

# Comparing ventral hernia repair outcomes in patients with and without liver failure

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# Disclosures

- None

# Introduction

- Ventral hernias - 40% of patients with liver failure
- Surgery often delayed due to increased perioperative risk
- Watch-and-wait, emergent presentations

## Aim

- Compare ventral hernia repair outcomes in patients with and without liver failure

## Hypothesis

- Patients with liver failure have an acceptable perioperative risk profile

# Methods

- ACHQC
  - Elective
  - Open ventral hernia repair
  - 1/2014 until 12/2023
  - 30-day follow-up available
- Liver failure
  - Only those with creatinine, bilirubin, and INR values
  - $MELD = 9.57 \times \log e (\text{creatinine}) + 3.78 \times \log e (\text{bilirubin}) + 11.20 \times \log e (\text{INR}) + 6.43$

# Results

	No liver failure	Liver failure	P-value
N	36,174	286	
Age, mean (IQR)	57 (46, 67)	59 (54, 66)	<0.001
Gender, N (%)			<0.001
Female	17,133 (47%)	77 (27%)	
BMI, kg/m <sup>2</sup> , (IQR)	31 (27, 36)	29 (25, 34)	<0.001
Hypertension, N (%)	16,659 (46%)	169 (59%)	<0.001
Diabetes Mellitus, N (%)	6,121 (17%)	82 (29%)	<0.001
COPD, N (%)	1,928 (5.3%)	31 (11%)	<0.001
Anti-coagulation medications, N (%)	2,091 (5.8%)	17 (5.9%)	0.91
Immunosuppressants, N (%)	1,562 (4.3%)	42 (15%)	<0.001
Current smoking, N (%)	3,815 (11%)	55 (19%)	<0.001
History of abdominal wall SSI, N (%)	3,043 (8.4%)	29 (10%)	0.29
Prior prosthetic mesh, N (%)	6,203 (17%)	56 (20%)	0.28
Wound classification, N (%)			0.17
Clean	32,026 (89%)	242 (85%)	
Clean-contaminated	2,598 (7.2%)	28 (9.8%)	
Contaminated	1,080 (3.0%)	12 (4.2%)	
Dirty/Infected	457 (1.3%)	4 (1.4%)	
Hernia width, cm, (IQR)	4.0 (2.0, 8.0)	4.0 (2.0, 8.0)	0.045
Hernia length, cm, (IQR)	5 (2, 14)	5 (2, 12)	0.25
Recurrent, N (%)	9,087 (25%)	97 (34%)	<0.001
Concomitant procedure performed, N (%)	5,943 (16%)	51 (18%)	0.52

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N	36,174	286	
<b>Age, mean (IQR)</b>	<b>57 (46, 67)</b>	<b>59 (54, 66)</b>	<b>&lt;0.001</b>
<b>Gender, N (%)</b>			<b>&lt;0.001</b>
Female	17,133 (47%)	77 (27%)	
<b>BMI, kg/m<sup>2</sup>, (IQR)</b>	<b>31 (27, 36)</b>	<b>29 (25, 34)</b>	<b>&lt;0.001</b>
<b>Hypertension, N (%)</b>	<b>16,659 (46%)</b>	<b>169 (59%)</b>	<b>&lt;0.001</b>
<b>Diabetes Mellitus, N (%)</b>	<b>6,121 (17%)</b>	<b>82 (29%)</b>	<b>&lt;0.001</b>
<b>COPD, N (%)</b>	<b>1,928 (5.3%)</b>	<b>31 (11%)</b>	<b>&lt;0.001</b>
Anti-coagulation medications, N (%)	2,091 (5.8%)	17 (5.9%)	0.91
<b>Immunosuppressants, N (%)</b>	<b>1,562 (4.3%)</b>	<b>42 (15%)</b>	<b>&lt;0.001</b>
<b>Current smoking, N (%)</b>	<b>3,815 (11%)</b>	<b>55 (19%)</b>	<b>&lt;0.001</b>
History of abdominal wall SSI, N (%)	3,043 (8.4%)	29 (10%)	0.29
Prior prosthetic mesh, N (%)	6,203 (17%)	56 (20%)	0.28
Wound classification, N (%)			0.17
Clean	32,026 (89%)	242 (85%)	
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Contaminated	1,080 (3.0%)	12 (4.2%)	
Dirty/Infected	457 (1.3%)	4 (1.4%)	
Hernia width, cm, (IQR)	4.0 (2.0, 8.0)	4.0 (2.0, 8.0)	0.045
Hernia length, cm, (IQR)	5 (2, 14)	5 (2, 12)	0.25
<b>Recurrent, N (%)</b>	<b>9,087 (25%)</b>	<b>97 (34%)</b>	<b>&lt;0.001</b>
Concomitant procedure performed, N (%)	5,943 (16%)	51 (18%)	0.52

# Results

	No liver failure	Liver failure	P-value
N	837	279	
Age (IQR)	60 (51, 68)	59 (54, 66)	0.41
Gender, N (%)			>0.99
Female	222 (27%)	74 (27%)	
BMI, kg/m2, (IQR)	29.2 (26.0, 33.2)	29.4 (25.3, 34.2)	0.71
Hypertension, N (%)	436 (52%)	164 (59%)	0.052
Diabetes Mellitus, N (%)	145 (17%)	78 (28%)	<0.001
COPD, N (%)	78 (9.3%)	27 (9.7%)	0.86
Anti-coagulation medications, N (%)	59 (7.0%)	17 (6.1%)	0.58
Immunosuppressants, N (%)	112 (13%)	40 (14%)	0.69
Current smoking, N (%)	154 (18%)	52 (19%)	0.93
History of abdominal wall SSI, N (%)	73 (8.7%)	28 (10%)	0.51
Prior prosthetic mesh, N (%)	183 (22%)	55 (20%)	0.45
Recurrent, N (%)	289 (35%)	94 (34%)	0.80
Concomitant procedure performed, N (%)	152 (18%)	50 (18%)	0.93
<b>MELD Score, median (IQR)</b>	<b>n/a</b>	<b>10 (8.2, 12.2)</b>	

	No liver failure	Liver failure	P-value
N	837	279	
Wound classification, N (%)			0.675
Clean	706 (84%)	236 (85%)	
Clean-contaminated	74 (8.8%)	27 (9.7%)	
Contaminated	49 (5.9%)	12 (4.3%)	
Dirty/Infected	8 (1.0%)	4 (1.4%)	
<b>Ascites, N (%)</b>	<b>4 (0.5%)</b>	<b>116 (42%)</b>	<b>&lt;0.001</b>
Hernia width, cm, (IQR)	4.0 (2.0, 9.0)	4.0 (2.0, 8.0)	0.57
Hernia length, cm, (IQR)	5 (2, 15)	5 (2, 12)	0.48
Concomitant procedure performed	152 (18%)	50 (18%)	0.93
<b>Mesh used</b>	<b>708 (85%)</b>	<b>221 (79%)</b>	<b>0.037</b>
Mesh type			0.070
Permanent Synthetic	659 (93%)	195 (88%)	
Resorbable Synthetic	31 (4.4%)	15 (6.8%)	
Biological tissue-derived	17 (2.4%)	11 (5.0%)	
Other/Unknown	1 (0.1%)	0 (0%)	
Mesh location			0.10
Inlay	15 (2.1%)	2 (0.9%)	
Onlay	44 (6.2%)	22 (10%)	
Sublay Intraperitoneal	197 (23.5%)	59 (26.7%)	
Sublay Preperitoneal	231 (27.8%)	67 (30.3%)	
Sublay Retrorectus or Retromuscular	301 (42.5%)	102 (46.2%)	
<b>Mesh Fixation</b>	<b>574 (80%)</b>	<b>163 (72%)</b>	<b>0.011</b>
Myofascial Release	300 (36%)	102 (37%)	0.83
Fascial Closure	773 (92%)	267 (96%)	0.055

# Results

	No liver failure	Liver failure	P-value
N	837	279	
<b>Length of stay</b>	<b>1 (0, 4)</b>	<b>2 (0, 5)</b>	<b>&lt;0.001</b>
Recurrence	3 (0.4%)	0 (0%)	0.58
<b>Readmission, N (%)</b>	<b>39 (4.7%)</b>	<b>23 (8.2%)</b>	<b>0.024</b>
Readmission reason, N (%)			
Pain	6 (0.7%)	5 (1.8%)	0.15
Wound complication	14 (1.7%)	4 (1.5%)	>0.99
Bleeding complication	2 (0.2%)	2 (0.7%)	0.26
Thrombotic complication (non-cardiac)	1 (0.1%)	0 (0%)	>0.99
Gastrointestinal complication	13 (1.6%)	7 (2.5%)	0.29
Cardiac complication	0 (0%)	2 (0.7%)	0.061
Respiratory complication	2 (0.2%)	1 (0.4%)	0.58
Reoperation, N (%)	15 (1.8%)	6 (2.2%)	0.70
Reoperation reason, N (%)	15 (1.8%)	6 (2.2%)	0.70
Major wound complication	7 (0.8%)	3 (1.1%)	0.72
Postoperative bleeding	1 (0.1%)	2 (0.7%)	0.16
Early recurrence	1 (0.1%)	0 (0%)	>0.99
Bowel obstruction	4 (0.5%)	0 (0%)	0.58
Unrelated intraabdominal pathology	3 (0.4%)	1 (0.4%)	>0.99

# Results

	No liver failure	Liver failure	P-value
N	837	279	
Surgical Site Infection, N (%)	28 (3.3%)	13 (4.7%)	0.31
Superficial	18 (2.2%)	7 (2.5%)	0.73
Deep	10 (1.2%)	6 (2.2%)	0.25
Organ Space	1 (0.1%)	0 (0%)	>0.99
SSI treatment, N (%)			
No treatment or intervention needed	0 (0%)	1 (0.4%)	0.25
Oral antibiotics	22 (2.6%)	9 (3.2%)	0.60
IV antibiotics	11 (1.3%)	4 (1.4%)	>0.99
Wound opening	13 (1.6%)	3 (1.1%)	0.77
Wound debridement	3 (0.4%)	1 (0.4%)	>0.99
Percutaneous drainage	4 (0.5%)	1 (0.4%)	>0.99
Complete mesh removal	1 (0.1%)	0 (0%)	>0.99
SSOPI, N (%)	25 (3.0%)	11 (3.9%)	0.43
SSOPI treatment, N (%)			
Oral antibiotics	22 (2.6%)	7 (2.5%)	0.91
IV antibiotics	4 (0.5%)	1 (0.4%)	>0.99
Wound opening	14 (1.7%)	5 (1.8%)	>0.99
Wound debridement	6 (0.7%)	2 (0.7%)	>0.99
Percutaneous drainage	9 (1.1%)	5 (1.8%)	0.36

# Results

	No liver failure	Liver failure	P-value
N	837	279	
Pulmonary Embolism, N (%)	2 (0.2%)	1 (0.4%)	>0.99
DVT, N (%)	5 (0.6%)	3 (1.1%)	0.42
Sepsis, N (%)	1 (0.1%)	1 (0.4%)	0.44
Urinary tract infection, N (%)	2 (0.2%)	2 (0.7%)	0.26
Acute renal failure, N (%)	(0%)	4 (1.4%)	0.004
Pneumonia, N (%)	5 (0.6%)	3 (1.1%)	0.42
Respiratory failure requiring intubation, N (%)	4 (0.5%)	2 (0.7%)	0.64
Post op bleeding requiring transfusion, N (%)	8 (1.0%)	5 (1.8%)	0.33
Death within 30 days, N (%)	0 (0%)	2 (0.7%)	0.062
Death within 1 year	7 (0.8%)	5 (1.8%)	0.19
Recurrence at 1 year	13/85 (15%)	3/21 (14%)	>0.99
Recurrence at 2 year	5/28 (14.7%)	1/6 (17%)	>0.99

# Conclusion

- Largest study looking at outcomes of liver failure patients
- Patients with liver failure have acceptable postoperative outcomes
- Elective ventral hernia repair may be offered to symptomatic patients with liver failure

