Mesh or not in the repair of complicated umbilical hernia in cirrhotic patients with decompensated liver cell failure

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Background
Umbilical hernia had been found to occur in 20% of cirrhotic patients with decompensated liver cell failure who had ascites; in such patients, umbilical hernia had a marked liability for complications such as irreducibility, obstruction, and strangulation. Management of complicated hernias especially irreducible hernias in such patients could be done by excision of the hernial sac, closure of the defect and then fixation of the prolene mesh (hernioplasty), or by reduction and repair in two layers of continuous sutures using polypropylene sutures without mesh (herniorrhaphy).
Aim
The aim of our study was to compare hernioplasty with the use of prolene mesh and the conventional anatomical repair (herniorrhaphy) in complicated umbilical hernia in patients with decompensated liver cell failure.
Patients and methods
In our descriptive study, we included 101 cases who were followed up for a period of 24 months, and we divided them into two groups: group A contained cases who had complicated umbilical hernia and were managed by hernioplasty with the use of prolene mesh, and group B contained cases that had complicated umbilical hernia and were managed by reduction and repair in two layers of continuous sutures using polypropylene sutures without using a mesh (herniorrhaphy).
Results
We found a statistically significant difference between both groups regarding recurrence of the umbilical hernia and duration of hospital stay (days) (P=0.004).
Conclusion
Complicated umbilical hernia in cirrhotic patients with decompensated liver cell failure who were managed by hernioplasty with the use of prolene mesh showed lower incidence of recurrence than the conventional anatomical repair (herniorrhaphy).

Keywords:
ascites, cirrhotic patients, prosthetic mesh, umbilical hernia

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Introduction

The incidence of umbilical hernias is 3% in general and rises to 20% in patients having liver cirrhosis and ascites [1]. The major risk factors for the occurrence of umbilical hernias in cirrhotic patients are increased intra-abdominal pressure, the presence of ascites, malnutrition, and muscle wasting [2]. In addition, the umbilical hernias in cirrhotic patients had many complications – e.g. ulceration, acute rupture or gradual leakage with discharge of variable amounts of ascites, irreducibility, obstruction, and strangulation [3]. Management of cirrhotic patients who have umbilical hernia is a matter of controversy [4–6]. Such patients could be managed expectantly because of the higher rate of complication and recurrence of hernia [4]. However, the expectant management might lead to many complications – e.g. hernia incarceration and necrosis of the overlying skin that will be followed by evisceration, ascites, and peritonitis [5,6]. Recently, many studies found that the results of surgical repair might depend on the degree of ascites and liver functions [7–9]. Elective umbilical herniorrhaphy is a safe and effective method in a majority of cirrhotic patients in whom ascites is controlled adequately [9]. However, it is better to be avoided in patients with uncontrolled ascites. Recently, there is an absence of high-quality prospective study about management of cirrhotic patients having umbilical hernia to be sure of the right decision [10]. Indications, time, and technique of herniorrhaphy in such patients remain a matter of controversy [6,7]. The use of mesh and laparoscopic access is also subject to debate [11,12]. There is an increase in the recurrence rate of umbilical hernia following its correction in cirrhotic patients, and thus

hernioplasty with the use of prolene mesh in its repair has been introduced [13]. Previous studies have studied the hernia repair with mesh in comparison with the conventional anatomical repair (herniorrhaphy) and they found that it might reduce the recurrence rate of hernia, but may increase the risk of some complications – e.g. seroma and infection [14]. The technique of mesh repair, i.e., 'hernioplasty', involved either a mesh plug, which is put in the defect, or a flat mesh put over the defect with or without sutures to preserve the mesh secure. The most common mesh used is synthesized from polypropylene prosthetic material [15]. There are many conflicting results on whether the mesh should be used in umbilical hernia repair.

Our goal in this study was to explore the best surgical method for the open repair of primary umbilical hernias in cirrhotic patients by detecting the advantage of mesh use in repairing umbilical hernias.

The aim of our study was to compare hernioplasty with the use of prolene mesh and the conventional anatomical repair (herniorrhaphy) in complicated umbilical hernia in patients with decompensated liver cell failure.

Patients and methods

Study design

Location

We carried out this study in General Surgery Department, Zagazig University Hospitals, after local ethics committee and Institutional Research Board approval.

Sample size

A total of 101 cases were included in our study.

Patients criteria

Inclusion criteria – the inclusion criteria were as follows:

(1) All patients more than 18 years old.
(2) All men and women with complicated umbilical hernia with decompensated cirrhotic liver.
(3) Patients who want to undergo surgery for complicated hernia and accept participation in the study.

Exclusion criteria – the exclusion criteria were as follows:

(1) Lack of consent.
(2) Cases with incomplete data and those lost in follow-up were excluded.

Tools – all patients were subjected to the following:

(1) Full history taking as regards onset, course, duration, and manifestations of liver condition.
(2) Clinical examination.
(3) Full preoperative investigations, which include:
    (a) Complete blood count.
    (b) Liver function.
    (c) Kidney function.
    (d) Coagulation profile.
    (e) Blood glucose level.
    (f) ECG.
    (g) Viral markers.
    (h) Abdominal ultrasound.
    (i) Plain radiography erect and supine positions.

Operational design

The operational design was as follows:

(1) Type of study: descriptive study.
(2) An informed consent was taken for the type of surgery.
(3) Preoperative prophylactic intravenous broad spectrum antibiotic was given to all patients.
(4) All patients were divided into two groups:
    (a) Group A: this group included cases of complicated umbilical hernia, which were managed by reduction repair in two layers of continuous sutures using polypropylene sutures and insertion of nonabsorbable onlay prolene mesh (hernioplasty).
    (b) Group B: this group included cases of complicated umbilical hernia, which were managed by reduction repair in two layers of continuous sutures using polypropylene sutures without mesh (herniorrhaphy).
(5) For every patient the following was recorded:
    (a) The operative time.
    (b) The need for blood and plasma transfusion.
    (c) Oral feeding was started in patients of the first and second groups on first postoperative morning after restoration of bowel movement.
(6) All patients were followed up in the early postoperative period for the following:
    (a) The length of hospital stays (days).
    (b) Hemorrhage.
    (c) Wound infection.
    (d) Deep vein thrombosis/pulmonary embolism.
    (e) Ileus.
    (f) Leakage of fluid (ascetic leak).
    (g) Burst abdomen (partial and complete).
    (h) Postoperative pain.

All patients were followed up monthly for 6 months for recurrence.

Administrative design

The administrative design was as follows:

(1) Approval was obtained from the Surgery Department of Zagazig University.
(2) Approval was obtained from ethics committee of Faculty of Medicine.
(3) Approval was obtained from Institutional Review Board.
(4) Approval was obtained from all patients included in the study.

Statistical analysis

Continuous variables were expressed as the mean±SD and the categorical variables were expressed as a number (percentage). Continuous variables were checked for normality by using Shapiro–Wilk test. Independent Student's *t*-test was used to compare two groups of normally distributed data, whereas Mann–Whitney *U*-test was used for non-normally distributed data. Percentage of categorical variables was compared using χ^2-test or Fisher's exact test when appropriate. All tests were two-sided. *P* values less than 0.05 was considered statistically significant. All data were analyzed using statistical package for the social sciences for windows version 18.0 (SPSS Inc., Chicago, Illinois, USA).

Results

Preoperative characteristics of our patients are included in Table 1. Group A included 29 (54.76%) men and 24 (54.3%) women. Group B included 29 (60.4%) men and 19 (39.6%) women. Most of the patients in both groups are 50–60 years old. The following table shows the basic characteristics for the patients.

Preoperative results

There were statistically significant differences between both groups regarding the presenting complications of the hernia and model for end-stage liver disease score (P=0.021 and <0.001, respectively). There were no statistically significant differences between both groups regarding age, sex, associated comorbidities, Child classification, and the presence of ascites (Table 1).

There were statistically significant differences between both groups regarding type of anesthesia (P=0.004), content of the sac, resection and anastomosis, and type of the drain used (P<0.001) (Table 2).

Postoperative results

There were statistically significant differences between both groups regarding total length of hospital stay (P=0.004), length of ICU stay, and postoperative recurrence of the hernia (P<0.001) (Table 3).

There were no statistically significant differences between both groups regarding postoperative complications such as infection, seroma, hematoma, ascetic leak, and wound dehiscence.

Table 1 Preoperative characteristics of our patients

Basic characteristics	With mesh (*N*=53) [*n* (%)]	Without mesh (*N*=48) [*n* (%)]	*P* value
Sex			
Male	29 (54.7)	29 (60.4)	0.563‡
Female	24 (45.3)	19 (39.6)	
Age (mean±SD) (years)	56.32±9.28	56.60±11.08	0.762•
<50	7 (13.2)	8 (16.7)	0.802‡
50–60	32 (60.4)	26 (54.2)	
>60	14 (26.4)	14 (29.2)	
Comorbidity			
Any	20 (37.7)	24 (50)	0.214‡
Hypertension	17 (32.1)	23 (47.9)	0.104‡
DM	14 (26.4)	17 (35.4)	0.327‡
IHD	13 (24.5)	18 (37.5)	0.158‡
Renal	15 (28.3)	18 (37.5)	0.325‡
Chest infection	18 (34)	18 (37.5)	0.711‡
Pleural effusion	13 (24.5)	18 (37.5)	0.158‡
Child classification			
A	8 (15.1)	2 (4.2)	0.057‡
B	35 (66)	29 (60.4)	
C	10 (18.9)	17 (35.4)	
MELD score (mean±SD)	13.30±4.44	16.91±6.55	0.021•
Encephalopathy	0 (0)	2 (4.2)	0.223‡
Ascites			
No	6 (11.3)	2 (4.2)	0.021‡
Mild	18 (34)	6 (12.5)	
Moderate	25 (47.2)	36 (75)	
Tense	4 (7.5)	4 (8.3)	
Presentation			
Irreducible	0 (0)	18 (37.5)	<0.001‡
Obstructed	42 (79.2)	1 (2.1)	
Strangulated	1 (1.9)	29 (60.4)	
Ruptured	10 (18.9)	0 (0)	
Multiple air fluid level	10 (18.9)	25 (52.1)	<0.001‡

Quantitative data were expressed as mean±SD; qualitative data were expressed as *n* (%). DM, diabetes mellitus; IHD, ischemic heart disease; MELD, model for end-stage liver disease. ‡χ^2-Test. P<0.05, significant. •Mann Whitney U test.

Discussion

Our study included 101 cirrhotic patients with decompensated liver cell failure who were suffering from complicated umbilical hernia. Our results showed a male predominance among all patients, where group

Table 2 Operative characteristics of our patients

Operative data	With mesh (*N*=53) [*n* (%)]	Without mesh (*N*=48) [*n* (%)]	*P* value‡
Anesthesia			
Local	6 (11.3)	17 (35.4)	0.004
General	47 (88.7)	31 (64.6)	
Content of sac			
Loop	30 (56.6)	27 (56.3)	<0.001
Omentum	23 (43.4)	5 (10.4)	
Ascitic fluid	0 (0)	16 (33.3)	
Finding			
Viable	52 (98.1)	9 (18.8)	<0.001
Gangrenous	1 (1.9)	25 (52.1)	
Ascitic fluid	0 (0)	14 (29.2)	
R&A	1 (1.9)	25 (52.1)	<0.001
Pus	4 (7.5)	3 (6.3)	1.000
Clear ascites	46 (86.8)	45 (93.8)	0.325
Drain			
No drain	7 (13.2)	2 (4.2)	0.001
SC	21 (39.6)	5 (10.4)	
Abd.	10 (18.9)	20 (41.7)	
SC and Abd.	15 (28.3)	21 (43.8)	

Abd, abdominal; R&A, resection & anastomosis; SC, subcutaneous. Quantitative data were expressed as mean±SD; qualitative data were expressed as *n* (%). ‡χ^2-Test. $P<0.05$, significant.

Table 3 Postoperative characteristics of our patients

Outcomes of treatment	With mesh (*N*=53) [*n* (%)]	Without mesh (*N*=48) [*n* (%)]	*P* value
Child classification			
A	7 (13.2)	4 (8.3)	0.106‡
B	36 (67.9)	26 (54.2)	
C	10 (18.9)	18 (37.5)	
MELD score (mean±SD)	13.81±4.07	17.12±5.63	0.031•
Complication			
Infection	4 (7.5)	6 (12.5)	0.512‡
Seroma	14 (26.4)	7 (14.6)	0.143‡
Hematoma	2 (3.8)	0 (0)	0.496‡
Ascites leak	7 (13.2)	5 (10.4)	0.665‡
Wound dehiscence	3 (5.7)	22 (45.8)	<0.001‡
Hematemesis	6 (11.3)	8 (16.7)	0.437‡
Coma	17 (32.1)	12 (25)	0.433‡
Total LOS (mean±SD) (days)	3.98±3.80	5.89±4.15	0.004•
In-ward stay (mean±SD) (days)	3.56±3.46	4.06±3.72	0.424•
In-ICU stay (mean±SD) (days)	1.62±2.82	3.29±3.26	<0.001•
Recurrence	5 (9.4)	24 (50)	<0.001‡
Mortality	0 (0)	12 (25)	<0.001‡

Quantitative data were expressed as mean±SD; qualitative data were expressed as *n* (%). LOS, length of hospital stay; MELD, model for end-stage liver disease. ‡χ^2-test. $P<0.05$, significant. •Mann Whitney U test.

A included 29 (54.76%) men and 24 (54.3%) women and group B included 29 (60.4%) men and 19 (39.6%) women.

Our results are similar to results of Chatzizacharias *et al.* [16], Sarit *et al.* [17], and Ammar [10], who stated that unlike the whole population in general, where female sex and obesity are risk factors for occurrence of umbilical hernia, men with ascites are the most common cirrhotic patients with umbilical hernias.

Our results are similar to those of the study by Yu *et al.* [18] that included 18 patients, in which the incidence of male patients was 61%.

Our results were different from the results of Maniatis and Christin [19], in which they found that female patients comprised 63.9% of all patients. Their results may be explained by the fact that women had more liability to obesity and weak abdominal musculature, which are risk factors for occurrence of umbilical hernia.

In our study, umbilical hernia irreducibility was the most common complication that formed 42.6% of cases, followed by strangulation, 29.7%, but results of the study performed by Ragab and Abdelaal [20] documented that strangulation was the most common complication that had occurred in 50% of their patients followed by irreducibility, which forms 27.3%, such discrepant results may be because of different time of hospital attendance and admission of the patients (early or delayed). Ruptured hernia was the first complication (38.2%) in the study performed by Andraus *et al.* [2], followed by irreducibility (29.4%).

The total number of our patients who had comorbidities form 37.7 and 50% of cases in group A and group B, respectively. The most frequent comorbidities were hypertension, diabetes mellitus, ischemic heart disease, renal impairment, and pleural effusion. On the basis of Child–Turcott's grading, child B formed the majority of cases (66%) in group A and (60.4%) group B. This is nearly similar to the result obtained by Ammar [10]. Sonography has been shown to be an accurate preoperative technique in adults for confirming hernias evident on clinical examination [21], which coincides with our results as sonography has been done for all cases and is helpful in accurate diagnosis.

The treatment of complicated umbilical hernia in cirrhotic patients remains controversial [22]. Some authors do not recommend urgent surgery in rupture umbilical hernia and suggest daily sterile dressing associated with intravenous antibiotics, correction of

fluid and electrolyte imbalance, correction of coagulopathy, and medical treatment of ascites. In addition, it has been shown that emergency operation, for hernia disruption in ascitic patients, did not appear to enhance survival [23]. On the other hand, other authors advocate rapid surgery, as conservative treatment may be associated with ascites super infection, a complication that carries a high mortality [24].

In our study, we have urgently operated all patients who had ruptured umbilical hernia, with no increase in operative or postoperative mortality. This might be explained by the observation that these patients had stable liver functions as indicated by their stable child class. Moreover, leakage of ascetic fluid acts as a sort of spontaneous paracentesis, thus controlling the amount of ascites and allowing for a better prognosis after surgery.

Strangulation is a life-threatening complication [24]. In this study, emergency surgical repair was performed for all these patients, and emergency operation did not result in an increased operative mortality. In addition 25 (25.7%) patients had resection anastomosis of small bowel. This did not increase the operative mortality or recurrence rate without any evidence of intestinal leak.

Recurrence rates of complicated umbilical hernia in cirrhotic patients have been reported to be as high as 20–30% [15]. In this current study, there was a statistically significant difference between the two groups including the use of mesh that decreased the postoperative recurrence only in 9.4% of cases. The use of mesh was not associated with increased incidence of postoperative infection rate. These results go favorably with those of Belghiti and Durand [25], where recurrence was documented in 12.5% of cases.

De la Pena *et al*. [26] reported the results of the use of mesh in 14 cirrhotic patients with complicated umbilical hernia. They reported no recurrence with very minimal postoperative complications during follow-up period of 32 months [25].

A meta-analysis performed by Aslani and Brown [27] concluded results similar to ours that there was a 10 times decreased recurrence risk in using mesh repair when compared with the use of primary suture repair, and rates of recurrence that were associated with primary tissue repair ranged from 15 to 40%.

Regarding mortality rate in this study, it was 11.9% of cases; this coincides with reports from other series such as O'Hara *et al*. [24] (16%), Lemmer *et al.* [3] (11.1%), and Teonetti *et al*. [28] (8.4%). Although this rate is higher than that of those undergoing elective umbilical hernia repair, these results may be explained by the presence of complications in decompensated patients with child class B and C, which constituted the main bulk of patients.

Several authors who performed complicated umbilical herniorrhaphy in cirrhotic patients have reported discrepant results. Mortality ranged from 0% by McAlister [29] to 31% by Belli *et al*. and Baron [30,31].

Conclusion

The development of umbilical hernia in cirrhotic patients with ascites should alert the physician to a potentially serious condition. Complicated umbilical hernia management in those patients is a matter of controversy. Regarding our study, complicated umbilical hernia should be urgently repaired as early as possible with available multidisplinary team formed of surgeon, anesthesiologist, and hepatologist for preoperative preparation, operative management, and postoperative monitoring of the patients. The use of a prosthetic mesh in complicated cases showed an advantage over the conventional techniques. However, the use of mesh needs to be investigated on a larger scale of patients in comparison with the conventional herniorrhaphy, and longer follow-up periods are needed to assess its influence on recurrence rates.

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Conflicts of interest

There are no conflicts of interest.

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