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An Observational Prospective Study of Adult Patients with Ventral Hernia Presenting As Surgical Emergency in Tertiary Care Hospital

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Abstract

Background: Ventral hernias, including primary and incisional types, are common surgical problems that may present as emergencies due to obstruction or strangulation. Risk factors such as obesity, previous abdominal surgeries, and comorbidities contribute significantly to their development and outcomes. This study aimed to evaluate the clinical presentation, risk factors, and surgical outcomes of ventral hernias, with special focus on previous surgeries, obesity, and comorbidities, and to compare anatomical and mesh repair techniques.

Methods: This prospective observational study was conducted in the Department of General Surgery at a tertiary care hospital from November 2022 to July 2024. Thirty adult patients (>18 years) presenting with ventral hernias requiring emergency open repair were included. Data on demographics, comorbidities, surgical history, intraoperative findings, and postoperative outcomes were collected and analyzed.

Results: The mean age of patients was 53.3 ± 8.2 years, with females comprising 80%. Incisional hernia was the most common type (73.33%), followed by umbilical (13.33%). Obesity (26.66%) and hypertension (23.33%) were frequent comorbidities. Mesh repair was performed in 80% of cases, while 20% underwent anatomical repair. The most common hernial contents were omentum and small bowel (40%). Postoperative complications occurred in 30% of patients, with surgical site infection (10%) being most frequent. The mean postoperative hospital stay was 11.9 ± 5.0 days, and mortality was 6.66%.

Conclusion: Prolene mesh repair demonstrated better outcomes and lower recurrence compared to anatomical repair, even in emergency settings. Female sex, obesity, and prior lower midline incisions were key risk factors.

Early elective repair and optimized management can improve surgical outcomes and reduce morbidity.

Keywords: Ventral hernia, Incisional hernia, Mesh repair, Anatomical repair, Surgical outcomes.

Introduction

A hernia is the protrusion of an organ or tissue through a weakness or defect in the abdominal wall [1]. The term originates from the Latin word meaning "rupture." Abdominal wall hernias are among the most frequent surgical conditions, with a prevalence of about 1.7% in the general population and up to 4% in individuals over 45 years. Globally, nearly 20 million hernia repairs are performed annually, underscoring their significant clinical and economic burden [1].

Ventral hernias, which include both primary (umbilical, epigastric) and secondary or incisional hernias, are particularly common and often present as abdominal wall swellings with or without pain. They may occasionally complicate as strangulated or incarcerated hernias requiring emergency intervention [2,3]. Although sometimes asymptomatic, most patients seek surgical repair due to discomfort, pain, or cosmetic reasons [2].

Obesity is a key risk factor for ventral hernia formation, owing to increased intra-abdominal pressure and impaired wound healing. Other contributing factors include previous midline laparotomy, chronic cough, constipation, and systemic diseases such as diabetes mellitus [2,4]. Emergency repair of ventral hernias carries higher morbidity due to poor preoperative condition and associated comorbidities, leading to increased rates of surgical site infection, prolonged hospital stay, and greater healthcare costs [5].

Both open and laparoscopic methods are used for ventral hernia repair. Although laparoscopic repair offers faster recovery, open repair remains preferred in emergency settings and for large or complicated hernias [6]. Among open techniques, mesh repair has demonstrated lower recurrence rates and better outcomes compared to anatomical repair and are recommended whenever feasible. Considering these factors, the present study aimed to evaluate the clinical presentation, risk factors, and surgical outcomes of ventral hernias, with special focus on the impact of previous surgeries, obesity, and comorbidities, and to compare the results of different open surgical techniques, particularly anatomical versus mesh repair.

Methodology

This was a prospective observational study conducted in the Department of General Surgery at a tertiary care centre. The study included patients with ventral hernias who underwent emergency surgical management. The study was carried out from November 2022 to July 2024.

Study Population

A total of 30 patients of either gender, aged above 18 years, presenting with ventral hernias requiring emergency open surgical intervention were included.

Inclusion Criteria

All patients above 18 years of age, irrespective of sex, presenting with ventral hernias and requiring emergent open surgical management were included.

Exclusion Criteria

Patients with femoral or inguinal hernias, those unwilling to participate, and those taking discharge against medical advice were excluded.

Data Collection

After obtaining written informed consent, data were collected using a pre-designed proforma. Detailed history regarding duration of swelling, pain, indication and type of previous abdominal surgeries, postoperative complications, comorbid conditions (such as diabetes,

hypertension, tuberculosis), medications, and habits such as smoking or alcohol use were recorded. When patients were unable to provide information, history was obtained from relatives or attendants. Height and weight were measured to calculate body mass index (BMI).

Clinical Examination

All patients underwent thorough general and systemic examinations. Vital parameters such as pulse rate, blood pressure, respiratory rate, and pallor were noted. Per-abdominal examination included inspection of swelling, operative scars, and reducibility, followed by palpation for tenderness, rigidity, and size of defect. In male patients, a per-rectal examination was performed to rule out benign prostatic enlargement or anorectal pathology contributing to straining.

Investigations

Routine laboratory investigations included complete blood count, bleeding and clotting time, blood grouping and cross-matching (when required), urine analysis, blood sugar, renal function tests, and serum electrolytes. Screening for HIV and hepatitis B was done for all patients, and liver function tests were performed when indicated. Radiological evaluation comprised ultrasonography of the abdomen and pelvis to assess the hernia defect and its contents, chest radiograph to detect any pulmonary pathology, and plain erect abdominal radiograph in suspected cases of intestinal obstruction.

Preoperative Preparation

Patients were kept nil per oral overnight before surgery. After administration of tetanus toxoid, routine pre-anaesthetic evaluation and informed consent were obtained. Comorbid conditions were optimized, the operative site was shaved, and nasogastric tube, Foley's catheter, and broad-spectrum intravenous antibiotics were administered preoperatively.

Operative Management

All patients underwent emergent open hernia repair under general, spinal, or epidural anaesthesia. The surgical approach was decided based on the size of the hernia defect and the presence of local infection.

- **Anatomical repair (resuturing):** Performed for defects ≤3 cm using interrupted polypropylene sutures.
- **Onlay polypropylene mesh repair (Chevrel technique):** Performed for defects >3 cm using a mesh placed over the anterior rectus sheath and fixed with non-absorbable sutures. A vacuum drain was placed over the mesh and removed once drainage decreased to <20 ml per day.

Postoperative Management

Patients were monitored in the surgical ward or ICU as required. Nasogastric aspiration and input-output charting were maintained. Intravenous fluids, antibiotics, and analgesics were administered. Oral feeding was gradually resumed after bowel sounds returned. Suction drains were removed within 2–3 days, and sutures were removed on the 10th–12th postoperative day. Patients were encouraged for early ambulation and deep-breathing exercises. At discharge, patients were advised to avoid heavy lifting for six weeks and to wear an abdominal belt. Follow-up visits were scheduled at one month, three months, and six months to assess for recurrence or complications. Postoperative complications evaluated included wound infection, seroma, hematoma, skin necrosis, and recurrence.

All collected data were checked daily for completeness, entered into Microsoft Excel, cleaned, and analyzed. Quantitative variables were expressed as mean, standard deviation, and percentages, while categorical variables were expressed as proportions.

Results

In the present prospective observational study of 30 adult patients presenting with ventral hernia as a surgical emergency, the majority of cases (76.67%) were observed in the 51–60 years age group, with a mean age of 53.3 ± 8.2 years. Females predominated, accounting for 80% of the cases, while males comprised 20%. Incisional hernia was the most common type, seen in 73.33% of patients, followed by umbilical (13.33%), epigastric (6.66%), and paraumbilical hernias (6.66%).(Table 1)

The most frequent clinical presentation at admission was irreducible swelling with pain in 63.33% of patients, followed by irreducible swelling with intestinal obstruction in 23.33% and strangulation in 13.33%. More than half of the patients (53.33%) were admitted within 25–48 hours after symptom onset, while 26.6% presented between 13–24 hours and 13.33% within 12 hours. (Table 1)

Associated comorbidities included obesity in 26.66%, hypertension in 23.33%, diabetes mellitus in 20%, ischemic heart disease in 6.66%, COPD in 3.33%, and alcoholic liver disease in 3.33%. Among patients with incisional hernia, the time of onset after previous surgery ranged from 6 months to 10 years, with the majority (53.33%) developing hernia within 1–5 years postoperatively. (Table 1)

Regarding surgical history, 50% of hernias occurred through a lower midline incision, 20% through an upper midline, and 13.33% through a mid-midline vertical incision. Previous surgeries most commonly associated with incisional hernia were hysterectomy (53.33%), followed by laparotomy (20%), lower segment cesarean section (13.33%), and tubectomy (13.33%). Notably, 16.66% of patients had no history of previous abdominal surgery. (Table 1)

In the present study of 30 adult patients with ventral hernia presenting as surgical emergencies, incisional hernia was the most common type, observed in 73.33% of cases, followed by umbilical hernia in 13.33%, and both epigastric and paraumbilical hernias in 6.66% each. The majority of hernia defects (70%) measured between >3 cm and <4 cm, while 16.66% measured 2–3 cm**,** 10% were more than 4 cm, and only 3.33% were less than 2 cm**.**(Table 2)

Regarding the surgical procedures performed**,** mesh repair (onlay technique) was the preferred method in 80% of patients, whereas anatomical repair was performed in 20%. Examination of the hernial contents revealed that both omentum and small bowel were present in 40% of cases, while small bowel alone and omentum alone were found in 26.6% each, and colon was involved in 6.66% of patients. (Table 2)

The postoperative complications were observed in 30% of patients. The most common complication was surgical site infection (SSI), occurring in 3 patients (10%), followed by paralytic ileus and burst abdomen, each seen in 2 patients (6.66%)**.** Mesh infection and septicemia were noted in 1 patient (3.33%) each. Out of the total 30 patients, 2 patients (6.66%) succumbed during the course of treatment, resulting in an overall mortality rate of 6.66%**.** (Fig 1) Recurrence was observed in 2 patients (33.33%) who had undergone anatomical repair and in 1 patient (4.16%) who had undergone mesh repair. Statistical analysis using Fisher's exact test showed a P value of 0.0936 (two-tailed), which was not statistically significant (P > 0.05), indicating that the difference in recurrence rates between the two surgical techniques was not significant.(Table 4)

In the present study, the mean postoperative hospital stay was 11.9 ± 5.0 days**.** The majority of patients, 19 (63.33%), remained hospitalized for 10–15 days, while 7 patients (23.33%) were discharged within 10 days. A smaller proportion had prolonged stays, with 2 patients (6.66%) staying for 16–20 days, and 1 patient (3.33%) each staying for 21–25 days and 26–30 days**,** respectively.(Table 3)

Table 1: Distribution of study participants according to Socio-demographic Characteristics

Socio-demographic Characteristics	Number of patients (N=30)	Percentage (100%)
Age group		
21-30	1	03.33%
31-40	1	03.33%
41-50	3	10.00%
51-60	23	76.67%
61-70	1	03.33%
>70	1	03.33%
Mean age with SD = 53.3±08.2 Years		
Gender		
Male	06	20%
Females	24	80%
Type of ventral hernia		
Epigastric hernia	02	6.66%
Umbilical hernia	01	13.33%
Paraumbilical hernia	02	6.66%
Incisional hernia	25	73.33%
Clinical presentation at the time of admission		
Irreducible swelling with pain	19	63.33%
Irreducible swelling with intestinal obstruction	07	23.33%
Irreducible swelling with strangulation	04	13.33%
Time interval between onset of symptoms and admission to hospital		
Within 12 hours	04	13.33%
13 to 24 hours	08	26.6%
25 to 48 hours	16	53.33%
More than 48 hours	02	6.66%
Associated co-morbidity		
Hypertension	07	23.33%
Diabetes Mellitus	06	20%

COPD(Chronic obstructive pulmonary disease)	01	3.33%
Ischemic heart disease	02	6.66%
Alcoholic liver disease	01	3.33%
Obesity	08	26.66%
Time of onset of incisional hernia after previous surgery		
6 months – 1 year	05	13.33%
1 year to 5 years	14	53.33%
>5 to 10 years	04	20%
More than 10 years	02	13.33%
No any previous abdominal surgery	05	16.66%
Previous abdominal incision through which hernia occurred		
Lower midline	15	50%
Mid midline vertical	04	13.33%
Upper midline	06	20%
No any previous abdominal surgery	05	16.66%
Previous abdominal surgery		
Laparotomy	05	20%
Tubectomy	04	13.33%
Hysterectomy	10	53.33%
LSCS	06	13.33%
No any previous abdominal surgery	05	16.66%

Table 2: Distribution of study participants according to Characteristics of Hernia

Characteristics of Hernia	Number of patients (N=30)	Percentage (100%)
Type of ventral hernia		
Epigastric hernia	02	6.66%
Umbilical hernia	01	13.33%
Paraumbilical hernia	02	6.66%
Incisional hernia	25	73.33%
Size of defect		
Less than 2cm	01	3.33%
2 to 3 cm	05	16.66%
.>3cm and <4cm	21	70%
More than 4cm	03	10%
Surgical procedures performed		

Anatomical repair	06	20%
Mesh repair (Onlay)	24	80%
Content of hernia		
Small bowel only	08	26.6%
Omentum only	08	26.6%
Omentum + small bowel	12	40%
Colon	02	6.66%

Figure 1: Distribution of study participants according to post operative complications

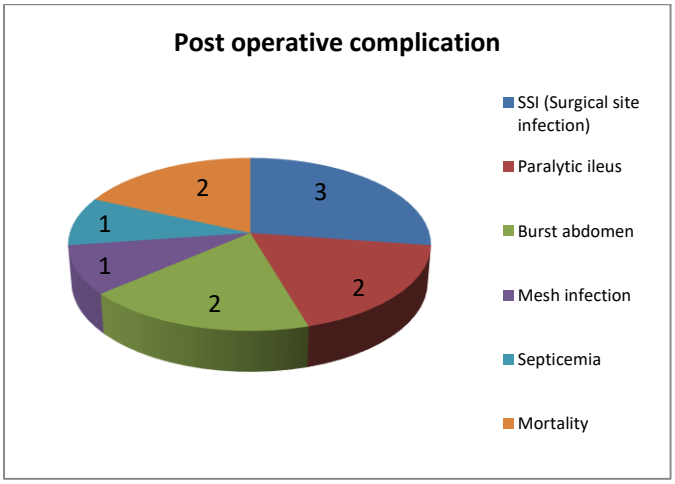

Table 3: Distribution study participants according to post operative hospital stay

Post operative hospital stay	Number of patients	Percentage	Mean post operative hospital stay (In days)
Less than 10 days	7	23.33%	11.9 ± 5.0 days
10- 15 days	19	63.33%	
16-20 days	2	6.66%	
21-25 days	1	3.33%	
26-30 days	1	3.33%	
Total	30	100%	

Table 4: Distribution study participants according to surgical procedure performed and recurrence

Surgical procedures performed	Number of patients with recurrence	P value using Fisher exact test (NS>0.05)
Anatomical repair (06)	2(33.33%)	0.0936 (two-tailed)
Mesh repair (Onlay)(24)	1(04.16%)	

Discussion

In the present study, the mean age of patients with ventral hernia was 53.3 ± 8.2 years, which was comparable to the findings of Zafar H et al. (2012)[7] and Whittaker RM et al. (2021)[8], who reported mean ages of 52.4 ± 15 years and 53 ± 13 years, respectively. This similarity indicates that ventral hernias predominantly affect individuals in the middle-aged to elderly population, reflecting the gradual weakening of abdominal musculature with age.

The male-to-female ratio in the present study was 1:4, showing a female predominance. This finding was in agreement with Eyvaz K et al. (2022)[9], who reported a ratio of 1:2.6, and Kumar HR et al. (2024)[10], who observed a ratio of 1:1.8, suggesting that ventral hernia is more common among females, possibly due to factors such as multiple pregnancies and postoperative abdominal wall weakness.

In the current study, the most common clinical presentation was irreducible swelling (63.33%), followed by irreducible swelling with signs of obstruction (23.33%) and irreducible swelling with signs of strangulation (13.33%). These findings were comparable to Clement SH et al. (2018)[11], who reported irreducibility in 66.66% of patients and irreducibility with obstruction in 22.22%**,** supporting the observation that irreducibility is the most frequent presentation in emergency ventral hernia cases.

Regarding the type of hernia**,** incisional hernia was the most common, followed by paraumbilical hernia, similar to the findings of Chavan SS et al. (2017)[12] and Ali IM et al. (2024)[13], who also reported incisional hernia as the predominant type.

In terms of surgical management**,** mesh repair was the preferred technique in 80% of cases in the present study, while anatomical repair was performed in 20%. This trend aligns with Clement SH et al. (2018)[11] and Ali IM et al. (2024)[13], who reported mesh repair rates of 66.6% and 67.5%**,** respectively, highlighting the superiority and preference for mesh repair due to lower recurrence rates.

The most common postoperative complications observed in this study were wound infection (10%). Similar findings were noted by Zafar H et al. (2012)[7], who reported wound infection in 21.5% and by Kumar HR et al. (2024)[10], who reported wound infection in 3.7% indicating that wound-related complications are the most frequent postoperative issues following ventral hernia repair.

The mean hospital stay in the present study was 11.9 ± 5.0 days, which was slightly longer than that reported by Whittaker RM et al. (2021)[8] (6.5 days) and Pavithira GJ et al. (2022)[5] (8 days). The longer duration in the present series could be attributed to the higher number of emergency cases and associated comorbidities. The mortality rate in the current study was 6.66%**,** which was comparable to Eyvaz K et al. (2022)[9], who reported 5%, and slightly higher than Pavithira GJ et al. (2022)[5], who observed 3%, reflecting the impact of emergency presentations and associated systemic illnesses.

Finally, the recurrence rate in the present study was 10%**,** which was consistent with the findings of Zafar H et al. (2012)[7] and Dissanayake B et al. (2020)[14], who reported recurrence rates of 9.5% and 8%, respectively. This indicates that the recurrence pattern in the present study was similar to that of previous studies, reaffirming that mesh repair significantly reduces recurrence compared to anatomical repair.

Conclusion

The study concluded that among various open surgical modalities, prolene mesh repair was associated with a significantly lower recurrence rate compared to anatomical repair, even in emergency settings. Emergency ventral hernia repairs were linked to longer hospital stays and greater use of hospital resources. Female sex, obesity, and lower midline laparotomy incisions emerged as important risk factors influencing hernia occurrence and recurrence. Recognizing these factors, along with proper patient education and early elective repair of ventral hernias, was essential in

improving postoperative outcomes and reducing the overall healthcare burden.

Limitations

The study was limited by its small sample size and single-centre design, which may restrict the generalizability of the findings. Being an observational study, it lacked randomization and long-term follow-up, which could have provided more robust data on recurrence and postoperative outcomes. Additionally, variations in surgical expertise and patient comorbidities might have influenced the results.

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