Evaluation of surgical techniques of ventral hernias repair in cirrhotic patients: a cross-sectional study

Ahmed Soliman[a], Essam Eldeen M.O. Mahran[b]

Departments of [a]General Surgery, [b]Tropical Medicine and Gastroenterology, Faculty of Medicine, Assiut University, Assiut, Egypt

Correspondence to Essam Eldeen M.O. Mahran, Department of Tropical Medicine and Gastroenterology, Faculty of Medicine, Assiut University, Assiut, Postal Code: 71511, Egypt. Tel: +20 100 470 090; fax: 0882333808; e-mail: essam1805 @yahoo.com

Received: 8 May 2021
Accepted: 14 June 2021
Published: xx Month 2021

The Egyptian Journal of Surgery 2021, 40:1104–1109

Background
Ventral hernias are defects of ventral aspect of the anterior abdominal wall, which can be congenital or acquired, including epigastric, umbilical, and incisional hernia. Umbilical hernia is present in 20% of cirrhotic patient with ascites. The aim of this work was to assess the outcome of different techniques of closure of ventral hernias in cirrhotic patients.
Patients and methods
This prospective study was conducted during the period from January 2017 till December 2018. It included 148 cirrhotic patients with ventral hernias.
Result
Male patients represented 75% of the cases, and female sex 25%. Child A represented 34%, Child B 7%, and Child C 59%. Overall, 90% of cases underwent elective repair, whereas 10% of the patients had urgent repair. Onlay repair was done in 15.6%, retromuscular repair in 29.7%, intraperitoneal onlay mesh sublay repair in 21%, laparoscopic repair in 6%, and retromuscular repair with posterior component separation in 27.7%. Complications were hematoma (4.7%), bleeding (0.7%), wound infection (1.3%), skin erosions by mesh (0.7%), true recurrence (6%), and false recurrence (3.3%).
Conclusion
Surgical intervention in cirrhotic patient with ventral hernia should be done either elective or emergency, especially after control of ascites. Complications in laparoscopic hernia repair are less than those in open repair and in those with controlled ascites and Child A.

Keywords:
liver cirrhosis, ventral hernias, ventral herniorrhaphy

Egyptian J Surgery 40:1104–1109

1110-1121

All authors made substantial contributions to the conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agreed to be accountable for all aspects of the work.

Introduction

Ventral hernias are defects of the anterior abdominal wall, which can be congenital or acquired, including epigastric, umbilical, and incisional hernia. Incisional ventral hernia is a frequent complication of laparotomy that occurs in up to 11% of surgical abdominal wounds [1].

Umbilical hernia represents a common surgical problem in cirrhotic patients with ascites with 20% incidence [2]. Factors that play a role in occurrence of umbilical hernia in cirrhotic patients with ascites are chronic increased intra-abdominal pressure, recanalization of the left umbilical vein, muscle wasting, and fascial weakening from nutritional deficiencies [3,4].

Most of the interventions for ventral hernia repair in cirrhotic patients with ascites are done in the emergency setting owing to the concept of high perioperative morbidity and mortality rates in those patients. However, this strategy leads to a high risk of life-threatening complications such as incarceration and skin rupture [5,6].

Effective treatments of ascites are essential for ventral hernia repair in cirrhotic patients [7,8], which also reduces complications, such as wound infection, evisceration, ascites drainage from the wound, and peritonitis [9]. Sodium restriction, diuretics, and

paracentesis should be the first step in the management. Umbilical hernia repair is indicated in whom medical treatment is effective in controlling the ascites [9].

The mortality rate ranges from 60 to 80% following conservative management of ruptured umbilical hernia and 6–20% after urgent herniorrhaphy. Therefore, complicated umbilical hernia in those patients should be corrected urgently [2,10]. Hernia repair with mesh versus suture repair reduces hernia recurrence rate but increases the risk of some complications, including infection, seroma, mesh erosion, intestinal adhesion, obstruction, and fistula [11,12].

The techniques of mesh placement include onlay, inlay, sublay, and underlay [11,12]. In the onlay repair, the mesh is sutured on the anterior rectus sheath, after dissection of the subcutaneous tissue and closing of the fascia. In the inlay technique, the mesh is placed in the hernia defect and sutured circumferentially to the edges of the fascia. In the sublay procedure, the mesh is inserted in the preperitoneal space or retro-rectus. In the underlay procedure, the mesh is placed intraperitoneally and fixed to the abdominal wall, usually with tackers [11]. The goal of this study was to evaluate the surgical techniques used in ventral herniorrhaphy in patients with liver cirrhosis.

Patients and methods

It included 148 cirrhotic patients with ventral hernias. Liver cirrhosis and ascites were diagnosed by clinical, laboratory, and ultrasonographic findings. Ventral hernias were also diagnosed by physical examination and ultrasound.

After acceptance by the Local Ethics Committee, all patients underwent elective or emergent ventral hernia repair following written informed consents taken from them. The emergency surgical hernia repair in those cirrhotic patients was done within 12 h after the diagnosis of ruptured hernia, incarceration, or skin necrosis and ulceration.

Elective hernia correction was done after good perioperative care, as the result of such operation depends on how much you prepare your patient from avoiding postoperative complications, which affects directly the morbidity and mortality rate. This includes several factors, such as good nutrition; correction of hypoalbuminemia; supplementation by trace elements and vitamins needed; proper management of ascites and coagulopathy during the preoperative period, if indicated, using one or several from the following therapeutic options: diuretics (spironolactone and/or furosemide), nutritional support, intravenous albumin to increase patients' serum albumin to greater than 3 g/l, and correction of coagulation disorders with fresh frozen plasma and cryoprecipitate; detection and management of low-grade hepatic encephalopathy; fluids and electrolyte should monitored closely and corrected as needed; and adjustment of renal function.

Administration of intravenous third-generation cephalosporins (cefotaxime sodium) (2 g) was done 1 h before the surgery. The antibiotics were continued according to the operative sequelae. The excluded patients included those with ascites owing to other causes other than cirrhosis.

Surgical techniques

Local onlay repair

It was used in some cases when the patient was cooperative and the posterior rectus sheath was weak and could not hold suture. Repair of the defect and fixation of the mesh above the anterior rectus sheath (used in early cases of the study) were done.

Local retromuscular repair

After injection of local anesthetic into the skin and neck of the sac, incision was done, and then infiltration at peritoneum underneath the rectus muscle followed by dissection of the peritoneum. Posterior rectus sheath out of the rectus muscle and then closure of posterior rectus sheath at the midline were done. Then fixation of the mesh was done throughout the anterior abdominal wall passing the rectus muscle, followed by closure of the defect, insertion of a drain, and then closure of the wound.

Local repair using intraperitoneal onlay mesh sublay technique under monitored anesthesia care

Under local anesthesia and after incision and reduction of the content, insertion of the intraperitoneal onlay mesh meshes was done, followed by closure of the defect after fixation of the mesh to the peritoneal aspect of the anterior abdominal wall and through the anterior abdominal wall passing the rectus muscle.

Laparoscopic hernia repair

It was used in selected patients (Child A) under general anesthesia where intraperitoneal mesh placement was done after closure of the defect. Fixation was done

using the three-port technique, and then closure of the ports at the end of the procedure.

Local retromuscular repair with posterior component separation under monitored anesthesia care in case of multiple hernia or associated with groin hernia

This was done using the same technique as retromuscular technique but with a widened incision and dissection up to xiphisternum and anterior superior iliac spine. Fixation of the mesh was done through the anterior abdominal wall passing through the rectus muscle.

Intraoperative complications were bleeding in one case in retromuscular repair with posterior component separation technique.

Postoperative mortality was considered up to 30 days after surgery.

We use the STROBE (strengthening the reporting of observational studies in epidemiology) cross-sectional reporting guidelines [13], and the work has been in line with the STROCSS (strengthening the reporting of cohort studies in surgery) criteria [14].

Results

The following data were collected for all patients: age, se, Child–Pugh–Turcotte classification (to evaluate liver disease severity), BMI, circumstance of operation, complications before surgery (skin rupture, incarceration, etc.), and duration of hospital stay (Table 1).

Table 1 Characteristics of the studied patient

Characteristics	*N*=148
Age (mean±SD) (years)	58.4±10.8
Sex [*n* (%)]	
Male	111 (75)
Female	37 (25)
Child–Pugh classification [*n* (%)]	
Child A	50 (34)
Child B	10 (7)
Child C	88 (59)
BMI (kg/m^2) (Mean±SD)	23.3±3.1 (18.1–32.0)
Operation [*n* (%)]	
Elective	133 (90)
Emergency	15 (10)
Cause of emergency [*n* (%)]	
Strangulation	10 (7)
Rupture	5 (3)
Duration of hospital stay (range)	F 2 h up to 2 days

Table 2 compares the different techniques used in ventral hernia repair regarding the number of patients, hernia type, Child–Pugh classification, complication, mortality, and recurrence.

True recurrence was regarding as recurrence of the hernia after repair, and false recurrence was regarded as missed defect during repair.

Postoperative complications were as follows: hematoma in seven cases (4.7%), bleeding in two cases (1.35%), wound infection in two cases (1.35%), one case skin erosion by mesh (0.67%), true recurrence in nine cases (6%), and false recurrence in five cases (3.4%).

Discussion

Ventral hernias are common sequelae in cirrhotic patients with ascites. Table 3 compared our results with similar studies regarding the number of patients, type of operation, technique used, complications, and follow-up period.

Our result matched with a meta-analysis evaluation of McKay *et al*. [10] regarding hernia recurrence in cirrhotic ascetic controlled patients and without

Table 2 Data of different techniques used in ventral hernia repair

	Number	Hernia type and Child classification	Complications		Mortality	Recurrence
			Intraoperative	Postoperative		
Local retromuscular hernia repair	44 cases (6 emergency and 38 elective)	Single small umbilical hernia, Child C	No	3 cases hematoma	No	3 case true recurrence
				1 case bleeding		4 cases false recurrence
Local onlay repair	23 cases (7 emergency and 16 elective)	Single small umbilical hernia, Child C	No	1 case wound infection	No	2 cases of true recurrence
				2 cases hematoma		1 case of false recurrence
				1 case skin erosion by mesh		
Local hernia repair with IPOM sublay technique	31 cases (2 emergency and 29 elective).	Single small umbilical hernia (defect less than 2 cm), Child B and C	No	2 cases hematoma	No	1 case true recurrence
				Mild intraperitoneal bleeding (conservative)		
Laparoscopic hernia repair	9 cases (all elective).	Medium sized hernia, Child A	No	No	No	1 case true recurrence
Posterior component deposition with retromuscular technique.	41 cases (all elective)	Recurrent multiple, Child A	Bleeding	1 case wound infection	No	2 cases true recurrence

IPOM, intraperitoneal onlay mesh.

Table 3 Comparison of previous studies of ventral hernia repair in cirrhotic patients and our study

References	Number of patients	Type of operation	Technique	Complication	Follow-up
Licari *et al.* [15]	27	Elective (17 cases)	Mesh repair technique with inlay technique	Death: 5 cases (18.5%)	6 months
		Emergency (10 cases)		Recurrence: 3 cases (11%)	
				Seroma: 3 cases (11%)	
Salamone *et al.* [16]	117	Elective (76 cases)	Direct suture repair (41 patients)	Death: 27 cases (23%)	12 months
		Emergency (41 cases)	Mesh repair technique with sublay technique (76 patients)	Recurrence: 2 cases (1.7%)	
El-shoura *et al.* [17]	102	Elective (57 cases)	Suture repair (57 patients)	Death: 4 cases (3.9%)	6 months
		Emergency (45 cases)	Mesh repair technique with sublay technique (45 patients)	Leakage: 6 cases (5.8%)	
				Surgical site infection: 10 cases (9.8%)	
				Seroma: 11 cases (10.7%)	
				Encephalopathy: 14 cases (13.7%)	
				Variceal bleeding 4 cases (3.9%)	
				Peritonitis: 1 case (0.9%)	
				Recurrence: 10 cases (9.8%)	
Yousef *et al.* [18]	60	Elective (all cases)	Laparoscopic repair without defect closure before mesh fixation (30 cases)	Recurrence: 5 cases (8.3%)	24 months
				Ileus: 3 cases (5%)	
			Laparoscopic repair with defect closure before mesh fixation (30 cases)	Seroma: 22 cases (36.6%)	
				Wound infection: 2 cases (3.3%)	
Petro *et al.* [19]	253	Elective (186 cases)	Open surgery: 230 cases (91%)	Wound dehiscence: 16 cases (6.3%)	3 months
		Emergency (67 cases)	Laparoscopic: 18 cases (7%)	Bacterial peritonitis: 12 case (4.7%)	
			Laparoscopic to open: 5 cases (2%)	Decompensated liver failure: 24 cases (9.5%)	
			Mesh utilization: 118 cases (46.6%)	Reoperation: 8 cases (3.1%)	
			Onlay techniques: 50 cases (42.3%)	Mortality: 14 cases (5.5%)	
			Inlay technique: 4 cases (3.4%)		
			Sublay technique: 50 cases (42.3%)		
			Intraperitoneal technique: 14 cases (12%)		
This study	148	Elective (133 cases)	Local retromuscular hernia repair (44 cases)	Hematoma: 7 cases (4.7%)	12 months
		Emergency (15 cases)	Local onlay repair (23 cases)	Bleeding: 2 (1.35%)	
			Local hernia repair with IPOM sublay technique (31 cases)	Wound infection: 2 case (1.35%)	
			Laparoscopic hernia repair (9 cases)	Skin erosion: 1 case (0.7%)	
			Posterior component deposition with retromuscular technique (41 cases)	True recurrence: 9 cases (6%)	
				False recurrence: 5 cases (3.4%)	

control. The recurrence rate was 45% (22 of 49 patients) in the ascites uncontrolled group and 4% (2 of 47 patients) in the controlled group, which means that uncontrolled ascites strongly correlates with umbilical hernia recurrence in cirrhotic patients.

Moreover, our results matched with Amar, 2010, who in a randomized study found that hernia recurrence rate was lower in the group in which polypropylene mesh was used compared with the group without mesh, in which the hernia correction was performed by conventional fascial suture (2.7 vs. 14.2%). However, the rate of wound complications, such as seroma, hematoma, wound and mesh infection, was higher following umbilical hernia repair with mesh [20].

Conclusion

(1) All cirrhotic patients with hernia should be managed either elective or emergency.
(2) The choice of surgical technique for ventral hernia repair in cirrhotic patients is determined according to general condition of the patient; degree of hepatic derangement; size, type, and number of ventral hernias; and suitable anesthesia.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

References

1 Mudge M, Hughes LE. Incisional hernia: a 10 year prospective study of incidence and attitudes. Br J Surg 1985; 72:70–71.

2 Chatzizacharias NA, Bradley JA, Harper S, Butler A, Jah N, Huguet E, *et al.* Successful surgical management of ruptured umbilical hernias in cirrhotic patients. World J Gastroenterol 2015; 21:3109–3113.

3 Fitz JG. Hepaticencephalopathy, hepatopulmonary syndromes, hepatorenal syndrome, coagulopathy, and endocrine complication of liver disease. In: Feldman M, Freidman LS, Sleisenger MH, editors. Sleisenger and Fordtran's Gastrointestinal and Liver Disease. 7th ed. Philadelphia, PA: Elsevier 2002. pp. 1543–1558.

4 Shlomovitz E, Quan D, Etemad-Rezai R, McAliste VC. Association of recanalization of the left umbilical vein with umbilical hernia in patients with liver disease. Liver Transpl 2005; 11:1298–1299.

5 Gray SH, Vick CC, Graham LA, Finan KR, Neumayer LA, Hawn MT. Umbilical herniorrhapy in cirrhosis: improved outcomes with elective repair. J Gastrointest Surg 2008; 12:675–681.

6 Ginsburg BY, Sharma AN. Spontaneous rupture of an umbilical hernia with evisceration. J Emerg Med 2006; 30:155–157.

7 Carbonell AM, Wolfe LG, DeMaria EJ. Poor outcomes in cirrhosis-associated hernia repair: a nationwide cohort study of 32,033 patients. Hernia 2005; 9:353–357.

8 Marsman HA, Heisterkamp J, Halm JA, Tilanus HW, Metselaar HJ, Kazemier G. Management in patients with liver cirrhosis and an umbilical hernia. Surgery 2008; 142:372–375.

9 Belghiti J, Durand F. Abdominal wall hernias in the setting of cirrhosis. Semin Liver Dis 1997; 17:219–226.

10 McKay A, Dixon E, Bathe O, Sutherland F. Umbilical hernia repair in the presence of cirrhosis and ascites: results of a survey and review of the literature. Hernia 2009; 13:461–468.

11 Holihan JL, Nguyen DH, Nguyen MT, Mo J, Kao LS, Liang MK. Mesh location in open ventral hernia repair: a systematic review and network meta-analysis. World J Surg 2016; 40:89–99.

12 Vorst AL, Kaoutzanis C, Carbonell AM, Franz MG. Evolution and advances in laparoscopic ventral and incisional hernia repair. World J Gastrointest Surg 2015; 7:293–305.

13 von Elm E, Altman DG, Egger M, Pocock SJ, Gotzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines for Reporting Observational Studies. J Clin Epidemiol 2008; 61:344–349.

14 Agha R, Abdall-Razak A, Crossley E, Dowlut N, Iosifidis C, Mathew G. STROCSS 2019 Guideline: strengthening the reporting of cohort studies in surgery. Int J Surg 2019; 72:156–165.

15 Licari L, Salamone G, Ciolino G, Campanella S, Parinisi Z, Sabatino C, *et al.* The abdominal wall incisional hernia repair in cirrhotic patients. G Chir 2018; 39:20–23.

16 Salamone G, Licari L, Guercio G, Campanella S, Falco N, Scerrino G, *et al.* The abdominal wall hernia in cirrhotic patients: a historical challenge. World J Emerg Surg 2018; 13:35.

17 El-shoura A, Elbedewy A. Surgical repair of umbilical hernia in cirrhotic patients with ascites: is it safe? Egypt J Surg 2019; 38:52–57.

18 Yousef M, Mohamed M, Gaber A, Ahmed M, Husein H. Laparoscopic ventral hernia repair: tow centre experience prospective comparative study: Open Access Library Journal. 2018; 5:e4871.

19 Petro C, Haskins I, Perez A, Tastaldi L, Strong A, Ilie R, *et al.* Hernia repair in patients with chronic liver disease – a 15-year single-center experience. Am J Surg 2019; 217:59–65.

20 Ammar SA. Management of complicated umbilical hernias in cirrhotic patients using permanent mesh: randomized clinical trial. Hernia 2010; 14:35–38.