

	ORIGINAL RESEARCH PAPER		General Surgery
A PROSPECTIVE OBSERVATIONAL STUDY OF MANAGEMENT OF VENTRAL HERNIA			KEY WORDS: Ventral hernia, Incisional hernia, Mesh repair, Complications
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ABSTRACT	Background: Understanding ventral hernia repair, including anatomy, etiology and surgical techniques, is crucial for successful outcomes. Our institute prefers open, pre-peritoneal mesh repair due to cost considerations and lower complication rates. Materials & Method: A prospective observational cohort study was conducted at GCSMCHRC, Ahmedabad, from January 2023 to December 2023, with follow-up until December 2024. The study included patients who presented to GCS Hospital and diagnosed with ventral hernia, aged 18-75 years, consenting to study Result: The study involved 83 cases of ventral abdominal wall hernia, with the highest incidence in the 5th decade and a male-to-female ratio of 1:2. Common symptoms in both sexes included swelling (80%) and pain (70%). Among the patients, 18 (21.7%) had comorbid conditions: diabetes (55.5%),hypoproteinemia (22.2%), and hypertension, heart disease, or COPD (22.2%). Umbilical and incisional hernias were most prevalent, and 60% of female patients were obese (BMI > 30). Mesh repair was performed in 75 patients (90.4%), mostly using pre-peritoneal mesh. Common complications were seroma (12%) and wound infection (10%). Recurrence occurred in 2 patients (2.4%). One case (1.2%) of strangulated ventral hernia was managed by primary suture repair. Most patients were discharged within a week, with follow-up ranging from 6 months to 1 year Conclusion: The study highlighted the highest prevalence of ventral hernias in the 5th decade, with a higher incidence in females, particularly those who are obese. Mesh repair, especially pre-peritoneal mesh, was effective with low recurrence rates. Common complications included seroma and wound infection.		
	INTRODUCTION The term “hernia” is derived from the Latin word meaning “a rupture.” A ventral hernia refers to the protrusion of tissue through the anterior abdominal wall fascia. These defects can be classified as spontaneous or acquired, depending on their origin, or by their location on the abdominal wall. Ventral hernias include incisional, umbilical, epigastric, Spigelian, and parastomal hernias, while excluding inguinal, pelvic, and diaphragmatic hernias. The estimated incidence of ventral hernia ranges from 15% to 20%.^{1,2} Abdominal muscle weakness can be congenital, such as incomplete obliteration of the umbilicus leading to umbilical hernias, or acquired due to factors like obesity, repeated pregnancies, postoperative wound complications, and poor closure techniques. Anatomical areas of potential weakness in the abdominal wall, such as the linea alba, are particularly susceptible to hernia formation. The linea alba, which is primarily connective tissue without nerve or blood vessels, is a common site for incisional hernias and other types like epigastric and umbilical hernias. Understanding these contributing factors and anatomical weaknesses is essential for identifying and preventing ventral hernias.^{1,2-3} Acquired hernias, often resulting from surgical incisions, are termed incisional hernias and account for a significant challenge in general surgery. Incisional hernias occur in 3% to 13% of laparotomy incisions, with a higher incidence—up to 23%—in patients who develop wound infections following abdominal surgery.⁴ While not a true hernia, the condition of rectus diastasis (divarication of recti) can present as a midline bulge due to a stretched Linea alba, which is typically non-surgical unless symptomatic. Primary ventral hernias, or “true” ventral hernias, are classified based on their anatomic location.⁵ Increased intra-abdominal pressure, which can contribute to the development of ventral hernias, is often associated with various conditions, including chronic coughing, chronic obstructive pulmonary disease (COPD), obesity, straining (such as from constipation or lower urinary tract symptoms), pregnancy, ascites, cigarette smoking, and heavy weightlifting. These factors can exacerbate pressure within the abdominal cavity, leading to hernia formation.⁶ Ventral hernias can be managed surgically to restore abdominal wall integrity, alleviate symptoms, and prevent complications. Techniques include open hernia repair, laparoscopic repair, component separation technique, and mesh considerations. Open repair involves direct access to the defect, reduction of contents, and closure. Mesh reinforcement is commonly used to strengthen the repair and reduce recurrence. Can be performed with onlay, inlay, sublay (retro-rectus, pre-peritoneal), or underlay (intraperitoneal) mesh placement. Laparoscopic repair is minimally invasive, with benefits like reduced pain and quicker recovery. Mesh type and placement technique are crucial for successful outcomes. Synthetic mesh is standard for most repairs, while biologic or absorbable meshes may be used in contaminated fields.⁷⁻⁸ Over the last decade, laparoscopic repair has become increasingly common, particularly for ventral hernias, utilizing mesh placement deep to the defect in the abdominal wall. Newer approaches such as extended TEP (E-TEP) allow for mesh placement in the pre-peritoneal plane for infra-umbilical defects and laparoscopic onlay mesh repair. The component separation technique has proven effective for large or complex midline abdominal wall defects, offering advantages in restoring dynamic abdominal wall integrity without undue tension.⁹ Ventral hernias are commonly encountered in clinical practice, necessitating the need for comprehensive study regarding their presentation, risk factors, and optimal treatment modalities. The current study aims to evaluate the		

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prevalence of ventral hernias across sexes and age groups, identify associated risk factors, assess the clinical presentations, and determine the most effective treatment approaches. A total of 83 cases of ventral hernias were studied between January 2023 and December 2023 at GCS Medical College.

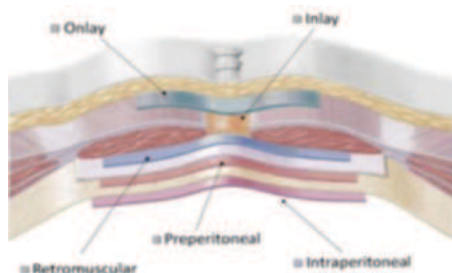


Figure-1 Different spaces for meshplasty in ventral hernia

EHS				EHS			
Incisional Hernia Classification				Primary Incisional Hernia Classification			
Midline	Subumbilical	M1		Small	Small		
	Umbilical	M2		Medium	Medium		
	Supraumbilical	M3		Large	Large		
	Epigastric	M4					
	Epigastri-umbilical	M5					
Lateral	Infraumbilical	L1					
	Subcostal	L2					
	Flank	L3					
	Flank	L4					
Recurrent Incisional Hernia Classification				Recurrent Incisional Hernia Classification			
	Length	cm	width	cm			
	Small	M1	M2	M3			
	Medium	M4	M5	M6			
	Large	M7	M8	M9			

Figure 2: European Hernia Society's Classification of ventral hernia

METHODS & MATERIALS

Data was collected from all patients diagnosed with ventral hernia presenting to GCS Hospital , Ahmedabad in the General Surgery department and who were operated for the same had been included. Patient aged between 18-70 years and those consenting for the study were study.

Study Design

- **Study Type:** A Prospective ,Observational study.
- **Study Site:** Department of General Surgery, GCSMCH & RC,Ahmedabad.
- **Study Duration:** January 2023 to December 2023 for case enrollment & followed upto December 2024.

Subject Selection:

Inclusion Criteria

- All patients presenting with ventral hernia and being operated for the same.
- Patients consenting to the study.
- Patients aged between 18-70 years.

Exclusion Criteria

- Patients not fit for surgery or not willing for surgery.
- Patient of <18 years age and >70years.
- Not consenting for the study.

Data Collection:

Patient demographics, BMI, comorbidities, hernia type, size, duration, previous surgeries, intra-operative findings and post surgical follow-ups were recorded. The decision between open and laparoscopic repair was based on hernia characteristics and surgeon discretion.

Intra Operative Finding Were Recorded As Follow:

Whether open or laparoscopic repair,whether primary repair was done or meshplasty was done and if meshplasty was done then in which plane was the mesh placed and operative time.

Post Operative Finding Were Recorded As Follow:

Post operative complications in the form of seroma formation, wound infection, mesh infection, recurrence of hernia, increased length of hospital stay and post operative pain.

RESULTS AND ANALYSIS

The study involved 83 cases of ventral abdominal wall hernia, with the highest incidence in the 5th decade and a male-to-female ratio of 1:2. All the patients presented with a complaint of swelling(100%), out of 83 patients 30(36.14%) had pain, while 4 (4.81%) patients had nausea and vomiting, and 1 (1.2%) patient had abdominal distension. 4 patients had other complication, like erythema, itching, redness, excoriation. Out of these four, one had redness and edema due to strangulation, and the rest three had overlying skin Changes. In my study out of 83 patients, 34(40.96%) had a complication in post-op periods. out of the 10 patients, 10 (12.08%) had diabetes, and 4 (4.8%) had Hypoproteinemia, and 4(4.8%) had another co-morbidity like history of heart disease, dyslipidemia. Umbilical and incisional hernias were most prevalent, and 60% of female patients were obese (BMI > 30). Among the 83 patients in the present study 47(56.62%) patients had an umbilical hernia, 23 (27.07%) had incision hernia, 7 (8.43%) patients epigastric hernia, and 5 (6.02%) patients had a para-umbilical hernia, and 1(1.20%) patient had Spigelian hernia. The highest incidence of incisional hernia is seen in females (65.21%). As per EHS classification, there were 7 Epigastric hernia- 5 were medium size and 2 were large size,47 umbilical hernia- 7 was a small size,30 medium sizes, and 10 large sizes and 1 medium size Spigelian hernia. Whereas 23 incisional hernia were operated, of these 5 (26%) were M3(at umbilicus) type 13(47%) were M4(infra umbilicus) type, 1(8%) were L1(at subcostal) type and 2(17%) were L3(iliac) type. As per size 12(52.17%) were W1(<4cm) ,W2(4-10 cm) and 03(13.04%) hernia was W3(>10cm) size.2 had recurrence incisional hernia within one year after previous surgery. In the present study, the common associated predisposing conditions are mainly obesity seen in 42.16%, and a history of previous surgery in 31.32% and multiparity is seen in 6.2%, while 4.8% had constipation, and 1% had benign prostatic hyperplasia, A total of 23 patients had incisional hernia out of 83, from where the highest incidence is seen after after exploratory laparotomy procedures through lower midline incision (10.84%) ,second most common causes LSCS (4.81%) and after hysterectomy in Pfannenstiel incision. Other causes for the development of the incisional hernia were hysterectomy, appendectomy, tubal ligation performed. In these study, 52(67.65%) patients underwent open pre-peritoneal hernia repair with meshplasty. and 11(13.25%) patients underwent open retrorectus meshplasty. and 4(5.63%) patients underwent laparoscopic retrorectus mesh repair and 3(3.61%) patients underwent intraperitoneal Onlay mesh repair. In the present study, most patients undergo open preperitoneal hernioplasty. Seroma is the most common complication in the present study, which occurred in 19 (22.8%) patients, wound infection is the second most common complication occurred in 11(12.25%) patients while mesh infection, mesh migration, and chronic pain is the rarest complication occurred in 1.2 % patients. Two patients developed recurrence (2.4%).While 49 had no complication.



- Open Pre-peritoneal repair
- Anatomical repair
- Open retrorectus repair
- Lap retrorectus mesh repair
- IPOM repair
- Open onlay mesh repair

Figure 3:Types of surgery performed

The total duration of hospital stay was lower in patients operated by laparoscopic repair, had no co-morbid condition, mean duration of discharge of those patients was 4-5 days. while those with open repair with risk factors like obesity or postoperative wound complication needed prolonged postoperative hospital stay .

Complications	Frequency	Percentage
Seroma	19	22.88%
Wound infection	11	12.25%
Recurrence	2	2.40%
Mesh infection	1	1.20%
Mesh migration	1	1.20%
Chronic pain	1	1.20%

Table 1 : complications of surgery

CONCLUSIONS

A successful ventral hernia repair requires a comprehensive understanding of abdominal wall anatomy, the underlying etiology and pathophysiology of hernia formation, and the available surgical management techniques. Patient counseling, particularly in preventing incisional hernias through modifiable risk factor control, is essential in reducing the overall burden.

In this study, although a direct comparison between open and laparoscopic repair was limited due to an inadequate laparoscopic sample size, certain trends were observed. Open preperitoneal mesh repair demonstrated superior outcomes compared to on lay mesh repair, particularly in minimizing wound-related complications such as infections and seromas.

Laparoscopic repair, while offering benefits like early mobilization and shorter hospital stays, was less frequently utilized due to the high cost of composite meshes. Despite these constraints, laparoscopic techniques are recognized as being generally superior in terms of patient recovery and postoperative outcomes.

Based on the findings, open preperitoneal mesh repair is currently the preferred technique at our institute, offering a balance between efficacy, safety, and cost-effectiveness in the surgical management of ventral hernias.

Limitations:-

This study was conducted at a single center. Multi-centric, large-scale randomized controlled trials are needed for more robust outcome assessment.

In our study we had only included 1 year follow up post operatively.however certain complications such as hernia recurrence may present even after 1 year.

Cost factor had not been studied and due to high cost of composite mesh laparoscopic repair is limited in these study.

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