patients by Stoppa^{8, 9}, Wantz¹⁰, and other authors¹². Thus minimal open preperitoneal (MOPP) mesh hernioplasty is an excellent technique for bilateral and complex groin hernias. MOPP technique gave good comparable results in terms of early & late complications with similar advantages in terms of chronic pain & recurrence when compared with laparoscopic hernia surgery. The MOPP technique gave less chronic pain than the Lichtenstein technique¹³.

Feliu X, Torres G¹⁴ et al in their comparative study on laparoscopic and open posterior approaches for recurrent inguinal hernias reported that both methods are equally effective although postoperative pain was less & hospital stays were shorter in laparoscopic group. However, laparoscopic hernia repair requires a lengthy learning curve, is more expensive, requires costly instruments, general anesthesia, CO₂ insufflation and carries a risk of visceral & vascular injuries. Minimal open preperitoneal (MOPP) hernioplasty can be performed under spinal anesthesia and avoids the risks associated with general anesthesia & CO₂ insufflation. The peritoneal rents can be easily repaired and mesh can be safely placed in preperitoneal plane avoiding contact with pelvic blood vessels and abdominal viscera. The complications associated with laparoscopic hernia surgery like visceral & vascular injury can be avoided and so open preperitoneal technique is equally effective, inexpensive & safer as well.

We performed minimal open preperitoneal (MOPP) hernioplasty safely in elderly patients and in patients with co morbidities like hypertension, coronary artery disease, COPD with chronic coughs, diabetes and obesity. In elderly patients mainly those above 70 or 80 years due to co morbidities and risks of general anesthesia most surgeons prefer open procedures over laparoscopic TEP or TAPP for hernia surgery¹¹. In elderly patients minimal

open preperitoneal (MOPP) hernioplasties can be preferably offered under spinal anesthesia. This procedure can also be used as a rescue conversion if complication occurs during laparoscopic hernia surgery.

The recurrence rate after preperitoneal hernia surgery should be <2% to be considered a viable alternative to the most successful methods of conventional hernioplasty. In a review on recurrences after preperitoneal open & laparoscopic hernia repair by Anthony S Lowham¹⁵ et al, the factors leading to recurrence were surgeon inexperience, inadequate dissection, insufficient prosthesis size, insufficient prosthesis overlap of hernia defects, improper fixation, prosthesis folding or twisting, missed hernias, or mesh lifting secondary to hematoma formation. The important aspects in successful preperitoneal hernia repair are adequate dissection & exposure of all potential groin hernia sites with adequate coverage & overlap of the defects by correct size mesh. Mesh lifting or displacements, mesh migration due to inadequate fixation were the common causes of recurrences. In a review of 54 recurrences after 3229 laparoscopic hernia repairs by Philips et al¹⁶. it was found that most common causes of recurrence were inadequate prosthesis size (60%) and inadequate fixation. In our study all potential hernia sites were exposed, a 15 x 15 cm mesh trimmed on medial side to conform to myopectineal orifice was placed on each side and three point fixations with proline sutures was done in all cases. There were no recurrences in 1-3 years follow up.

Conclusions

Our modified MOPP technique gave comparable results in terms of early & late postoperative complications, chronic pain & recurrence when compared with laparoscopic hernia surgery. The ease to perform the procedure, avoidance of general anesthesia, costly instruments & CO₂ insufflation, low complication & recurrence rate and

practicability to discharge patients early makes our modified minimal open preperitoneal (MOPP) mesh hernioplasty a safe, inexpensive & effective technique for bilateral, giant, pantaloon and recurrent inguinal hernias.

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Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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