

## TECHNICAL ARTICLE

## Laparoscopic division of a portosystemic shunt to treat chronic hepatic encephalopathy

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### Abstract

In the event of liver cirrhosis with severe portal hypertension, voluminous portosystemic shunt may lead to refractory encephalopathy. Obliteration of the shunt has been described as a satisfactory therapeutic solution, and reported procedures are mainly endovascular embolization and surgical shunt ligation through laparotomy. The former procedure is less invasive and seems to be as efficient. Laparoscopy, which is widely recognized to minimize mortality and morbidity in cirrhotic patients undergoing surgery, has never been used for such a procedure. Shunt division can therefore be considered using this modern approach to good effect and reduced morbidity. In support of this view, we report a case of severe chronic encephalopathy cured by laparoscopic surgical division of a large shunt after failure of the percutaneous technique.

**Key Words:** *Portosystemic shunt, Encephalopathy, laparoscopy*

### Introduction

A large portal-systemic shunt may lead to isolated recurrent hepatic encephalopathy in cirrhotic patients [1]. In the rare case of chronic and severe encephalopathy exclusively related to a voluminous portosystemic shunt, shunt obliteration has already been proposed with apparently good results [2–8]. Two main techniques of obliteration have been described: endovascular embolization [3,7,8] and surgical shunt ligation through laparotomy [2,4–6]. The former procedure is less invasive and seems just as efficient. However, laparoscopy is now widely recognized to minimize mortality and morbidity in cirrhotic patients [9,10] and shunt division could therefore be considered in this modern approach.

We report a case of severe chronic encephalopathy cured by laparoscopic surgical division of a large shunt after failure of the percutaneous technique.

### Case report

A 48-year-old man with alcoholic cirrhosis was referred to our hospital in April 2005 for isolated

and recurrent episodes of hepatic encephalopathy. The patient initially presented in 1998 with alcoholic cirrhosis, Child-Pugh score of 11, and variceal bleeding, which was managed endoscopically. After a long period of abstinence, beta-blocker treatment and variceal ligation program, esophagastric endoscopy showed that the esophageal and gastric varices had resolved. However, he developed severe and permanent encephalopathy requiring repeated hospitalization. After an exhaustive assessment, we could assume that the encephalopathy was not related to a metabolic or septic etiology, but suspected it to be related to a large portosystemic shunt. When referred to our department for surgery, the patient had neither jaundice nor hepatic insufficiency (INR <2) and was scored Child-Pugh B. CT scan showed a large shunt formed by recanalization of the umbilical vein through the iliac vein (Figure 1a). The first treatment was endovascular, but the embolization failed due to the very large size of the shunt. The procedure was complicated by migration of the coil into the left inferior pulmonary vein. As such, we decided to proceed with surgical ligation of this large portosystemic shunt using a laparoscopic approach.

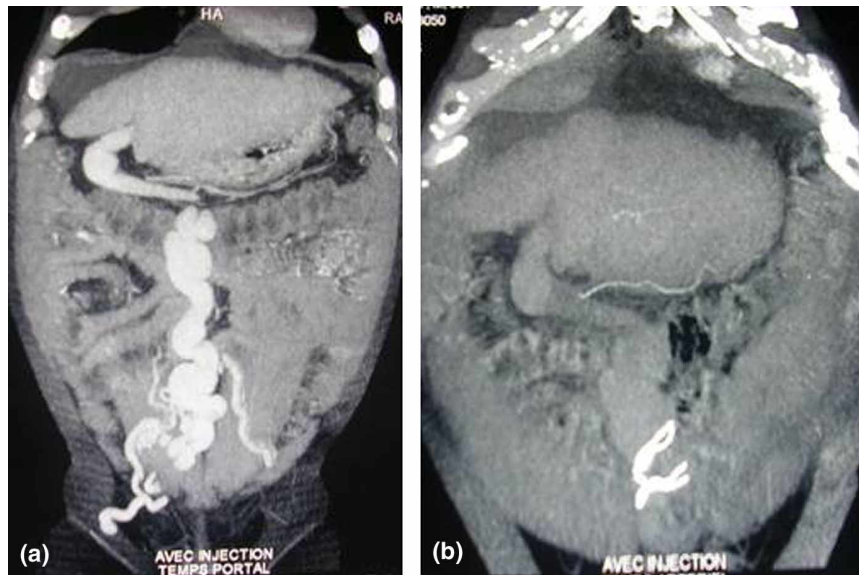


Figure 1. (a) Preoperative CT scan showing the shunt forming by re-permeabilization of the umbilical vein to the iliac vein. (b) Postoperative CT scan showing disconnection of the shunt and disappearance of the latter.

### Technical aspects of the procedure

With the patient in the supine position and the operator standing on his left side, a carbon dioxide pneumoperitoneum (11 mmHg) was created using the open laparoscopy technique in the left flank. This site, which was used to introduce the camera port, was situated 3 to 4 cm laterally on the umbilicus level line to avoid any tangential vision to the shunt. The optical device was a 0° camera angle. Two other instrumental port sites were placed, one in the left hypochondrium the other in the left iliac fossa. These additional ports did not require fascia incision (Versastep plus®; Tyco® Healthcare, Norwalk, Ct., USA). The shunt was easily exposed. Prior to shunt dissection, a Reverdin's needle was used to place two threads (Vicryl® 1) percutaneously on either side of the vein. This maneuver aimed to secure the shunt dissection, allowing an immediate shunt clamping by compression of the vein against the abdominal wall (Figure 2a) in case of uncontrolled bleeding. Shunt dissection was performed using bipolar forceps and scissors, controlled and taped using a braided tape (PTFE, Bard®). Shunt division was performed with a laparoscopic vascular stapling device (EndoGIA® 30, Tyco® Healthcare). After checking that there was no active bleeding, the threads were removed (Figure 2b). The operation time was 32 min. The postoperative course was uneventful. The patient was discharged on postoperative day 5. A postoperative vascular CT-scan reconstruction demonstrated that the shunt was totally disconnected (Figure 1b). After a follow-up of 24 months, the patient is still alive, has no hepatic encephalopathy recurrence or gastrointestinal bleeding, but has developed moderate ascitis which is controlled by medical treatment.

### Discussion

We report a case of laparoscopic surgical division of a large portosystemic shunt performed to cure severe

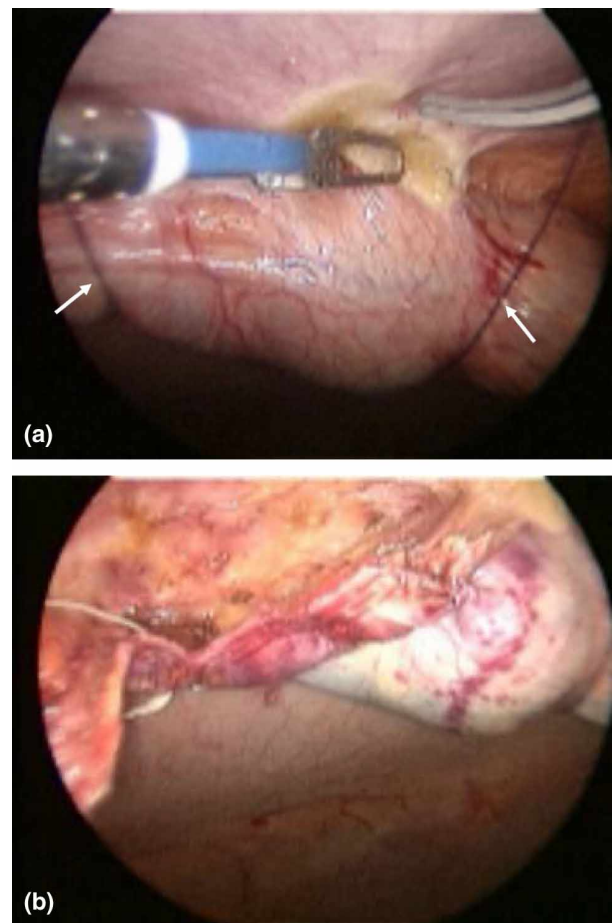


Figure 2. (a) Operative view of the shunt. To avoid uncontrolled bleeding, two cords (white arrows) were introduced percutaneously to secure the shunt dissection. (b) Operative view after disconnection of the shunt using a vascular stapler.

chronic encephalopathy. Given that embolization failed and that a laparoscopic approach has recently been reported to be superior to laparotomy in cirrhotic patients [9,10], we decided to apply the laparoscopic approach to divide the shunt.

The placement of portosystemic shunt ligation to treat chronic encephalopathy remains an issue of debate [11–13]; this treatment is proposed in rigorously selected patients. As surgery in cirrhotic patients is a risky procedure, we believe that an exhaustive biological assessment is mandatory in such cases so that medical etiologies of encephalopathy are ruled out before patients are scheduled for surgery. Retroperitoneal shunts are contraindications for either embolization or laparoscopic division and an exhaustive radiological assessment is mandatory, as well, to evaluate anatomy and distribution of the shunt.

Historically, the first treatment reported to cure severe chronic encephalopathy related to large shunt was surgical ligation of portal-systemic shunts [2]. Although effective, this procedure was associated with significant mortality and morbidity. Even though percutaneous endovascular techniques have been developed to minimize post-procedure complications [3,7,8], several drawbacks have been reported, especially intra-abdominal bleedings and coil migrations. Another way to decrease the mortality rate and to control the risk of bleeding during the procedure may be the laparoscopic approach. This technique allowed us to perform this disconnection safely.

The laparoscopic approach of shunt disconnection offers several advantages over laparotomy or percutaneous embolization. In the case reported here, the shunt was formed by re-permeabilization of the umbilical vein through the iliac vein. As we decided to divide the shunt in the round ligament, which is readily accessible through laparoscopy, we had to introduce the open laparoscopic port site into the left flank. This chosen position for the camera port allowed optimal exposition of the shunt and excellent visual control during the procedure. For the sake of safety during the dissection, two threads (Vicryl® 1) were introduced percutaneously and under direct visualization to allow an immediate clamping of the shunt in the event of accidental bleeding. As opposed to the endovascular procedure, the entire procedure was performed under sight control. Shunt disconnection was performed using a vascular stapler, which may theoretically be more efficient than embolization or ligation. Within a relatively long follow-up, no re-permeabilization occurred and neurological symptoms totally regressed. Although the procedure was well tolerated, division of the shunt meant a slight increase in portal hypertension. The preoperative

control of esophagastric varices avoided any bleeding during the follow-up.

Our case gives further support to a case previously reported by Yamaguchi et al. [14] and confirms that laparoscopic division of the shunt is a simple, sure and reproducible technique which may be considered in therapeutic solutions for severe chronic hepatic encephalopathy related to large portosystemic shunts in selected patients.

## References

- [1] Riggio O, Efrati C, Catalano C, et al. High prevalence of spontaneous portal-systemic shunts in persistent hepatic encephalopathy: a case control study. *Hepatology* 2005;42: 1158–65.
- [2] Hanna SS, Smith RS, Henderson JM, Millikan WJ, Warren WD. Reversal of hepatic encephalopathy after occlusion of total portosystemic shunts. *Am J Surg* 1981;142:285–9.
- [3] Uflacker R, Silva Ade O, d'Albuquerque LA, Piske RL, Mourão GS. Chronic portosystemic encephalopathy: embolization of portosystemic shunts. *Radiology* 1987;165:721–5.
- [4] Kato K, Kondo S, Hirano S, et al. Surgical closure of the gastrosplenic shunt with distal splenorenal shunts operation for portosystemic encephalopathy. *Hepatogastroenterology* 2001; 48:840–1.
- [5] Dagenais MH, Bernard D, Mareleau D, et al. Surgical treatment of severe postshunt encephalopathy. *World J Surg* 1991;15:109–13.
- [6] Moriya K, Kojima H, Matsumura M, et al. Disappearance of hepatic encephalopathy and improvement of liver function after surgical treatment of portal-systemic shunt in a patient with liver cirrhosis. *Hepatogastroenterology* 2003;50:1128–32.
- [7] Chikamori F, Kuniyoshi N, Shibuya S, et al. Transjugular retrograde obliteration for chronic portosystemic encephalopathy. *Abdom Imaging* 2000;25:567–71.
- [8] Sakurabayashi S, Sezai S, Yamamoto Y, Hirano M, et al. Embolization of portal systemic shunts in cirrhotic patients with recurrent hepatic encephalopathy. *Cardiovasc Intervent Radiol* 1997;20:120–4.
- [9] Lesurtel M, Cherqui D, Laurent A, Tayar C, et al. Laparoscopic versus open left lateral hepatic lobectomy: a case control study. *J Am Coll Surg* 2003;196:236–42.
- [10] Cherqui D, Laurent A, Tayar C, et al. Laparoscopic liver resection for peripheral hepatocellular carcinoma in patients with chronic liver disease: mild term results and perspectives. *Ann Surg* 2006;243:499–506.
- [11] Sarfeh J, Rypins EB, Conroy RM, Mason R. Portal H-graft: relationships of shunt diameter, portal flow patterns and encephalopathy. *Ann Surg* 1983;422–6.
- [12] Hermann RE, Henderson JM, Vogt DP, et al. Fifty years of surgery for portal hypertension at the Cleveland Clinic Foundation. Lessons and prospects. *Ann Surg* 1995;221: 459–66.
- [13] Hsieh JS, Wang JY, Huang CJ, et al. Effect of spontaneous portosystemic shunts on hemorrhage from esophagogastric varices. *World J Surg* 2004;28:23–8.
- [14] Yamaguchi S, Kawanaka H, Konishi K, Anegawa G, Yoshida D, Kinjo N, et al. Laparoscopic disconnection of a huge paraumbilical vein shunt for portosystemic encephalopathy. *Surg Laparosc Endosc Percutan Tech* 2007;17:212–4.