

Short-Term Outcomes of Umbilical Hernia Repair with Cirrhosis and Ascites

Tien Tran Phung Dung^{1*}, Linh Huynh Van², Huan Nguyen Ngoc¹ and Trung Lam Viet¹¹Digestive Surgery Department, Cho Ray Hospital, Viet Nam²Faculty of Medicine, Tra Vinh University.***Corresponding author****Tien Tran Phung Dung,**
Digestive Surgery Department,
Cho Ray Hospital,
Viet Nam.

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Background: Umbilical hernia is a popular disease, especially in patients with cirrhosis and ascites. The high and prolonged intra-abdominal fluid leads to increased intra-abdominal pressure, which causes the hernia to grow rapidly and cause complications. The clinical manifestations are mainly two: signs of hernia and symptoms of cirrhosis and ascites. The diagnosis of this condition is relatively simple, based mainly on clinical findings, and sometimes supported by imaging techniques. Umbilical hernia management in patients with cirrhosis and ascites has shifted towards early surgical repair to avoid complications. Two techniques of hernia reconstruction are available: simple suture and mesh implantation. Mesh-based methods are regarded as superior, but surgery in this population has many potential hazards and is still a surgical dilemma. This study examines the short-term outcomes of umbilical hernia reconstruction in patients with cirrhosis and ascites.

Subjects – Methods: We conducted a retrospective study on 43 patients with cirrhosis and ascites who had umbilical hernia repair surgery at Cho Ray Hospital from January 2018 to December 2022. The surgery was either elective or emergency. We recorded the patient characteristics, surgical approaches, morbidity, and mortality. We followed up the patients for 30 days after the surgery.

Results: The male: female ratio was 4:1. The average of age was 56.8 ± 10.7 years old (range: 27 - 79 years old). BMI was categorized into four groups: underweight in 9/43 cases (9.3%), normal in 22/43 cases (51.2%), overweight in 8/43 cases (18.6%), and obese in 9/43 cases (20.9%). All patients had a protrusion in the umbilicus when they were admitted to the hospital. Hernia pain and tenderness were present in 51.2% and 55.8% of the cases, respectively. 8/43 cases (18.6%) had complications of hernia rupture. The mean size of the hernia was 6.4 ± 5.1 cm (range: 2 – 30 cm). The patients underwent emergency surgery in 37/43 cases (86%). All surgeries were open, and the methods of hernia repair were simple suture in 35/43 cases (81.4%), onlay mesh placement in 4/43 cases (9.3%), sublay mesh placement in 1/43 case (2.3%), and preperitoneal mesh placement in 3/43 cases (7%). The mean operative time was 93 ± 37.2 minutes (range: 50-200 minutes). The mean hospital stay was 7 ± 3.2 days (range: 2 - 17 days). There were 13 cases with postoperative complications, accounting for 30%. 2 deaths occurred due to intra-abdominal bleeding and severe peritonitis.

Conclusion: Umbilical hernia is a frequent complication in patients with ascites and cirrhosis. The diagnosis is mainly based on clinical signs, and imaging techniques are used in complicated cases that require further evaluation of the content and condition of the hernia sac. The patients have a high rate of complications and mortality after surgery, which are related to late surgery, degree of cirrhosis, and MELD score ≥ 20 . Therefore, the patients need early diagnosis and surgery to avoid complications that affect their survival.

Keywords: Umbilical hernia, cirrhosis, suture repair, mesh placement, umbilical hernia repair.**Introduction**

Umbilical hernia is a frequent ventral hernia, and asymptomatic umbilical hernia can be detected in 25% of the population by ultrasound (Hegazy, 2016). Risk factors for hernia include connective tissue disease, colonic diverticula, obesity, ascites, pregnancy, African and American ancestry, and Down syndrome (Oh et al., 2008). Umbilical hernia is the

most common abdominal wall complication due to ascites in cirrhotic patients, occurring in 20% of cirrhotic patients with ascites. The high and prolonged intra-abdominal pressure causes the umbilical hernia to grow rapidly and become complicated (Shankar et al., 2017).

The clinical manifestations of umbilical hernia in cirrhotic patients include two groups of signs: signs of hernia and signs of cirrhosis and ascites. A small mass in the umbilical ring usually has no symptoms. When the mass enlarges, the patient feels a tightness around the umbilical area. In more severe cases, the patient has signs of inflammation, ulceration, and pain around the umbilical area, which are found in strangulated umbilical hernia. Strangulated umbilical hernias account for 13% of all types of strangulated hernias (Wang et al., 2016). Umbilical hernia is diagnosed by clinical examination alone; special cases where the hernia cannot be palpated or obese patients require additional imaging methods. Imaging methods are ultrasound, CT Scan, MRI, X-ray of the hernia, in which CT Scan and ultrasound are recommended as priority.

Before surgical repair of the umbilical region, patients with cirrhosis and ascites require medical treatment of ascites. In the past, surgery was only performed for symptomatic hernias, but now, early surgery is advised for even small hernias to avoid life-threatening complications such as strangulation and necrosis. Simple suture and mesh implantation are the most prevalent techniques for abdominal wall reconstruction. Mesh-based methods have transformed the field of hernia surgery. The mesh can be placed in different ways, such as onlay, inlay, sublay and underlay. Minimally invasive surgery is also a potential option with many benefits and is widely used. This study aims to review the different methods for umbilical hernia repair in patients with cirrhosis and ascites.

Material and Methods

We conducted a retrospective analysis of 43 patients with cirrhosis and ascites who underwent umbilical hernia repair, either electively or emergently, at Cho Ray Hospital from January 2018 to December 2022. We collected data on patient demographics, surgical techniques, complications, and mortality.

Exclusion Criteria

Umbilical hernia due to other reasons: nephrotic syndrome, cancer, etc.

Analyze Data

We used SPSS 23 software to analyze the data. We reported quantitative variables as mean \pm standard deviation (for normal distribution) or median with range (for non-normal distribution). We reported categorical variables as counts or percentages. We used Chi-square test (if expected frequency in each cell ≥ 5) or Fisher's exact test (if 20% of cells have expected frequency < 5) to compare two categorical variables. We performed univariate analysis of postoperative complications and mortality with independent variables such as: age, gender, ascites grade, cirrhosis stage according to Child - Pugh, MELD score, serum sodium level, hernia size, surgery type, abdominal wall repair technique and length of hospital stay. We considered $p \leq 0.05$ as statistically significant.

Results

We reviewed 43 cases of umbilical hernia repair in patients with cirrhosis and ascites who underwent surgery from January 2018 to December 2022. The majority of the patients were male (79%, $n = 34$) and the rest were female (21%, $n = 9$). The mean age of the patients was 56.9 ± 10.7 years, ranging from 27 to 79 years.

The patients were classified into four groups based on their BMI: underweight (< 18.5) 9.3% ($n = 4$), normal (18.5 – 22.9) 51.2% ($n = 22$), overweight (23 – 24.9) 18.6% ($n = 8$) and obese (≥ 25) 20.9% ($n = 9$). All the patients had ASA score of at least 3.

Table 1 shows the clinical characteristics of the patients in the study group. All the patients had umbilical hernia on admission, 51.2% ($n = 22$) had incarcerated hernia, and 55.8% ($n = 24$) had pain on hernia palpation. Hernia rupture occurred in 18.6% ($n = 8$) of the patients, and 44.2% ($n = 19$) had skin ulceration around the umbilicus. The mean hernia diameter was 6.4 ± 5.1 cm, ranging from 2 to 30 cm.

Characteristic	Number of patients	Ratio (%)
Vomiting	6	14
Abdominal bloating	7	16.3
Mild ascites	7	16.8
Moderate ascites	3	7
Severe ascites	33	76.7
Fever	4	9.3

Table 1: Patient clinical characteristics

The diagnosis of the patients was mainly based on clinical examination, supplemented by ultrasound in 15 cases, upright abdominal radiography in 3 cases and computed tomography in 31 cases. The mean MELD score was 16 ± 6.3 , with a range of 8 to 32. The table below shows the distribution of the cirrhosis stage. (Fig 1).

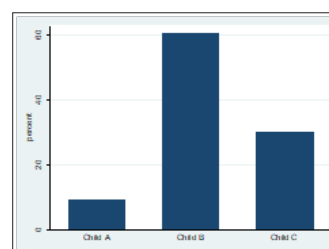


Figure 1: Patient's level of cirrhosis

Most of the patients (86%, $n = 37$) underwent emergency surgery, while only 14% ($n = 6$) underwent elective surgery. All the patients had open surgery, with abdominal wall reconstruction as the main technique. Simple fascial suture with prolene 1.0 was used in 81.4% ($n = 35$) of the cases, and synthetic mesh implantation was used in 18.6% ($n = 8$) of the cases. Among the mesh-based techniques, onlay mesh placement was performed in 5 cases, sublay mesh placement in 3 case. The hernia sac contents are shown in table 2 and the

intraoperative complications of hernia are reported in table 3.

Small intestinal	20 (46.5%)
Omentum	12 (27.9%)
Ascite	8 (18.6%)
Small intestinal and Omentum	3 (7%)

Table 2: Hernia sac contents

The major component in the hernia sac has the small intestine in 20 cases (46.5%).

Symptoms	Number of patients	Ratio (%)
Intestinal necrosis	7	16.3
Serosal tear	1	2,3
Intestinal perforation	0	0

Table 3: Complications of hernia

The most frequent complication during surgery was bowel necrosis, which occurred in 16.3% (n = 7) of the cases. The mean duration of surgery was 92.9 ± 37.2 minutes, with a range of 50 to 200 minutes. The mean length of hospital stay was 7 ± 3.2 days, varying from 2 to 17 days. For perioperative safety, 30.2% (n = 13) of the patients received blood coagulation factor transfusions and 7% (n = 3) of the patient received packed red blood cell transfusions before surgery.

The rate of postoperative complications was 30.2% (n = 13), including one case of surgical wound hematoma, seven cases of simple serous hematoma that were observed after surgery, one case of superficial surgical wound infection, one case of deep surgical wound infection with postoperative intestinal obstruction, which resulted in the patient's death on the eighth postoperative day due to severe septic shock, one case of seroma with ascites leakage, one case of surgical wound dehiscence that required reoperation, and one case of intra-abdominal bleeding that led to the patient's death of respiratory failure on the third postoperative day. The two fatal cases both had Child C cirrhosis and MELD score above 20.

We performed statistical analysis to compare the risk of postoperative complications between different groups. We found that female patients had a four-fold higher risk of complications than male patients, but this difference was not statistically significant (OR = 4, 95% CI: 0.87 -18.9, p = 0.07). We also found that patients who waited for surgery had a 6.22 times higher risk of complications than patients who had early surgery on admission, and this difference was statistically significant (OR = 6.22, 95% CI: 0.97 - 39.81, p = 0.045). Moreover, we observed that longer hospital stay was associated with increased risk of complications (OR = 1.25, 95% CI 1- 1.57, p = 0.037). We conducted statistical analysis to examine the relationship between postoperative mortality and various factors. We detected significant associations between postoperative mortality and the following factors: red blood cell count (p = 0.02), total blood bilirubin (p = 0.003), serum sodium level (p = 0.04), cirrhosis stage (p = 0.05) and MELD score above 20 (p = 0.038). Other factors are shown in table 4.

	OR	95% CI	p
Age > 65	3.56	0.20 – 62.63	0.398
Woman	4.13	0.23 – 73.29	0.349
RBC	0.09	0.009 -0.956	0.022
HGB	0.95	0.09 – 1.00	0.09
Bilirubin TP	13.2	0.73 – 238.7	0.003
Blood sodium	0.76	0.56 – 1.03	0.06
Hernia size	1.44	0.09 – 22.58	0.79
Surgery time	0.96	0.88 – 1.04	0.187

Table 4: Factors related to postoperative mortality.

Discussion

An umbilical hernia is a type of abdominal wall hernia that occurs at or near the navel. The European Hernia Society (EHS) defines an umbilical hernia as a midline hernia that is located within 3 cm above or below the umbilicus. Wang et al. (2016) reported that umbilical hernia was present in up to 20% of cirrhotic patients with ascites. In our study, we found a male-to-female ratio of 3.8:1 for umbilical hernia in cirrhotic patients. This contrasts with the finding of (Dabbas et al., 2011) who found that paraumbilical hernia due to all causes was more prevalent in females, with a male-to-female ratio of 1:3. However, our finding is consistent with that of (Salamone et al., 2018) who reported a male-to-female ratio of 5.9:1 for umbilical hernia in cirrhotic patients. This may be explained by the higher incidence of cirrhosis in males than in females. The mean age of our patients was 56.9 (range 27 - 79), which was similar to the mean age of 60 (range 53 - 81) reported by (Salamone et al., 2018) and 59.5 (range 49 -77) reported by (Marsman et al., 2007).

The diagnosis of umbilical hernia in this group of patients was relatively straightforward, as all the patients had umbilical hernia on admission. Only in some cases, imaging modalities were needed to confirm the diagnosis or to assess the contents and condition of the hernia. The main challenge was the treatment of this group of patients, as cirrhosis and ascites were associated with systemic disorders such as coagulopathy and malnutrition that affected the surgical outcomes. We used the Child - Pugh score and MELD score to evaluate the severity of cirrhosis. The two cases that had complications and died both had Child C cirrhosis and MELD score above 20. This was consistent with the finding of (Salomone et al., 2018) who reported that emergency surgery, Child C cirrhosis, and MELD score above 20 were high-risk factors for postoperative complications and mortality. This was important for preoperative prognostication and counseling of the patients before surgery.

We performed open surgery with abdominal wall reconstruction for all the patients, because laparoscopic surgery was complex, skill-demanding, time-consuming, and associated with high rates of systemic complications and mortality, as reported by Yen Yi et al. . We mainly used simple prolene 1.0 suture (81.4%) for abdominal wall reconstruction. Bhangui et al. (2012) suggested that synthetic mesh implantation increased

the risk of postoperative infection. However, some recent studies indicated that synthetic mesh implantation was safe and effective and reduced the recurrence of hernia compared to simple prolene suture. The rate of postoperative complications was 30.2% and the in-hospital mortality rate was 4.7%. This mortality rate was lower than that of (Salomone et al., 2018) who reported a 30-day mortality rate of 23%. We identified several factors that influenced the prognosis of complications and mortality after surgery, such as delayed surgery, cirrhosis stage, MELD score above 20, serum sodium level, blood bilirubin level, and red blood cell count. However, our study had a small sample size and a retrospective design, so more studies with larger sample sizes are needed to draw definitive conclusions.

Conclusion

Patients with cirrhosis and ascites often develop umbilical hernia as a frequent complication. The diagnosis is mainly based on clinical signs, and imaging is used for complicated cases that need further evaluation of the contents and condition of the hernia sac. Surgery is the treatment of choice, but it carries a high risk of postoperative complications and mortality, which are related to delayed surgery, cirrhosis severity, and MELD score above 20. Therefore, early diagnosis and surgery are recommended to prevent life-threatening complications.

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