Original Article

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Surgery Section

Outcomes of Open Preperitoneal Mesh Repair in Inguinal Hernia: A Prospective Observational Study

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ABSTRACT

Introduction: Contemporary hernia surgery focuses on reinforcing the Myopectineal Orifice of Fruchaud (MPO)-the anatomical sites through which all groin hernias emerge. While laparoscopic techniques are widely adopted, the open preperitoneal approach offers a direct and cost-effective alternative, especially in resource-limited settings.

Aim: To evaluate the immediate clinical outcomes of open preperitoneal mesh repair.

Materials and Methods: The present prospective observational study was conducted involving 67 consecutive patients with inguinal hernia who underwent open preperitoneal mesh repair between October 2023 and July 2025 in the Department of Surgery at a tertiary care teaching hospital in Central Maharashtra (Chhatrapati Sambhajinagar), India. Demographic details were noted. Outcomes assessed included operative time, postoperative pain, complications, hospital stay, and recurrence at a mean follow-up of 11 months. Patients were discharged after 48-72 hours and followed up on postoperative day 10, day 15, and subsequently at three-monthly intervals.

Results: The study population comprised 66 males and one female, with a mean age of 48.6 (range 21-70) years. The average operative time was 45-60 minutes. Hospital stay ranged from 48-72 hours. All procedures were completed without conversion to Lichtenstein repair. Minor postoperative complications were mild pain 42 (62.6%), seroma 14 (20.8%) and paralytic ileus 2 (2.9%). No major complications or recurrences were noted during mean follow-up of 11 (range 3-21) months.

Conclusion: Open preperitoneal mesh repair is a simple technique for inguinal hernia repair, associated with low postoperative morbidity and no recurrence at short-term follow-up.

Keywords: Contemporary hernia surgery, Cost-effective, Myopectineal orifice of Fruchaud

INTRODUCTION

Hernia (Latin-rupture) is defined as protrusion of a viscus through an opening in the wall of the cavity that contains it [1]. Myopectineal Orifice (MPO) is a well-defined weak area in the lower anterior abdomen, as there are no muscles or a strong tendinous structure in the region of this orifice, the site becomes an area of potential weakness [2,3]. All groin hernias, viz., direct and indirect inguinal hernia, femoral hernia, exit the abdominal cavity traversing the MPO. Indirect inguinal hernias are the most common hernias in both men and women, a right-sided predominance exists [1]. Lichtenstein repair is a traditional tension-free open procedure for inguinal hernia repair; however, it does not cover the entire myopectineal orifice, as the mesh is placed on the transversalis fascia, unlike the open preperitoneal technique, where the mesh is kept behind the transversalis fascia, resulting in proper support for the abdominal wall [4]. In the open preperitoneal technique, a tension-free repair is achieved by placement of mesh in the preperitoneal space, covering the entire MPO and separated from the nerve plane. It is the ideal location hydrostatically and anatomically to prevent the recurrence of the three potential hernial orifices (inguinal, obturator and femoral) and chronic pain [5,6].

The laparoscopic Total Extraperitoneal (TEP) repair requires costly instruments, Carbon Dioxide (CO_2) insufflation and general anaesthesia with associated complications [1]. Laparoscopic TEP repair has a long learning curve phase and requires a skilled surgeon [7]. Open preperitoneal mesh repair requires a small suprapubic transverse incision, shorter duration of surgery, better understanding of anatomy, and is affordable to the patient. It also avoids reoperation through defective, scarred and weakened tissues, especially in recurrent hernias [8]. It also allows bilateral inguinal hernia repair via a single incision and can be done in regional anaesthesia and is suitable in patients who are unfit for general anaesthesia. At present, inguinal hernia repair is predominantly performed using the conventional anterior Lichtenstein technique or laparoscopic approaches, TEP and Transabdominal Preperitoneal (TAPP) repair [9]. The aim of the present study was to evaluate the immediate clinical outcomes of open preperitoneal mesh repair.

MATERIALS AND METHODS

The present prospective observational study was conducted in the Department of Surgery, RK Damani Medical College, Dr. Hedgewar Rugnalaya, Chhatrapati Sambhajinagar, Maharashtra, India from October 2023 to July 2025. The Institutional Ethics Committee approval was obtained EC/Approval/05/2025/02 with registration number of Ethics committee (ECR/641/Inst/MH/2014-RR17). The study population included 67 patients undergoing open preperitoneal mesh repair, of which 39 patients had bilateral inguinal hernia, 15 patients had unilateral inguinal hernia and 13 patients had recurrent inguinal hernia.

Inclusion and Exclusion criteria: Inclusion criteria consisted of all adult patients above 18 years of age and diagnosed with unilateral, bilateral or recurrent inguinal hernia and who gave consent to this procedure, were included in the current study by consecutive sampling. Patients who were not willing to undergo this procedure, obese patients (BMI>30), complete inguinal hernias, incarcerated and strangulated hernia were excluded from the present study.

Study Procedure

A detail history was taken and proper physical examination was done. Demographic details including age and gender were noted. Ultrasonography was done in all the patients to measure the defect size, content (omentum, bowel loop, fluid) and to rule out complications (incarceration, strangulation, obstruction). Basic preoperative investigations including complete blood count, liver function tests,

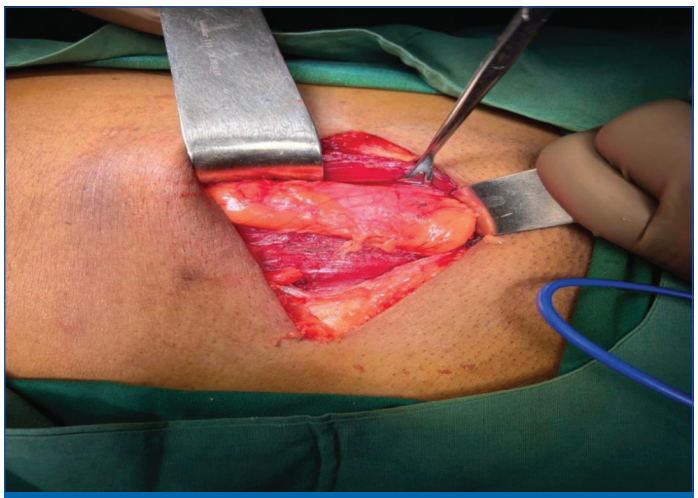
kidney function tests were done. This was followed by pre-anaesthetic evaluation and fitness. The patients were explained the procedure in detail. Informed consent was obtained from all the patients.

The surgical postgraduate residents were the first assistant for the procedure. All patients were catheterised after spinal anaesthesia before the start of the procedure. Patients were operated in supine position. Prophylactic intravenous antibiotic (Cefuroxime 1.5 gram) was administered 60 minutes before the incision and subsequently given 12 hourly till discharge. In all the patients, a Pfannesteil incision was used [Table/Fig-1]. Anterior rectus sheath was opened transversely and superior and inferior flaps were created, rectus muscles were retracted laterally from the midline and preperitoneal space was entered [Table/Fig-2,3]. Blunt dissection of the preperitoneal space was performed to create space of Retzius and the space of Bogros [Table/Fig-4]. At this point all other potential hernia sites namely inguinal, obturator and femoral were examined. Then dissection of the hernial sac was done. Peritoneal sac was separated from vas deferens and gonadal vessels. Direct hernias were identified and reduced. In large indirect hernias the distal sac was left in the scrotum and proximal sac ligated. Light-weight large pore polypropylene mesh of size 15×15 cm was placed in the preperitoneal space [Table/Fig-5] covering all the defects. No mesh fixation was done. The rectus muscle was approximated with polypropylene 2-0 [Table/Fig-6]. The anterior rectus sheath was closed with polypropylene 2-0. The subcutaneous layer was closed with polyglactin 910 2-0 and the skin was closed with staplers. No drains were kept in any of the patients, and per urethral catheters were removed after 24 hours of surgery.

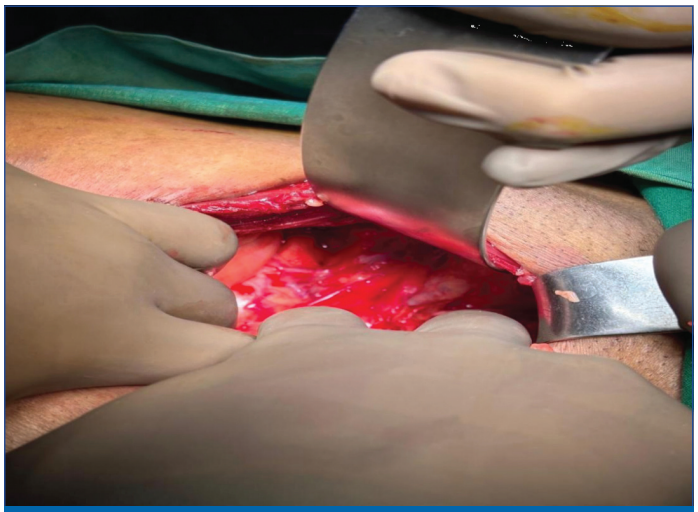
[Table/Fig-1]: Pfannensteil incision taken two centimetres above pubic symphysis.

[Table/Fig-2]: Anterior rectus sheath opened and flaps created.

The patients were monitored, and outcomes assessed were operative time, duration of hospital stay, postoperative complications like seroma, paralytic ileus, wound infection, pain, and recurrence. Operative time was calculated from skin incision to skin closure. Pain severity was assessed with the help of a pain scale [Table/Fig-7] [10]. The patients were discharged after 48/72 hours of surgery and were followed up at day 10, 15 and subsequently every three months or as and when required.



[Table/Fig-3]: Rectus muscle retracted laterally and preperitoneal space entered.



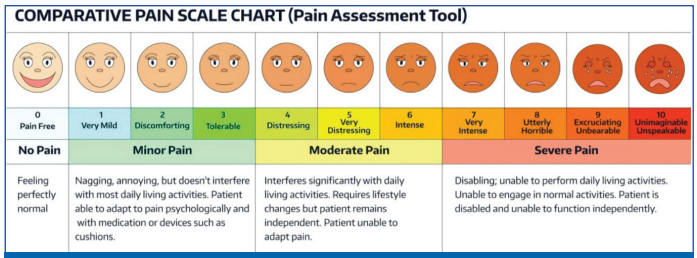
[Table/Fig-4]: Space of Retzius and Bogros created.

[Table/Fig-5]: Preperitoneal mesh placement.

STATISTICAL ANALYSIS

Statistical analysis was carried out using Microsoft Excel (Microsoft Office 2010 version). Descriptive statistics were used. Continuous variables were expressed as mean±Standard Deviation (SD) or median with range, while categorical variables were presented as frequencies and percentages. As this was a prospective observational descriptive study, no inferential statistical tests were applied.

[Table/Fig-6]: Approximation of the rectus muscle.



[Table/Fig-7]: Pain scale [10].

RESULTS

In the present study the mean age of patients was 48.6±11.6 years, with an age range of 21 to 70 years [Table/Fig-8]. All the patients were males except one female (1.49%). Bilateral inguinal hernia was present in 39 (58.2%) patients, while recurrent hernia was observed in 13 (19.4%) patients [Table/Fig-8]. The majority of our patients, 54 (80.5%) were labourers doing heavy strenuous work [Table/Fig-8]. In majority of patients, 61 (91%), we could finish the procedure within 45 to 60 minutes [Table/Fig-9], with the exception of two patients (2.9%) who had large indirect hernias, which required 62 and 70 minutes, respectively.

Parameters		Number of patients	Percentage
Age group (years)	21-30	5	7.46%
	31-40	13	19.4%
	41-50	15	22.3%
	51-60	24	35.8%
	61-70	10	14.9%
Types of inguinal hernia	Unilateral inguinal hernia	15	22.3%
	Bilateral inguinal hernia	39	58.2%
	Recurrent inguinal hernia	13	19.4%
Physical activity	Heavy strenuous work	54	80.5%
	Moderate work	09	13.4%
	Light work	04	5.97%

[Table/Fig-8]: Demographic and clinical characteristics of the study population (n=67).

Time	Number of patients	Percentage
30-45 min	4	5.9%
45-60 min	61	91%
>60 min	2	2.9%

[Table/Fig-9]: Time taken for surgery.

The mean duration of the hospital stay was 54.1±8.2 hours (ranged from 48 to 72 hours). In the postoperative period we observed seroma in 14 (20.8%) patients after 48-72 hours, which resolved in two to three weeks spontaneously and no intervention was done. Paralytic ileus was observed in two (2.9%) patients in first 24 hours which resolved within 48 hours spontaneously. One patient (1.4%) presented with postoperative superficial wound infection on postoperative day eight which was managed conservatively with regular dressings. Haematoma was seen in one (1.4%) patient which was managed conservatively and resolved in two weeks [Table/Fig-10]. The patient was advised to take adequate rest and assured about the self-limiting nature of the haematoma.

Complications	Number of patients	Percentage
Seroma	14	20.8%
Cord oedema	3	4.4%
Haematoma	1	1.4%
Postoperative paralytic ileus	2	2.9%
Superficial wound infection	1	1.4%

[Table/Fig-10]: Distribution of postoperative complications.

There was mild pain in 42 (62.6%) patients and moderate pain in 14 (20.8%) patients postoperatively which was managed with oral analgesics [Table/Fig-11]. The patients were mobilised and instructed to avoid lifting heavy weights, straining and coughing in early postoperative period. No recurrence was observed at a mean follow-up of 11 (range 3-21) months.

Pain grading	Number of patients	Percentage
None	11	16.4%
Mild	42	62.6%
Moderate	14	20.8%

[Table/Fig-11]: Postoperative pain.
No patient reported severe pain

DISCUSSION

Since inguinal hernia surgery is the most common procedure in general surgery, even slight improvements in clinical outcomes are significant. Despite the evolution of minimally invasive techniques, open Lichtenstein tension-free mesh repair continues to be the most commonly performed approach in routine Indian surgical practice, particularly in government hospitals and teaching institutions [11,12]. Indian retrospective and prospective studies have consistently demonstrated that the majority of inguinal hernia repairs are performed using the Lichtenstein technique, with laparoscopic and open preperitoneal repairs forming a smaller proportion of overall practice [11-13]. The Pascal's law states that when pressure is applied to a confined, incompressible fluid, that pressure is transmitted throughout the entire fluid in all directions. In human, abdominal cavity acts as a sealed container filled with visceral organs and fluids. Placement of mesh by open preperitoneal technique gives all the advantages of open Lichtenstein repair by tensionless and sutureless placement of mesh which exploits the Pascal's principle to hold the mesh in place (The "Bathtub" Analogy) [1,14].

In the present study, we assessed the clinical outcomes of the open preperitoneal mesh repair in 67 patients (66 males, one female) with a maximum age incidence between 51 and 60 years. This was also observed by Arumuguam S et al., who reported 45% of patients in the age group of 51-60 years [15]. This may be attributed to the laxity of the abdominal muscles with an increase in age. Majority of our patients 54 (80.5%) were labourers with heavy strenuous activity comparable to study done by Shukur NM having 50% of patients with heavy strenuous [16]. This implies that heavy work is a risk factor for development of hernias as the intra-abdominal pressure builds up during lifting heavy weights. The average time taken for the unilateral and bilateral hernia was 45-60 minutes in majority of our patients. This was comparable to the study by Devi BMP et al., in which average time taken was 30 to 40 minutes [17].

Study	Seroma	Haematoma	Superficial wound infection	Retention	Recurrence	Neuralgia
Current study	20.8%	1.4%	1.4%	Not applicable	Nil at 11 months of mean follow-up	Nil
Elsabagh A et al., [18]	2.76%	3%	0.90%	3.9%	2.70%	0.20%
Arumuguam S et al., [15]	6.5%	1.5%	1.5%	1.5%	1.31%	0%
Dasari et al., [19]	1.50%	0.80%	0.80%	NA	6.20%	1.50%

[Table/Fig-12]: Comparative data on the outcomes of open preperitoneal mesh repair in inguinal hernias [15,18,19].

The [Table/Fig-12] summarises the complication rates reported by various authors [15,18,19].

We observed high incidence of mild acute postoperative pain (62.6%), which may be due to intraoperative retraction of the rectus muscles with the Deaver retractor. This is comparable to the study by Malladad N et al., where 73.3% of his patients had acute postoperative pain [20].

At mean follow-up of 11 (range 3-21) months, no recurrence was noted. However, Dasari B et al., observed recurrence in 6.20% patients [19]. The open preperitoneal repair is a relatively easy procedure and can be performed with conventional general surgery instrument and have a short learning curve.

Limitation(s)

Long-term follow-up is required. Strangulated and incarcerated hernias were excluded from this study.

CONCLUSION(S)

Open preperitoneal mesh repair in a resource limited settings is a simple technique for inguinal hernia repair, associated with low postoperative morbidity, acceptable pain outcomes, and no recurrence at short term follow-up. It is also considered as a minimally invasive procedure without the need of specialist laparoscopic instruments and the use of general anaesthesia.

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