Risk factors associated with emergent ventral hernia repair: a retrospective case-control study

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Introduction

- Emergent ventral hernia repair (VHR) is associated with increased morbidity and mortality when compared to elective VHR.
- Identifying modifiable hernia-specific risk factors associated with emergent VHR can help reduce the need for emergency surgery and improve outcomes.
- The hernia-neck-ratio is a risk factor which has been shown to be significantly higher in patients undergoing emergent VHR.
- Watchful waiting and preoperative optimization of comorbidities such as obesity are also potential risk factors for emergent repair with rates of emergent VHR up to 8.3% and 16.7% respectively.
- The aim of our study is to evaluate hernia-specific risk factors associated with emergent VHR in our hospital system when compared with elective VHR in order to improve outcomes.
- This study assesses whether hernia-neck ratio correlates with the need for emergent VHR and examines the impact of other hernia-specific risk factors such as watchful waiting and optimization on emergent VHR.

Methods

- This single-center, retrospective case-control study included patients >18 years old who underwent VHR over a 12-month period.
- Cases included all emergent VHR; controls included elective VHR performed by two surgeons.
- Patients with lateral and flank hernias or other concurrent primary procedures were excluded.
- Univariate and multivariate analysis were performed using Mann-Whitney U-test for continuous data and Pearson's chi-square test or Fisher's exact test for categorical data.

Table 1: Measurements and Demographics

	Total 90 (%)	Emergent (38)	Elective (52)	p value
Average age (years)	52.1	52.8	51.5	0.99
Sex				
Male	41 (45.6%)	14 (36.8)	24 (63.2)	0.20
Female	49 (54.4%)	27 (51.9)	25 (48.1)	
Insurance status				
Private	37 (41.1)	18 (47.4)	19 (36.5)	**0.01**
Medicare	24 (26.7)	8 (21.1)	16 (30.8)	
Medicaid	23 (25.6)	6 (15.8)	17 (32.7)	
Uninsured	6 (6.7)	6 (15.8)	0 (0.0)	
Mean BMI (kg/m2)	30.7	32.0	29.8	0.27
Recurrent hernia (%)	19 (21.1)	11 (28.9)	8 (15.4)	0.19
Comorbidities				
Diabetes	11 (12.2)	5 (13.2)	6 (11.5)	1.00
COPD	7 (7.8)	3 (7.9)	4 (7.7)	1.00
Active Smoking	9 (10)	6 (15.8)	3 (5.8)	0.16
ASA class				
1	6 (6.7)	1 (2.6)	5 (9.6)	**< 0.01**
2	39 (43.3)	9 (23.7)	30 (57.7)	
3	43 (47.8)	26 (68.4)	17 (32.7)	
4	2 (2.2)	2 (5.3)	0 (0.0)	
PCP visit within 12 months				
No		19 (52.8)	n/a	
Yes, did not address hernia		13 (34.2)	n/a	
Yes, addressed hernia		6 (15.8)	n/a	
Surgeon visit within 12 months				
No		30 (78.9)	n/a	
Yes, surgery not recommended		1 (2.6)	n/a	
Yes, needed optimization		3 (7.9)	n/a	
Yes, surgery offered		4 (10.5)	n/a	
Imaging modality				
US	1 (1.1)	0 (0.0)	1 (1.9)	**0.01**
CT	71 (78.9)	35 (92.1)	35 (67.3)	
MRI	0 (0.0)	1 (2.6)	0 (0.0)	
none	18 (20)	2 (5.3)	16 (30.8)	
Hernia width ± SD	3.1 ± 2.4	3.1 ± 2.6	3.2 ± 2.3	0.73
Hernia neck (horizontal)	2.2 ± 1.2	2.5 ± 0.9	1.9 ± 1.4	0.41
Hernia neck (vertical)	2.3 ± 1.5	2.3 ± 0.9	2.4 ± 2	0.40
Radiologist reported hernia neck size	29 (42)	11 (30.6)	18 (54.5)	**0.04**
Hernia contents				
Bowel or mesentery	41 (56.9)	28 (77.8)	13 (36.1)	**<0.01**
Fat	27 (37.5)	6 (16.7)	21 (58.3)	
Ascites	2 (2.8)	2 (5.6)	0	
none	2 (2.8)	0	2 (5.6)	
Ischemic bowel	19 (26.4)	19 (52.8)	0	**<0.01**

Table 2: Surgical findings and Outcomes

	Total N (%)	Emergent	Elective	p value
Operative approach				
Open	52 (57.8)	36 (94.7)	16 (30.8)	**<0.01**
MIS converted to open	1 (1.1)	1 (2.6)	0	
Lap	2 (2.2)	1 (2.6)	1 (1.9)	
Lap hybrid	3 (3.3)	0	3 (5.8)	
Robotic	29 (32.2)	0	29 (55.8)	
Robot hybrid	3 (3.3)	0	3 (5.8)	
Fascial closure	88 (97.8)	36 (94.7)	52 (100)	0.09
Mesh placement	59 (65.6)	14 (36.8)	45 (86.5)	**<0.01**
Type of mesh				
Synthetic	44 (74.6)	0	44 (97.8)	**<0.01**
Bioabsorbable	15 (25.4)	14 (100)	1 (2.2)	
Biologic	0	0	0	
Mesh location				
Intraperitoneal	17 (28.8)	1 (7.1)	16 (35.6)	**<0.01**
Preperitoneal	17 (28.8)		17 (37.8)	
Retrorectus	12 (20.3)	1 (7.1)	11 (24.4)	
Onlay	12 (20.3)	11 (78.6)	1(2.2)	
Inlay or bridging repair	0			
Skin only closure or vac	1 (1.7)	1 (7.1)		
Drain placement	23 (25.6)	15 (39.5)	8 (15.4)	**0.01**
Bowel resection	5 (5.6)	5 (13.2)	0	**<0.01**
Mortality	1 (1.1)	1 (2.6)	0	0.24
ICU admission	4 (4.4)	4 (10.5)	0	**0.02**
Length of stay	2.4 ± 3.6	4.8 ± 4.6	0.7 ± 0.7	**<0.01**
30 day readmission	12 (13.3)	10 (26.3)	2 (3.8)	**<0.01**
30 day reoperation	3 (3.3)	3 (7.9)	0	**0.04**
SSI	1 (1.1)	1 (1.2)	0	0.24
SSO	13 (14.4)	9 (23.7)	4 (7.7)	**0.03**
SSOPI	3 (3.3)	2 (5.3)	1 (1.9)	0.38
Hernia recurrence	2 (2.2)	1 (2.6)	1 (1.9)	0.82

Results

- There were no differences in age, sex, BMI, diabetes, COPD, active smoking and prior hernia repair between the two groups. ASA class and proportion of uninsured patients were higher in the emergent VHR group.
- Prior to emergent VHR, only 15.8% of patients had the hernia addressed by a PCP within 12 months. 21.1% saw a surgeon and 50% of them were either recommended optimization or not offered surgery.
- 2.6% of emergent VHR were performed via minimally invasive surgery (MIS) compared to 69.2% of elective VHR.
- Hernia width and hernia-neck ratio were similar in both groups with mean values of 3.1 vs 3.2 (p= 0.73), and 2.3 vs. 2.4 (p= 0.40), respectively.
- Bowel resection, drain placement, ICU admission, length of stay, 30-day readmission and reoperation, and surgical site occurrence were significantly greater in emergent VHR.

Discussion

- There was no significant difference in hernia-neck ratio between patients undergoing emergent versus elective VHR.
- Emergent VHR was associated with inferior postoperative outcomes, which may be further exacerbated by the underutilization of minimally invasive surgical approaches.
- A higher proportion of patients requiring emergent VHR were uninsured. Many of these patients had either never seen a primary care provider (PCP) or had a PCP who did not appropriately diagnose or refer them for hernia management.
- Key contributors to need for emergent VHR included lack of access to care, prolonged watchful waiting, and inadequate preoperative optimization.
- Future prospective studies are warranted to further elucidate hernia-specific risk factors that predispose patients to emergent VHR.