

Incarceration of umbilical hernia: a rare complication of large volume paracentesis

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ABSTRACT

We present two cases of umbilical hernia incarceration following large volume paracentesis (LVP) in patients with cirrhotic ascites. Both patients became symptomatic within 48 hours after the LVP. Although being rare, given the significantly higher mortality rate of cirrhotic patients undergoing emergent herniorrhaphy, this complication of LVP is potentially serious. Therefore, it is recommended that patients be examined closely for the presence of umbilical hernias before removal of ascitic fluid and an attempt should be made for external reduction of easily reducible hernias, if a hernia is present.

CASE REPORT

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CASE 1: A 65-year-old man one year after orthotopic liver transplant for hepatitis C cirrhosis and Model for End-Stage Liver Disease (MELD) score of 6 presented with tense ascites. He also had asymptomatic right inguinal, right flank and umbilical hernias (Fig 1). The patient had multiple prior paracenteses and had re-accumulated fluid in his abdomen. In view of persistent intractable ascites, the patient underwent transjugular intrahepatic portosystemic shunt (TIPS) placement and concomitant ultrasound-guided drainage of 8L of abdominal fluid using 5 French Yueh needle and vacuum container accompanied by intravenous administration of 50 grams of albumin. Within 24 hours after the procedure, the patient began to complain of severe periumbilical pain accompanied by nausea and vomiting. His physical examination showed a tender irreducible umbilical hernia. He underwent surgical exploration and anatomical repair of the incarcerated umbilical hernia with an uneventful postoperative course. No bowel resection was performed, as the incarcerated bowel loop was viable. Over two years of follow up, the

patient had three elective surgeries with mesh placement for recurrent umbilical hernia.

CASE 2: A 39-year-old man with decompensated liver cirrhosis due to autoimmune hepatitis, MELD score of 11 and prior history of esophageal variceal bleeding presented with refractory ascites. He also had an asymptomatic reducible umbilical hernia. The patient underwent an ultrasound guided large volume paracentesis of approximately 10 L using a 5 French Yueh needle placed in the right lower abdominal quadrant and vacuum container accompanied by subsequent uneventful placement of a TIPS catheter. He was given 50 grams of intravenous albumin during the paracentesis. Over the next 48 hours after the procedure, he did not have a bowel movement or passage of gas and developed abdominal pain and distension. Physical examination demonstrated a tender irreducible umbilical hernia. The patient underwent urgent laparotomy which showed a strangulated umbilical hernia (Fig 2). A 20 cm segment of ischemic small bowel was resected, an end-to-end anastomosis was performed, and the patient improved postoperatively.

DISCUSSION

Etiology & Demographics

Cirrhotic patients who do not respond to initial medical treatments for ascites (salt and fluid restriction, diuretics), or who respond at first but subsequently lose their response, will require more invasive treatment such as serial therapeutic paracentesis, TIPS creation or shunt surgery. Large volume paracentesis (LVP), defined as removal of more than 5 L of ascitic fluid, is an effective therapy for patients with tense ascites [1].

Unlike large volume thoracentesis which is typically limited to 1.0 to 1.5 L due to chest discomfort and the risk for re-expansion pulmonary edema, LVP is a safe and effective treatment to relieve patients with tense or refractory ascites. LVP is also done commonly prior to TIPS placement in patients with massive ascites to decrease the radiation exposure to the patient and staff by decreasing patient's size, to facilitate cannulation of the hepatic vein and puncture of the portal vein, and to facilitate management of the respiratory function, especially in those that are done under general anesthesia [2].

Patients with ascites secondary to cirrhosis have a 20-24% risk of developing umbilical herniation [3, 4]. This increased risk is due to the elevated intra-abdominal pressure which thrusts the peritoneum forward through the umbilical ring. Ventral abdominal muscle wasting resulting from protein-calorie malnutrition and sarcopenia also contributes to the increase incidence of umbilical hernia in these patients [5, 6]. As explained by Tan and Chang, the fascial defect in the umbilical hernia remains widely patent as long as the abdomen is largely distended with ascitic fluid. Decompression of the ascitic fluid during LVP, however, decreases the tension and diameter of the hernia ring which may lead to trapping of hernia sac contents [5]. Furthermore, fixed adhesion of the hernia sac contents to the sac inner wall is responsible for difficult reduction of the hernia and later for its strangulation when the hernia ring diameter decreases during LVP. Few similar case reports of umbilical hernia incarceration have been reported following LVP [5, 7-10]. Incarceration of the umbilical hernia has been also reported to occur after medical therapy of ascites, and following transjugular-intrahepatic portosystemic and peritoneovenous shunt placement [4, 9, 11, 12].

Clinical & Imaging Findings

Physical examination of the patients before paracentesis often shows an asymptomatic reducible umbilical hernia. On radiographs, the hernia sac may be visualized as a density overlying the umbilical region. Computed tomography (CT) examination best shows the hernia, as a widened umbilical ring through which the abdominal structures are protruded. It may also contain ascitic fluid. If incarceration occurs after LVP, patients will complain of abdominal pain and distension, and demonstrate signs of bowel obstruction and eventually bowel ischemia. On physical examination, hernia sac will become irreducible, tender and inflamed. Hernia incarceration on CT may show proximal bowel loop dilatation from bowel obstruction, and signs of bowel strangulation at later stages

which include mesenteric fat stranding, bowel wall thickening, pneumatosis and engorged mesenteric vessels.

In all cases described in the literature [5, 7-10], hernia incarceration developed within few days after LVP. This is in contrast to those incarcerations seen after TIPS placement without LVP which occurred several weeks to months after LVP [4, 11]. In our cases, both patients developed hernia incarceration within two days following large volume paracentesis. Therefore, it is unlikely that the TIPS had any causative relation to the hernia incarceration given the rapid time course in our two patients.

Treatment & Prognosis

Similar to general population, the treatment for non-reducible incarcerated hernia following LVP is surgical repair. However, patients with chronic liver disease who require surgery represent a significant clinical challenge to surgeons. Specific estimates of mortality rates in patients with ascites undergoing umbilical hernia repair range from 0% to 30% [13]. These estimates correlate well with patient's MELD score, platelet and leukocyte counts and albumin level [14]. The mortality rates are even higher in urgent surgeries, and therefore, it is recommended that patients be examined closely for the presence of umbilical hernias before removal of ascitic fluid. If a hernia is present, the physician should be aware of this complication and an attempt should be made for external reduction of easily reducible hernias. Close follow up to assess for symptoms of a complicated hernia sac should be done post LVP.

Differential Diagnosis

Serious complications from abdominal paracentesis are uncommon. Known complications of paracentesis, however, include ascitic fluid leak from puncture site (5%), bleeding (0 - 0.97%), bowel perforation (0.6%) and infection (0.58 - 0.63%) [1, 15].

Ascitic fluid leak, the most common complication of paracentesis, can be prevented by performing a Z-track puncture using a small-bore needle and creation of a small skin incision. If a leak occurs, it is typically managed by placing an ostomy bag over the leak site and continued diuretic therapy. Placement of gauze dressings over the site usually leads to rapid soaking of the dressings and maceration of the skin. Occasionally, a repeat therapeutic paracentesis using proper technique is needed, if the leak is refractory to diuretic therapy [1, 15].

Hemorrhage from a vessel that is impaled by the needle can be managed by an external figure-of-eight suture surrounding the needle entry site. Rarely, a laparotomy is required to control the bleeding. Infection following paracentesis is rare unless the bowel is entered by the paracentesis needle. Bowel perforation by the paracentesis needle is often well tolerated and does not lead to clinical peritonitis [1, 15]. Post paracentesis circulatory dysfunction (PPCD) is a well know complication of LVP which may occur in up to 80% of patients if intravenous albumin is not administered [16]. With appropriate treatment with albumin infusion, the incidence of PPCD decreases to 14-20% [17].

TEACHING POINT

Incarceration of the umbilical hernia is a rare but potentially serious complication of large volume paracentesis, and therefore, it is recommended that patients be examined closely for the presence of umbilical hernias before removal of ascitic fluid. If a hernia is present, the physician should be aware of this complication and an attempt should be made for external reduction of easily reducible hernias. Close follow up to assess for symptoms of a complicated hernia sac should be done post LVP. Elective surgical repair of the hernia is also recommended when optimal control of ascites is achieved.

REFERENCES

1. Runyon BA. Diagnostic and therapeutic abdominal paracentesis. UpToDate [online]. 2014; Available at: <http://www.uptodate.com/contents/diagnostic-and-therapeutic-abdominal-paracentesis>. Accessed July 26, 2015.
2. Novelli PM. Transjugular Intrahepatic Portosystemic Shunt - Radiology. Emedicine [online] 2014; Available at: <http://emedicine.medscape.com/article/420343-overview>. Accessed July 26, 2015.
3. Lemmer JH, Strodel WE, Eckhauser FE. Umbilical hernia incarceration: a complication of medical therapy of ascites. *Am J Gastroenterol* 1983; 78(5):295-6. PMID: 6846308
4. Trotter JF, Suhocki PV. Incarceration of umbilical hernia following transjugular intrahepatic portosystemic shunt for the treatment of ascites. *Liver Transpl Surg* 1999; 5(3):209-10. PMID: 10226112
5. Tan HK, Chang PE. Acute Abdomen Secondary to Incarcerated Umbilical Hernia after Treatment of Massive Cirrhotic Ascites. *Case Reports Hepatol* 2013; 2013:3. PMID: 25374722
6. Belghiti J, Durand F. Abdominal wall hernias in the setting of cirrhosis. *Semin Liver Dis* 1997; 17(3):219-26. PMID: 9308126
7. Triantos CK, Kehagias I, Nikolopoulou V, Burroughs AK. Incarcerated umbilical hernia after large volume paracentesis for refractory ascites. *J Gastrointest Liver Dis* 2010; 19(3):245. PMID: 20922185
8. Baron HC. Umbilical hernia secondary to cirrhosis of the liver. Complications of surgical correction. *N Engl J Med* 1960; 263:824-8. PMID: 13687191
9. Chu KM, McCaughan GW. Iatrogenic incarceration of umbilical hernia in cirrhotic patients with ascites. *Am J Gastroenterol* 1995; 90(11):2058-9. PMID: 7485027
10. Touze I, Asselah T, Boruchowicz A, Paris JC. Abdominal pain in a cirrhotic patient with ascites. *Postgrad Med J* 1997; 73(865):751-2. PMID: 9519199
11. Smith MT, Rase B, Woods A, et al. Risk of hernia incarceration following transjugular intrahepatic portosystemic shunt placement. *J Vasc Interv Radiol* 2014; 25(1):58-62. PMID: 24269791
12. Ohta K, Shimohira M, Hashizume T, et al. Incarceration of umbilical hernia after radiological insertion of a Denver peritoneovenous shunt. *Jpn J Radiol* 2013; 31(3):208-10. PMID: 23196823
13. 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(5):461-8. PMID: 19652907
14. Saleh F, Okrainec A, Cleary SP, Jackson TD. Management of umbilical hernias in patients with ascites: development of a nomogram to predict mortality. *Am J Surg* 2015; 209(2):302-7. PMID: 25066022
15. De Gottardi A, Thevenot T, Spahr L, et al. Risk of complications after abdominal paracentesis in cirrhotic patients: a prospective study. *Clin Gastroenterol Hepatol* 2009; 7(8):906-9. PMID: 19447197
16. Carl DE, Ghosh S, Cheng J, Gehr TW, Stravitz RT, Sanyal A. Post-paracentesis circulatory derangements are related to monocyte activation. *Liver Int* 2014; 34(7):1001-7. PMID: 24373155
17. Alessandria C, Elia C, Mezzabotta L, et al. Prevention of paracentesis-induced circulatory dysfunction in cirrhosis: standard vs half albumin doses. A prospective, randomized, unblinded pilot study. *Dig Liver Dis* 2011; 43(11):881-6. PMID: 21741331

FIGURES

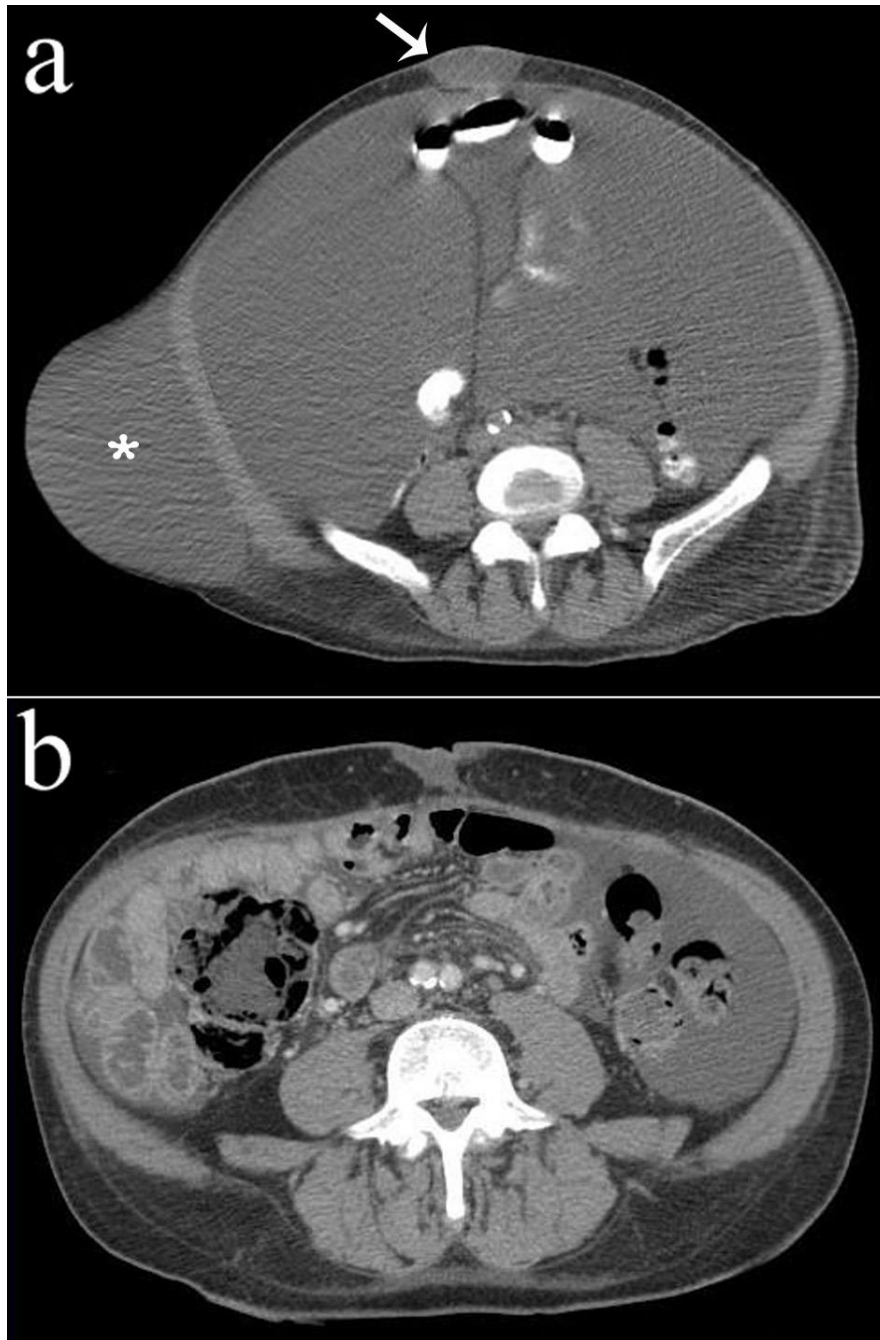


Figure 1: 65-year-old man with tense ascites and asymptomatic umbilical hernia who developed severe periumbilical pain, nausea and vomiting, and a tender irreducible umbilical hernia on physical examination within 24 hours after removal of 8L of ascitic fluid. Surgical exploration showed incarcerated umbilical hernia. FINDINGS: (a) Axial non-contrast CT scan (GE LightSpeed Pro 16, Slice thickness: 5mm, kVP:120, mAS:90) of the abdomen few days before presentation shows fluid-filled umbilical (arrow) and flank (asterisk) hernias with no loops of bowel within the hernia sacs. (b) Axial contrast-enhanced CT scan (GE LightSpeed Pro 16, Slice thickness: 2.5mm, kVP:120, mAS:437, 100mL of Isovue-370, venous phase) of the abdomen few days after the surgery showing repaired hernias.

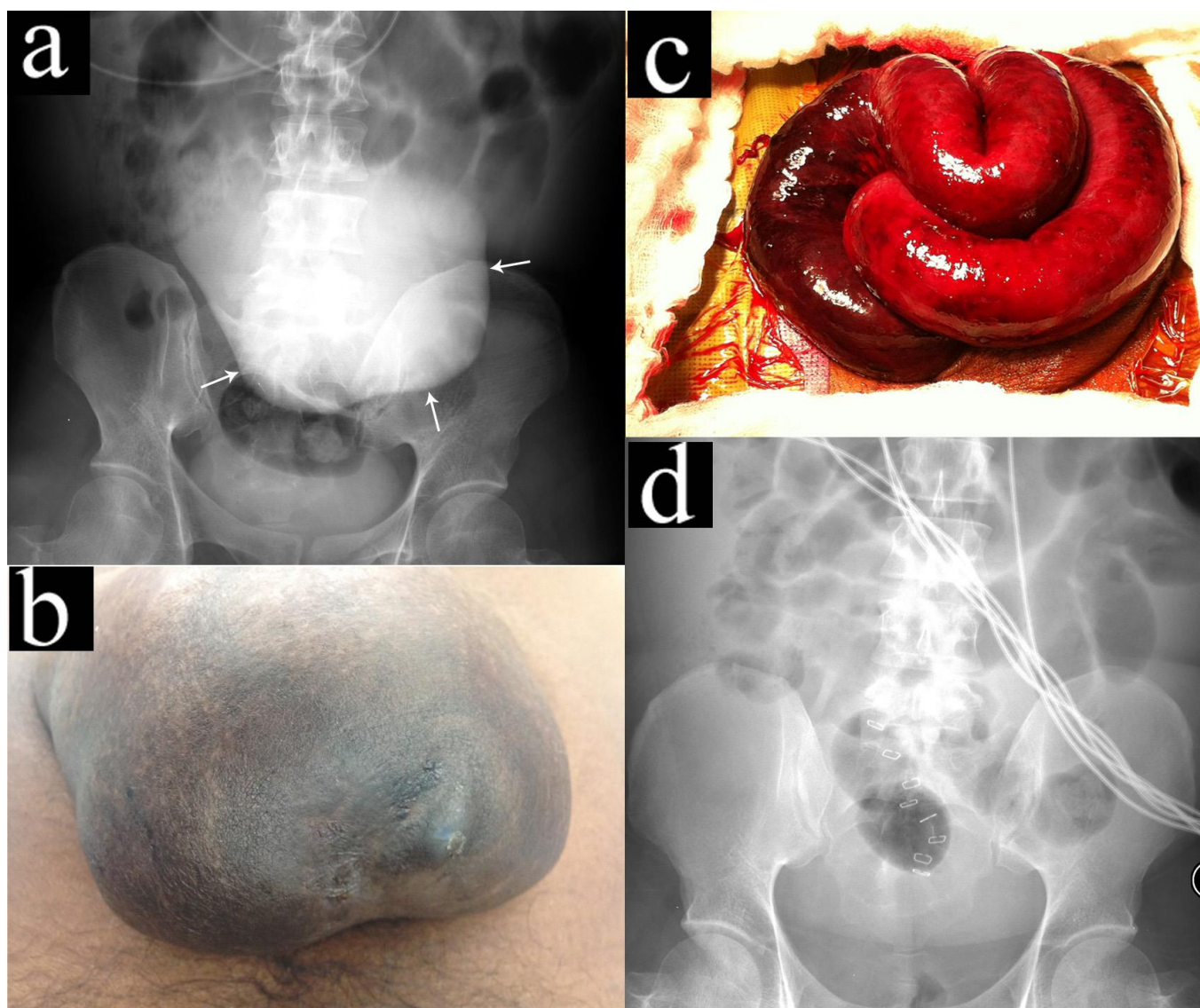


Figure 2: 39-year-old man with asymptomatic reducible umbilical hernia and refractory ascites underwent a large volume paracentesis of 10 L. Within 48 hours after the procedure, he developed abdominal pain and distension and a tender irreducible umbilical hernia. Urgent laparotomy showed a strangulated umbilical hernia. FINDINGS: (a) Radiodense hernia sac (arrows) on preoperative supine radiograph of the abdomen. (b) Preoperative umbilical hernia sac on physical examination. (c) Intraoperative distended bowel loops in hernia sac with dusky discoloration reflecting non-viability. (d) Postoperative supine radiograph of the abdomen, showing resolution of the radiodense hernia sac.

Etiology	Decompression of the ascitic fluid decreases the tension and diameter of the hernia ring which leads to trapping of hernia sac contents
Incidence	Unknown
Sex ratio	No specific sex predilection
Age predilection	No specific age predilection
Risk factors	Abdominal wall muscle wasting Higher volume and rapid paracentesis using large caliber needles and vacuum containers
Treatment	Urgent laparotomy and hernia repair
Prognosis	Up to 30% mortality rate in cirrhotic patients who undergo hernia repair
Clinical findings	Development of abdominal pain, tender and irreducible hernia and signs of bowel obstruction within few days after large volume paracentesis (LVP)
CT Imaging findings	<ul style="list-style-type: none"> • Widened umbilical ring through which the abdominal structures and ascitic fluid are protruded • May show proximal bowel loop dilatation from bowel obstruction • May show signs of bowel strangulation including mesenteric fat stranding, bowel wall thickening, pneumatosis and engorged mesenteric vessels

Table 1: Summary table of hernia incarceration after large volume paracentesis (LVP).

Paracentesis Complications	Incidence	Prevention	Treatment
Leak of ascitic fluid	5%	<ul style="list-style-type: none"> Performing a Z-track puncture Using small-bore needle Creation of small skin incision 	<ul style="list-style-type: none"> Placing an ostomy bag over the leak site Repeat therapeutic paracentesis using proper technique
Severe hemorrhage	0 - 0.97% (higher if renal failure is present)	<ul style="list-style-type: none"> Avoid arterial or venous puncture using ultrasound 	<ul style="list-style-type: none"> Using external figure-of-eight suture surrounding the needle entry site Rarely, laparotomy
Bowel perforation	0.6%	<ul style="list-style-type: none"> Avoid bowel puncture using ultrasound 	<ul style="list-style-type: none"> Generally well tolerated Treatment for peritonitis if symptomatic
Infection	0.58 - 0.63% (rare unless the bowel is punctured)	<ul style="list-style-type: none"> Avoid bowel puncture using ultrasound Sterile technique 	<ul style="list-style-type: none"> Treatment for peritonitis if symptomatic
Post paracentesis circulatory dysfunction following LVP	<ul style="list-style-type: none"> Up to 80% after LVP without albumin administration 14-20% after LVP with albumin infusion 	<ul style="list-style-type: none"> Intravenous albumin infusion Vasoconstrictors 	<ul style="list-style-type: none"> Intravenous albumin infusion Electrolyte correction Vasoconstrictors
Hernia incarceration following LVP	Unknown	<ul style="list-style-type: none"> External reduction of easily reducible hernias Elective surgical repair 	<ul style="list-style-type: none"> Urgent laparotomy and surgical repair
Death associated with paracentesis	0 - 0.39%		

Table 2: Differential table for hernia incarceration after large volume paracentesis (LVP): Paracentesis complications [1, 15-17].

ABBREVIATIONS

CT = Computed tomography
 LVP = Large Volume Paracentesis
 MELD = Model for End-Stage Liver Disease
 PPCD = Post Paracentesis Circulatory Dysfunction
 TIPS = Transjugular Intrahepatic Portosystemic Shunt

KEYWORDS

Large volume paracentesis; Cirrhosis; Umbilical; Hernia; Incarceration

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