

CASE REPORT

Successful surgical decortication for trapped lung in a patient with decompensated cirrhosis

Tripti R. Chopade¹, She-Yan Wong¹, David A. Sass¹, Scott W. Cowan², Nathaniel R. Evans², Jesse M. Civan¹

1. Division of Gastroenterology & Hepatology, Thomas Jefferson University, Philadelphia PA, United States. 2. Division of Cardiothoracic Surgery, Thomas Jefferson University, Philadelphia PA, United States.

Correspondence: Jesse M. Civan. Address: Division of Gastroenterology & Hepatology, Thomas Jefferson University, Philadelphia PA, United States. Email: jessecivan@yahoo.com

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Abstract

Hepatic hydrothorax affects 5% to 10% of patients with cirrhosis. Infection of the pleural fluid may result in “trapped lung” physiology, which may jeopardize a patient’s candidacy for liver transplant, and thus compromise long-term survival. We report a case of a patient with decompensated cirrhosis whose transplant candidacy hinged on management of his trapped lung, and who underwent successful decortication. In this particular case, surgical intervention was necessary not only as a “bridge” to transplant, but also because the patient’s short-term survival was limited by ongoing infection, which was refractory to medical therapy alone. In conclusion, our case illustrates that this high-risk surgery can be successfully carried out in the decompensated cirrhotic, but that further research is needed to ascertain the role for surgical decortication specifically for the purpose of “bridging” a patient to transplant.

1 Introduction

Hepatic hydrothorax is a recognized complication affecting 5% to 10% of patients with cirrhosis. Infection of the pleural effusion can result either spontaneously, or as a complication of drainage catheter placement. “Trapped lung” is a potential complication of such infection, and refers to a form a restrictive lung disease caused by deposition of a rind of fibrous material outside the visceral pleura. Surgical decortication may be necessary to release the affected lung, but this carries a high risk of bleeding and of peri-operative mortality in patients with decompensated cirrhosis. Herein, we report a case in which a patient with decompensated cirrhosis underwent a successful surgical decortication with a goal to both resolve recurrent secondary bacterial empyema and alleviate lung restriction thereby rendering him a suitable liver transplant candidate. Although this patient ultimately expired prior to undergoing liver transplant, his survival was not limited by the aforementioned trapped lung, nor by the corrective surgical intervention.

2 Clinical case

A thirty-five year old male with a history of cirrhosis secondary to chronic viral hepatitis C was transferred to our hospital for further management of a refractory right-sided hepatic hydrothorax. A pleurex catheter had already been placed at the referring hospital five days prior to transfer, to manage the patient’s hydrothorax. At our institution, the patient was treated

with aggressive diuresis. When this was not sufficient to control the high output from his pleurex catheter, the patient underwent transjugular portosystemic shunt (TIPS), which resulted in a decrease of the trans-sinusoidal pressure gradient from 16 mm Hg to 10 mm Hg. The patient tolerated this well, but continued to have high volumes of drainage from the pleurex catheter on the order of 1 to 1.5 liters daily. To confirm that the TIPS was functioning well, an angiogram was performed 12 days after TIPS placement, which demonstrated a trans-sinusoidal pressure gradient of 8 mm Hg. On the basis of his refractory hepatic hydrothorax, and model for end-stage liver disease (MELD) score of 24, the patient began evaluation for liver transplant. However, a sample of the fluid draining from his pleurex grew methicillin-resistant *Staphylococcus aureus*, thus adversely affecting his transplant candidacy. He was treated with intravenous antibiotics, and the pleurex catheter was removed despite the ongoing reaccumulation of fluid. Computed tomography (CT) scan of his chest now demonstrated multifocal pneumonia, persistent multiloculated pleural effusion, and trapped lung (see Figure 1). Our multidisciplinary team felt that even if his infection were to resolve completely, his trapped lung precluded him from safely undergoing a liver transplant. In an attempt to treat his trapped lung, he was treated with tissue plasminogen activator (tPA) infusion via newly placed chest tubes, but his lung did not re-expand. At that time, it was felt that although we could not proceed with liver transplant, that surgical decortication carried prohibitively high risk, and that we would manage the patient medically. He was discharged with his chest tubes in place with plan for a prolonged course of intravenous antibiotics.

However, approximately 2 weeks later the patient was re-admitted with hepatic encephalopathy, and diagnostic thoracentesis now showed infection of the pleural fluid with a new organism, *Escherichia coli*. After further multidisciplinary discussion, it was felt that in addition to the long-term goal of eventually bringing the patient to liver transplant, in order to secure his short-term survival, surgical intervention with decortication would be necessary to allow resolution of the recurrent infections of his pleural fluid. Therefore, he underwent open thoracotomy with decortication. Intraoperatively, the lung was observed to completely re-expand and fill the pleural space after decortication. Estimated blood loss from the surgery was three liters. Repeat cultures from pleural fluid collected at the time of decortication were negative. His post-operative course was complicated by persistent pleural effusion making it difficult to remove his chest tubes. However, repeat CT scan 3 weeks post-operatively showed improved aeration (see Figure 2). Approximately 4 weeks after his decortication, repeat cultures of the pleural fluid grew *Enterococcus faecium*, which was treated with intravenous antibiotics, and resolution of this infection was documented with repeat cultures of the pleural fluid two weeks later. His final chest tube was eventually removed on post-operative day number 56. With resolution of the empyema, and improved aeration of his right lung, he was able to continue his transplant evaluation.

Unfortunately, this patient resumed using illicit drugs including cocaine, which terminated his transplant evaluation. He ultimately died of progressive renal failure approximately 6 months after his initial presentation.

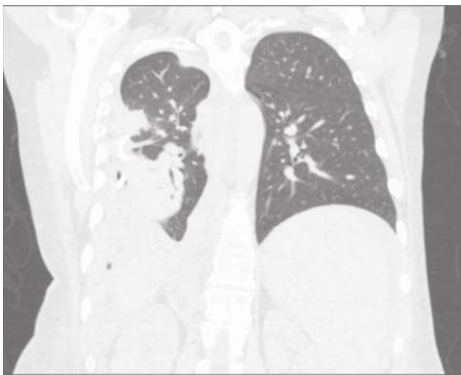


Figure 1. CT chest performed prior to decortication, demonstrating visceral pleural thickening and trapped lung

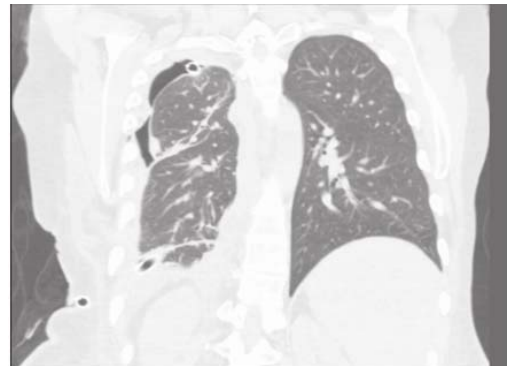


Figure 2. CT chest performed after decortication, demonstrating improved aeration of right lung

3 Discussion

Hepatic hydrothorax is a clinical manifestation of portal hypertension, affecting 5%-10% of cirrhotic patients^[1]. Although most commonly hepatic hydrothorax manifests as a right-sided pleural effusion, it can be left-sided or bilateral in 15%^[2]. The preferred management of hepatic hydrothorax is through dietary sodium restriction, and medical therapy with diuretics^[3]. However, in approximately 25% of cases, these measures will be insufficient^[4]. TIPS has been demonstrated to be effective in controlling hepatic hydrothorax refractory to medical management^[5]. Placement of percutaneous drainage catheters is associated with a high risk of various complications, including secondary bacterial pleuritic/empyema^[6,7] and current practice guidelines published by the American Association for the Study of Liver Diseases (AASLD) consider chest tube placement contra-indicated for the purpose of managing hepatic hydrothorax^[3].

In the case which we present above, our patient had already undergone placement of a drainage catheter, and indeed he did suffer from bacterial pleuritis/empyema. Since our patient also had radiographic evidence of pneumonia, it is impossible to ascertain with certainty whether the drainage catheter served as a conduit for secondary infection of the pleural fluid, or whether in this particular case the pleural fluid may have become infected as a complication of a parapneumonic effusion. Despite this uncertainty, our case still should serve as a cautionary tale, highlighting the danger of placing drainage catheters to manage refractory hepatic hydrothorax, especially in a patient who may be a candidate for TIPS.

Our patient developed trapped lung as a complication of his bacterial pleuritis/empyema. It has been reported that this serious complication may follow chest tube placement in such patients in 29% of cases^[6]. Although surgical decortication is indicated for the treatment of trapped lung^[8], major surgery of any kind, and decortication in particular, carries a high risk of peri-operative complications and death in decompensated cirrhotic patients^[8,9]. Due to the nature of this surgical procedure, in conjunction with the coagulopathy and thrombocytopenia associated with cirrhosis, bleeding in particular is an anticipated complication of paramount concern. Data on outcomes after decortication in cirrhotic patients are limited, but one case series of 4 patients reported 50% mortality^[8], and another case series of 32 patients reported 21% mortality^[10].

In our patient, the indication for surgical decortication was two-fold. First, the patient's long-term survival was limited by his decompensated cirrhosis, with poor prognosis without liver transplantation, and decortication was a necessary step in the path towards transplant. Secondly, and perhaps more importantly, his immediate survival was limited by recurrent infections of his refractory hepatic hydrothorax. Thus, although decortication improved the patient's pulmonary status and dramatically affected his liver transplant candidacy, this high risk intervention was ultimately undertaken as an immediately life-saving measure.

4 Conclusion

Although data on outcomes after surgical decortication of trapped lung in patients with decompensated cirrhosis are limited, this is clearly a high-risk procedure. We report a case illustrative of two points. First, we highlight the dangers of placing percutaneous drainage catheters for the management of refractory hepatic hydrothorax. Second, the case reinforces that although surgical decortication carries very significant risk, it can be undertaken successfully in the correct circumstances and with the required surgical expertise. Given the risks involved, it is vital that decortication be considered very carefully in multidisciplinary format. Further research is needed to determine whether the risks of decortication can be justified solely on the basis of "bridging" a patient with trapped lung to transplant, without other immediate indication for surgical intervention.

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