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Exploring Preperitoneal Meshplasty on Ventral Hernia: A Prospective Study from Western Maharashtra

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ABSTRACT

Ventral hernias, characterized by the protrusion of abdominal contents through weakened abdominal walls, present substantial challenges to patients and clinicians. Addressing these challenges the preperitoneal meshplasty technique involves strategically placing a mesh prosthesis within the preperitoneal space, effectively reinforcing the abdominal wall and significantly reducing the risk of hernia recurrence. This study aims to provide valuable insights into ventral hernia management using the preperitoneal meshplasty technique. This study included a cohort of diagnosed cases of Ventral hernia who underwent preperitoneal meshplasty. The study was conducted from June 2021 to December 2021 within our institute, primarily focusing on investigating outcomes of the preperitoneal meshplasty technique, assessing complications and tracking recurrence over six months. All patients underwent thorough assessments, including medical history, clinical examinations, laboratory tests and ultrasonography. Ventral hernia repair using open preperitoneal meshplasty was conducted after obtaining medical clearance, with general or regional anesthesia as suitable. Post-surgery, meticulous observation was carried out for immediate postoperative phases until discharge. Relevant data on outcomes and complications were recorded. Patients were followed up at one week, three weeks, six weeks, 12 weeks and six months post-discharge to monitor complications and hernia recurrence. Among these, 28% of patients had umbilical hernias, 14% had epigastric hernias, 10% had paraumbilical hernias and 12% had infra umbilical hernias. There were 18 patients (36.00%) with incisional hernias and 32 (64%) with non-incisional hernias. Early complications, including fever, wound infections, hematoma, surgical site infections and skin necrosis, exhibited distinct occurrences across the initial days following surgery. The study contributes insights into the patterns of hernia complications and their management outcomes. Late complications involving induration, seroma and skin necrosis showed consistent trends. No seroma, mesh removal, or recurrence was reported during observation. The study contributes insights into the patterns of hernia complications and their management outcomes.

INTRODUCTION

In recent years the surgical management of ventral hernias has witnessed remarkable advancements, with the preperitoneal technique of meshplasty gaining prominence as a robust approach[1]. Ventral hernias, characterized by the protrusion of abdominal contents through weakened abdominal walls, present substantial challenges to patients and clinicians. Addressing these challenges, the preperitoneal meshplasty technique involves strategically placing a mesh prosthesis within the preperitoneal space, effectively reinforcing the abdominal wall and significantly reducing the risk of hernia recurrence[2]. Despite the growing acceptance of this technique, a comprehensive and prospective study dedicated to evaluating its outcomes and effectiveness remains essential[3].

This study aims to provide valuable insights into ventral hernia management using the preperitoneal meshplasty technique. Analyzing hernioplasty results in 50 diagnosed patients, postoperative follow-up spans six months, assessing complications and recurrence rates. The study's comprehensive outcomes assessment enhances the literature on ventral hernia management, offering essential guidance for surgical practices and patient care improvement.

MATERIALS AND METHODS

This study included a cohort of diagnosed cases of Ventral hernia who underwent preperitoneal meshplasty. The study was conducted from June 2021 to December 2021, within our institute, with the primary focus on investigating outcomes of the preperitoneal meshplasty technique, assessing complications, and tracking recurrence over six months. Previous studies have reported the complication rate to be around 10%[4-6]. with 95% confidence interval, 9% absolute error and 10% attrition rate the final sample size was 48. But we considered 50 cases for our convenience.

All patients underwent thorough assessments, including medical history, clinical examinations, laboratory tests and ultrasonography. Patients and their families received comprehensive procedure explanations, including benefits and potential complications, documented through written informed consent. Ventral hernia repair using open preperitoneal meshplasty was conducted post obtaining medical clearance, with general or regional anesthesia as suitable.

Post-surgery, meticulous observation was carried out for immediate postoperative phases until discharge. Relevant data on outcomes and complications were recorded. Patients were followed-up at one week, three weeks, six weeks, 12 weeks and six months post-discharge to monitor complications and hernia recurrence.

Study results were compared with similar research to assess the preperitoneal meshplasty technique's effectiveness. Ethical approval was secured before the study's initiation.

The research plan involved preperitoneal ventral hernia repair using various mesh sizes placed at least 5 cm from the fascial defect. Complications and potential recurrence were monitored for six months. Inclusion criteria covered ages 18-70 and all genders. Exclusion criteria included complicated hernias, recurrent hernias after failed meshplasty and specific comorbidities. Parameters encompassed preprocedural tests, early postoperative complications, follow-ups at specific intervals and hernia recurrence assessment.

Preoperative preparation involved procedure explanation, consent, antibiotic administration and bladder emptying. Anesthesia was primarily spinal or general.

The procedure included patient positioning, incision, subcutaneous dissection, hernia sac separation, creating a preperitoneal plane, hernia sac opening, primary closure, mesh placement, rectus sheath closure, vacuum drain placement, subcutaneous layer approximation, skin closure and wound dressing.

Different mesh sizes were employed and postoperative management included fluid consumption, ambulation encouragement, analgesia provision, a hospital stay of up to three days and discharge upon no complications, allowing gradual resumption of activities with an abdominal belt.

Ethical considerations: All the study participants were provided informed written consent forms before the start of the study. Strict confidentiality about their particulars was maintained throughout the study. The study was approved by Institutional Ethics committee before the start of the study.

Statistical analysis plan: The data was collected, compiled, and analyzed using EPI info (version 7.2). The qualitative variables were expressed in terms of percentages. The Quantative variables were expressed in terms of mean and standard deviations.

RESULTS

The average age of the patients was 50.6 years, with a standard deviation of 13.56 years. Among the patients, 33 individuals (66%) were females, surpassing the number of male patients, 17 individuals (34%).The data shows that 16 people (32.00%) have undergone surgeries before, 9 individuals (18.00%) are dealing with diabetes, and 14 individuals (28.00%) fall into the category of obesity (Table 1).

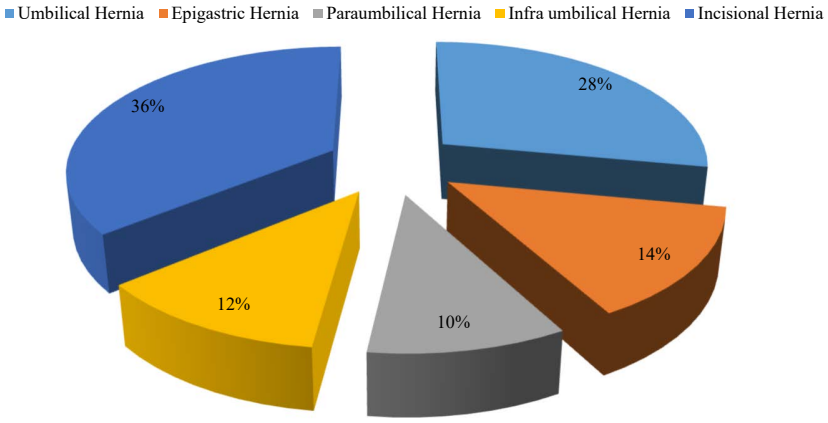

Fig. 1: Distribution based on diagnosis of hernia

Table 1: Demographic particulars

Demographic particulars	Frequency	Percentage
Age group		
20-30	5	10.00
31-40	10	20.00
41- 50	10	20.00
51-60	16	32.00
61-70	6	12.00
>70	3	6.00
Gender		
Male	33	66.00
Female	17	34.00
Previous surgery history	16	32.00
Diabetes	9	18.00
Obesity	14	28.00

Table 2: Distribution based on ultrasonography parameters

Ultrasonography parameters	Frequency	Percentage
Defect size [Mean±SD]		3.88 ± 1.02
Content of the sac		
Bowel	15	30.00
Omentum	32	64.00
Fat	3	6.00
Reducibility (present)	34	68.00

Table 3: Distribution based on drain removal day and hospital stay

Drain removal day, hospital stay	Frequency/Mean	Percentage/SD
Drain removal (days)	3.42	0.72
Hospital stay (days)	4.22	1.59

Table 4: Early post operative complications

Complications	Day 1	Day 3	Day 7
Fever	4 (8.00%)	0	0
Wound infection	4 (8.00%)	0	0
Hematoma	3 (6.00%)	2 (4.00)	0
Surgical site infection	4 (8.00%)	4 (8.00%)	4 (8.00%)
Skin necrosis	0	2 (4.00%)	2 (4.00%)

Among these, 28% of patients had umbilical hernias, 14% had epigastric hernias, 10% had paraumbilical hernias and 12% had infra umbilical hernias. There were 18 patients (36.00%) with incisional hernias and 32 (64%) with non-incisional hernias (Fig. 1).

The defect size has an average of 3.88±1.02. Within the hernia sac, bowel content is found in 15 cases (30.00%), omentum in 32 patients (64.00%), and fat in 3 patients (6.00%). Reducibility is observed in 34 patients (68.00%) (Table 2).

The average day for drain removal is 3.42±0.72 days, while the average length of hospital stay is 4.22±1.59 days (Table 3).

Table 4a displays early postoperative complications categorized by different days after the surgery. On Day 1, there were 4 cases (8.00%) of fever and wound infection each, while no cases was reported on Day 3 or Day 7. Hematoma was observed in 3 cases (6.00%) on Day 1, 2 cases (4.00%) on Day 3, and none on Day 7. Surgical site infections were documented in 4 cases (8.00%) on Day 1, 4 cases (8.00%) on Day 3 and 4 cases (8.00%) on Day 7. Skin necrosis, however, was absent on Day 1, reported in 2 cases (4.00%) on Day 3 and in 2 cases (4.00%) on Day 7.

Table 5b outlines late postoperative complications categorized by different weeks following the surgery. In Week 1, there were 4 cases (8.00%) of induration and seroma each. The same statistics were observed in Week 3 and Week 6. However, the incidence of induration decreased to 2 cases (4.00%) in Week 12 and 6 months. No seroma, mesh removal, or recurrence was reported in any of the weeks or the 6-month period.

DISCUSSION

Ventral hernias demand surgical solutions. Approaches include open repair with sutures and mesh and minimally invasive laparoscopic methods. Emerging is preperitoneal meshplasty, inserting mesh between the peritoneum and muscles, aiming for reduced recurrence and better comfort. It balances open and laparoscopic advantages[1-3]. The choice hinges on hernia specifics, patient health and surgeon expertise. Careful evaluation determines the best approach for effective ventral hernia management. With this idea in the background, we conducted the present study to understand our institute's ventral hernia approach.

Table 5 b: Late post operative complications

Complications	Week 1	Week 3	Week 6	Week 12	6 month
Induration	4 (8.00%)	4 (8.00%)	4 (8.00%)	2 (4.00%)	2 (4.00%)
Seroma	4 (8.00%)	4 (8.00%)	0	0	0
Mesh removal	0	0	0	0	0
Recurrence	0	0	0	0	0

Regarding early postoperative complications in our study, 8% experienced fever and wound infections on Day 1, with no cases on Days 3-7. Hematoma: 6% on Day 1, 4% on Day 3; surgical site infections: 8% consistently. Skin necrosis was absent on Day 1, 4% on Days 3 and 7. Regarding late postoperative complications, In Week 1, 8% had induration and seroma (4 cases each). This continued in Weeks 3 and 6. Induration decreased to 4% (2 cases) in Week 12 and 6 months. No seroma, mesh removal, or recurrence was reported.

A study by Akruwalia *et al*.[4] inferred that wound infection was observed in 4 patients (7.5%), while seroma formation occurred in 6 patients (11.3%). In another study conducted by Novitksy *et al*.[5] who included recurrent ventral hernias, they reported that wound infection occurred in 4 patients (12.5%, all smokers), requiring partial mesh excision in 1 patient. Wound infection was in four cases out of 50 cases in the study conducted by Mubhashir *et al*.[6] Similar results were reported by Srivastava et al.[7], Gleysteen *et al*.[8], Bhat *et al*.[9], Shingade *et al*.[10] and Citrambalam *et al*.[11].

Katzen *et al*.[12] divided their retrospective data into "Early" (2004-2012) and "Recent" (2013-2021) groups based on surgery date. Recent patients had higher proportions of prior failed ventral hernia repair (46.5% vs. 60.8%; P<.001), more significant hernia defects (199.7±232.8 vs. 214.4±170.5 cm2; p<.001), more Center for Disease Control class 3 or 4 wounds (11.3% vs. 18.6%; p<.001) and more component separations (22.5% vs. 45.7%; p<.001). Hernia recurrence decreased over time (7.1% vs. 2.4%; p<.001), as did wound complication rates (26.7% vs. 13.2%; p<.001).

Akruwalia *et al*.[4] study had no reported recurrence cases, sinus issues, or mesh removal. This was in concordance with the present study. Katzen *et al*.[12] reported that in both groups, recurrence was associated with wound complication (8.9 [4.1-20.1], p<.01 vs 3.4 [1.3-8.2]. p<.01) and recurrent hernias (4.9 [2.3-11.5], p<.01 vs 2.1 [1.1-4.2], p = .036).

The study has several limitations that should be acknowledged. Firstly, the sample size might need more significant to capture less common complications. Additionally, the study's retrospective design could introduce bias and hinder the establishment of causal relationships. A control group is needed to compare outcomes. Moreover, the study is conducted within a single institution, potentially limiting the generalizability of findings to other settings. Variations in surgical techniques among different surgeons could impact outcomes.

CONCLUSIONS

The study highlights the distribution of different hernia types, emphasizing umbilical, epigastric, paraumbilical and infra umbilical cases. Incisional hernias were observed more frequently than non-incisional ones. Late complications involving induration, seroma and skin necrosis showed consistent trends. No seroma, mesh removal, or recurrence was reported during observation. Early complications, including fever, wound infections, hematoma, surgical site infections, and skin necrosis, exhibited distinct occurrences across the initial days following surgery. The study contributes insights into the patterns of hernia complications and their management outcomes.

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