


CASE REPORT

Liver injury secondary to chest tube placement: a case report of conservative management and review of literature

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Introduction

Chest tube placement is an invasive procedure that is commonly used by different specialty physicians [1]. In the emergency department, the main indication is pneumothorax secondary to thoracic injury [2]. We report a case of hepatic injury secondary to chest tube placement treated with the successful conservative method.

Case Report

We report the case of a 42-year-old man, with no past medical history, who was admitted to an emergency department at a peripheral healthcare center for a penetrating thoracic injury secondary to aggression using a knife. At admission, patient had dyspnea with an open blowing wound localized in the right parasternal side at the fourth intercostal space. After patient conditioning and monitoring, he had a standard chest radio that showed a right pneumothorax. The medical team decided to place a chest tube thoracostomy. Under local anesthesia, a senior emergency doctor put the chest tube in place. Unfortunately, the drain did not bring

Key Clinical Message

Chest tube placement is a routine procedure performed in different medical departments. Liver injury is a very rare complication that can occur but can be life-threatening. Conservative management can be proposed in stable patient. Following guidelines and training physicians should decrease the incidence of such complications.

Keywords

Chest tube, complications, conservative management, liver injury.

air but only massive bleeding. Physicians concluded to a massive hemothorax, but the patient had palpitation with coldness and weakness. The drain was clamped immediately and the patient transfused with two red blood cells unit. After stabilization, he was transferred to our tertiary center for massive hemothorax. The patient arrived with a mild dyspnea, blood pressure was 90/65 mmHg, and pulse was 95/min, saturation after monitoring was at 94% and 98% under oxygen therapy. The examination showed a sutured injury in right parasternal side. The patient had a right thoracic chest tube clamped and placed in the seventh intercostal space (Fig. 1). The patient complained of a discrete sensitivity at palpation of the right hypochondrium. We suspected a liver injury secondary to chest tube placement. Biology showed hemoglobin level at 10.2 g/dL, white blood cells at 20,120/mm³, platelet at 190,000/mm³, CRP = 233.35 mg/L, ASAT = 66 UI/L, ALAT = 132 UI/L, GGT = 177 UI/L, and ALP = 162 UI/L. Abdominal CT scan confirmed the diagnosis of liver trauma secondary to a misplaced thoracostomy tube, with a mild hemoperitoneum localized to the liver area. The drain path in the liver was high avoiding

hilum structure and fortunately avoiding right and middle hepatic vein (Fig. 2). CT scan showed a mild hemothorax that does not need chest drainage after consultation with the thoracic surgeon. Considering the stable hemodynamic situation of the patient, we decided to be conservative and to remove the drain gradually by 2 cm each day (while keeping it clamped) under strict monitoring. At day 4, the drain was totally removed. Control showed hemoglobin level at 8.4 g/dL. The patient was transfused with two red blood cells unit, and control was at 10.6 g/dL. A CT scan control at day 7 showed no hemoperitoneum (Fig. 3), but we could see the path of the drain into the liver without active bleeding and the patient did not report any digestive bleeding and transit was normal. There was a persistence of atelectasis in the right lung, so the patient was transferred in thoracic surgery to manage it.

Discussion

Pleural disease requiring placement of chest tube is frequent and multiple [3]. It can concern traumatic situation [4], malignant effusion [5], or postoperative management [6]. In the emergency department, more

than 50% of patients presenting a thoracic injury require a thoracostomy [7]. Complications can occur during the procedure or during chest tube maintenance with a range from 5% to 10% and may concern lung, heart, intercostal pedicle, diaphragm, spleen, and bowel and the list is not exhaustive [3]. Hepatic injury secondary to chest tube insertion is very rare, and its management is not standardized [8–10]. Liver lesions can very rarely be life-threatening and may require emergency surgery [11]. In our case, the conservative strategy was preferred because of the stable hemodynamic situation of the patient and to avoid invasive surgery as possible. The study of the CT scan with radiologists showed that intrahepatic biliary and portal structures were safe and the right and middle hepatic veins were close but seem to be intact. Some authors reported successful conservative ablation of a chest tube in the liver using embolization technique [9, 10] or simply by removing the drain under close monitoring [8]. Our strategy was to retrieve the drain gradually each day, while keeping it clamped, to ensure progressive parenchymal hemostasis in the released part so the drain plays the role of a piston, which blocks the spread of the hemorrhage if it occurs. The success of a conservative strategy can be controlled immediately by fluoroscopy when embolization is used [9, 10] or by CT scan [8]. Our patient had no further complications after drain removal and control was made using a CT scan. If we resume literature, there are only five published cases of liver injury secondary to thoracic drainage (Table 1) [8–12]. Only one required an open surgery to remove the drain and stop hemorrhage in an unstable patient [11]. Three studies report a conservative management. Two of them used embolization technique by coils to remove the drain [9, 10], and in the other one, authors did not use any particular method because they estimate that the path of the drain was blinded at its end [8]. In the last case, authors did not specify their methodology of drain ablation, but they precise that it was done in the operating room [12]. Such incident raises again the question of teaching physicians, in different specialty (and especially in emergency departments), a safe procedure to put a chest tube and their ability to follow guidelines [13, 14]. A recent survey showed that incident after chest tube placement is not totally reported [15]. Moreover, it showed that it is not only caused by trainees but also by senior doctors [15]. Another study published previously found that there was a flaw in teaching young doctors [16]. Forty-five percent of questioned doctors in this study localized the area of chest tube placement outside the triangle of safety and 73% of doctors with no experience in chest tube placement did too [16].

Liver trauma after chest tube placement is very rare and can be managed conservatively in a stable patient.



Figure 1. Image showing the low position of chest tube.

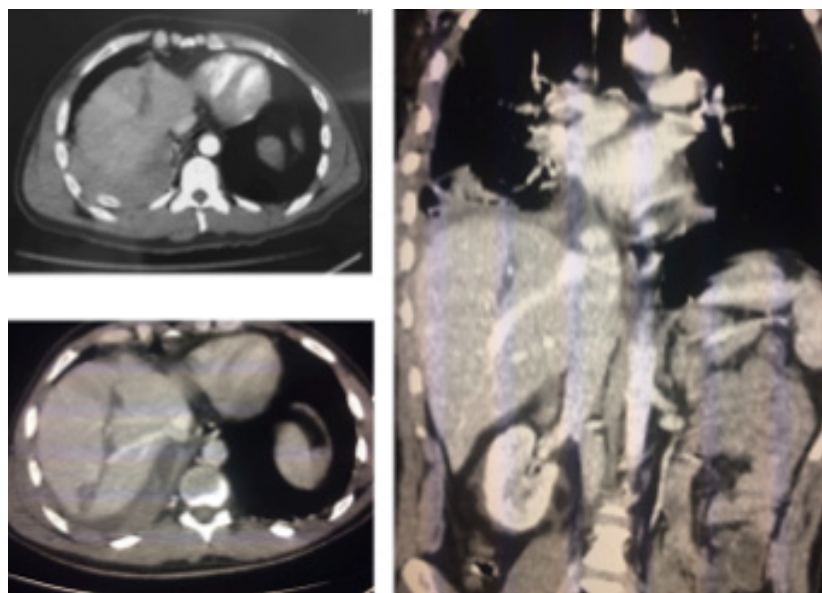


Figure 2. Images of abdominal CT showing the path of the chest tube thru the liver next to hepatic right and middle hepatic vein.

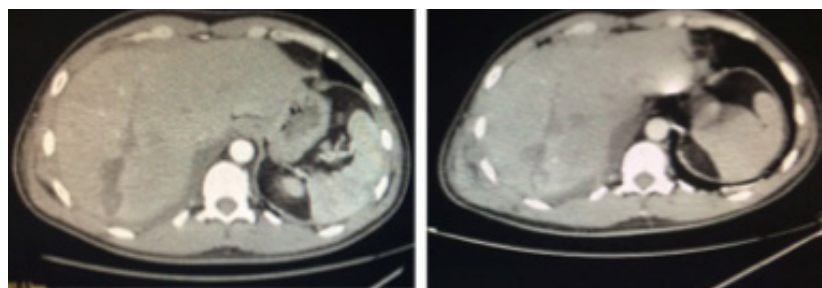


Figure 3. Abdominal CT at day 7 after ablation showing the cicatrization of the liver and resorption of initial perihepatic hemoperitoneum.

Table 1. Table resuming cases of liver injury secondary to chest tube placement reported in literature.

	Age	Gender	Indication of chest tube	Hemodynamic	Treatment
Sommacale et al.	44	M	Pleural effusion (Pneumopathy)	Stable	Conservative
Tait et al.	82	F	Pneumothorax	Stable	Conservative (Embolization: coils)
Hegarty et al.	26	F	Not precise	Stable	Conservative (Embolization: coils)
Bae	72	F	Pleural effusion	Unstable	Surgery
Gorospe et al.	76	F	Pleural effusion (Lung cancer)	Stable	Not precise

M, Male; F, Female.

Teaching physicians safe procedures is the best way to avoid such incident.

IK: revised CT images and interpretation. TEH: revised the manuscript.

Authorship

BS: reviewed the literature, wrote the manuscript, and is healthcare provider. MC: collected data. HM: collected data and revised the English version of the manuscript.

Conflict of Interest

Authors have no conflict of interests or financial support to disclose.

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