

The Selective Ligature of the Hepatic Artery in a Massive Trans Thoracic Hemorrhage

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Abstract

Introduction: The complex thoraco-abdominal trauma is rare but life threatening and very difficult to be managed. It is associated to a high morbidity and mortality. The goal of this study is to describe the diagnostic aspects and the management of the complications associated to this trauma.

Material and Methods: We will report the case of a hepatic pseudo aneurysm in a patient with the thoracic trauma and the rupture of the right diaphragm complicated with massive trans-thoracic hemorrhage.

Case Report: A 44 years old male, the patient was introduced to the ER after being hit by a heavy object. The CT evaluation revealed fractures of the 5-6-7-8-9-10th ribs with hemopneumothorax and central hepatic contusion. The first treatment: drainage of the right pleural space broad spectrum parenteral, antibiotic therapy perfusions and follow up of the patient. The day after the pleural drain has been removed, we noticed biliary effusion coming out from the drainage hole. A new CT evaluation 7 days after the first one confirmed the presence of multilocular fluid collections in the right pleural space, the rupture of the right diaphragm and contusion of the 7-8 hepatic segments. 10 days after trauma was performed the right thoracotomy and both organised hemothorax and biliary empyema was evacuated and the diaphragm was sutured. 16 days after trauma the patient developed hemobilia because of a fissuration of a pseudo aneurysm in the central hepatic biliary way. The treatment for it was the administration of the kher drainage + cholecystectomy. After many episodes of hemorrhage associated to the hepatic pseudo aneurysm and because we could not perform the hepatic artery embolization. The staff decided to perform the ligature of the right branch of the hepatic artery 4 weeks after trauma. The patient left hospital healthy 40 days after trauma.

Conclusion: The thoraco-abdominal complex trauma needs a multidisciplinary follow up. A very well-trained trauma staff and the disponibility of all medical equipments. Beside accurate management this trauma still has a high morbidity and mortality.

Keywords: Ligature; Hepatic Artery; Massive Trans Thoracic Hemorrhage

Introduction

Complex hepatic injuries occurred in approximately 10% to 30% of hepatic traumas, they remain a challenge even to the most experienced surgeons in the field of trauma [1]. Centrohepatic ruptures may result in the formation of a large intrahepatic cavity. Necrosis of the wall of this cavity can damage nearby structures causing delayed hemorrhages [2-4]. Post-traumatic intrahepatic pseudoaneurysms are rare in adults and even rarer in children, occurring at a frequency ranging from 1,2 to 1,7% [5]. Hemobilia is a rare and serious

secondary complication of the liver trauma, observed in 0,5 to 2% of cases [6-9]. Diaphragm ruptures are present in 0,8 to 5% of polytrauma patients. In 80 to 90% of cases, it involves a public road accident. They can also be found during attacks with firearms or knives [10,11]. 60 to 70% of the diaphragmatic ruptures are related to the left diaphragmatic dome, 30 to 40% to the right one [12]. Liver trauma remains the main cause of death during an internal organ injury. The management of liver trauma has radically evolved since the end of the 2000s, 80 to 100% of liver injuries have been treated conservatively [13]. The purpose of this report is to present the extent of complications and the challenges in the efficient management of complications that accompany severe and complex liver trauma.

Case Presentation

A 44 years old male, the patient was introduced to the ER after being hit by a heavy object. The CT evaluation revealed fractures of the 5-6-7-8-9-10th ribs with hemopneumothorax, and central hepatic contusion.

Assessment of the patient's clinical condition and the initial examinations that were done: biochemical balance, FAST, thoraco-abdominal CT.



Figure 1: Thoracic CT scan on admission: revealed fractures of the fifth, to tenth rib and right, hemopneumothorax.

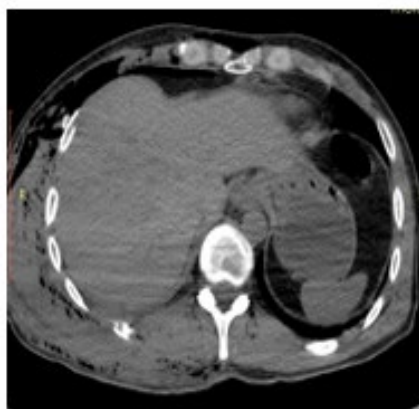


Figure 2: Abdominal CT scan on admission: not revealed liver contusion or/and intraperitoneal fluid.

The initial management was the drainage of the right pleural cavity with an output of blood and air, antibiotic therapy, fluids, analgesics, and supervision.

On the 6th day, the right pleural chest tube was removed. One day after the removal of the chest tube, bile leaks appeared from wound of the chest tube.

On the 7th day, in an re-examination done by a CT-scan of the thorax and abdomen was found multilocular liquid collections in in the right pleural cavity, the rupture of the right diaphragm, contusion of the 7, 8th hepatic seg.

On the 10th day, a thoracotomy was performed where an organized hemothorax with blood and bile content was removed, the right diaphragm was sutured. No intraabdominal damage was detected during the examination through the rupture of the diaphragm.

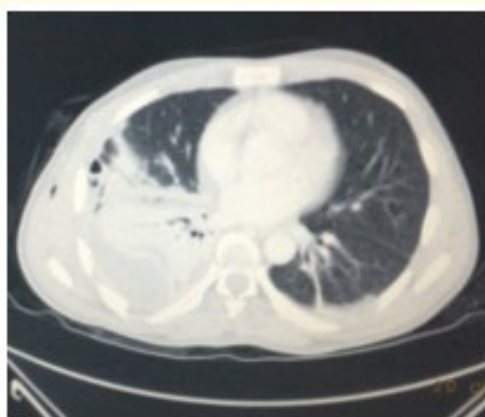


Figure 3: Thoracic CT scan findings on seventh day: multi-loculated pleural effusion in the right pleural cavity.



Figure 4: Abdominal CT scan findings on seventh day: rupture of the right diaphragm.



Figure 5: Abdominal CT scan findings on seventh day: contusion of the 7 - 8 liver segments.

On the 16th day, he manifested the clinic of hemobilia. After 3 days, this complication was managed by doing a choledochal drainage which consisted in putting a Kher tube + cholecystectomy. In the peritoneal cavity there was no hemorrhage nor bile.

In the following days, there was a repeated but not significant hemorrhage coming by the thoracic wound, which was related to the hepatic aneurysm. Arterial angioembolisation was attempted but it is impossible to perform this procedure due to hospital resources.

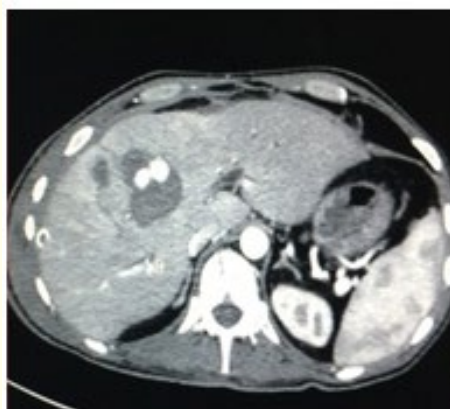


Figure 6: Pseudoaneurysm of segmental branch right hepatic artery recurrent bleeding from the thoracic wound, but not significant.

On the 26th day, the patient had profuse bleeding coming from the thoracic wound which was manifested by the clinic of a hemorrhagic shock. In an emergent laparotomy, it was performed ligation of the right branch of the hepatic artery and the administration of 5 units of blood.



Figure 7: Intraoperative view: ligation of the right hepatic artery

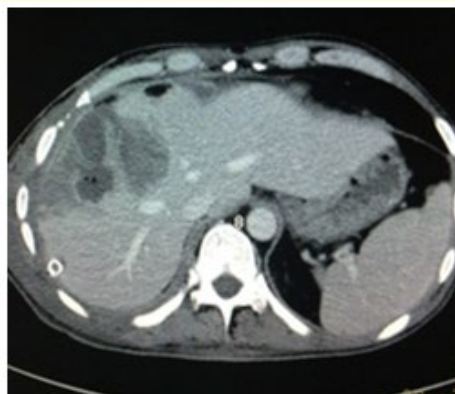


Figure 8: Angio CT scan after right hepatic artery ligation.

Complications during the course disease: clotted hemothorax, biliary empyema, pseudoaneurysm of segmental branch right hepatic artery, hemobilia, liver massive hemorrhage trans-pleural and wound thoracic wall. The patient was discharged healed forty days after the injury.

Discussion

The liver is the second most damaged organ after the spleen, due to a relatively protective abdominal location [14]. 10 to 30% of hepatic injuries are complex hepatic injuries. About 80% of liver injuries are accompanied by other abdominal injuries [15]. The method for diagnosing liver injuries depends on the hemodynamic status of the patient. Quickly, FAST detects free abdominal fluids. Sometimes, FAST has images of a poor quality due to the patient's construct. The CT-scan is currently considered the golden standard imaging technique in trauma. Conservative treatment is possible in approximately 92% of the 1st and 2nd grade of hepatic lesions, 80% of the 3rd grade, 72% of the 4th grade and 62% of the 5th grade. For the patient treated conservatively, there is no consensus in the literature regarding the length of time in intensive care. There is no consensus too, on the bed rest and physical activity restriction after the patient leaves the hospital [16]. In the liver, any hemostatic procedure requires proper and preliminary exposure. The grade of liver injury and the time of the hemostatic

procedure should be taken into account before starting the hemostatic procedure itself. The choice of the surgical technique varies according to the grade of the liver injuries. If there is no evidence of massive hemorrhage at the time of laparotomy, electrocautery topical hemostatic agents, a simple suturing of the hepatic parenchyma or omental tampon can be considered [17-19]. In the case of massive hemorrhage, invasive procedures such as manual compression, hepatic packing, vessel ligation, hepatic debridement of necrosis areas, balloon tamponade, shunt procedures and hepatic vascular exclusion should be considered. These techniques requires early intensive intraoperative resuscitation to maintain the organ's perfusion. The complication rate for all liver injuries is paradoxically low, ranging from 0 to 7% [20]. A diaphragm rupture should be systematically considered during a high-energy thoraco-abdominal trauma. The rupture mechanism consist of a sudden increase in abdominal pressure, up to 10 times above the normal pressure. Before the surgery, the diagnosis of diaphragm rupture is difficult [21]. 20 to 40% of the diaphragm ruptures are detected during a laparotomy performed for another injury, because the clinical signs are inconsistent and rarely specific [13]. 90% of diaphragmatic ruptures come from traffic accidents [22,23]. For more complex and deeper lesions, surgical treatment may be complication. For more complex and deeper injuries of the diaphragm, surgical treatment may be complicated. Hepatectomi and even partial resection are rarely performed. Our patient manifested complications such as massive transpleural hepatic hemorrhage through the rupture of the diaphragm which was exteriorized by the thoracotomy operative wound, bilo-pleural empyema, hemobilia, hepatic pseudoaneurysm. These complications can occur, either after hepatic trauma, or after a radiological procedure or after hepatobiliary surgery [24]. Transpleural hepatic hemorrhage is a very rare complication. Also, intrahepatic pseudoaneurysms are an infrequent complication of hepatic trauma with a frequency of 2 - 3%. In 80% of cases pseudoaneurysm of the hepatic artery occurs in the right hepatic artery. There is no accurate information on the incidence of the post-traumatic bilo-thoracic fistulas [2]. Sporadic cases of these fistulas have been reported in the literature. In 2002 Navsaria identified 34 cases reported in the English literature since 1994 and only 9 cases since 1999 [25]. This complication occurs in 2 to 4% of the liver injuries, regardless of their mechanism [26]. Hemobilia is a rare and serious secondary complication of the liver trauma observed in 0,5 to 2% of the cases. It usually corresponds to the formation of a deep arterial lesion such as the formation of a pseudoaneurysm and/or arterio-biliary fistula [2,6,8,27]. In fact, to cause hemobilia, the arterial lesions must be hilar or juxta-hilar. Blood, bile and necrotic tissue have been accumulated in these lesions which flow into the bile duct with simple pressure. Hepatic pseudoaneurysm occurs in 1,2% of the abdominal traumas [28]. They occur variably over time in a conservatively treated traumatized liver [29]. On the 16th day, we identified a centro-hepatic pseudoaneurysm in our patient the clinical sign was hemobilia. On the same day the patient underwent surgery, which consisted of placing Kher tube + cholecystectomy. An arterial angioembolization was attempted, this procedure failed for technical reasons. Some trauma surgeons prefer to do angiography and embolization higher than grade 3 in hepatic lesions. On the other hand, other surgeons will follow this protocol of treatment only if we have extravasation of contrast in a CT [30]. While waiting to perform the arterial embolization procedure, 4 weeks after the trauma, massive hemorrhage appeared from the operative wound of the thoracotomy. The patient in hemorrhagic shock was operated and the ligation of the right artery was performed. After the surgery the bleeding stopped and the patient was transferred at the intensive care unit. The patient managed to survive from this serious complication. Day after day the clinical condition of the patient has improved. 40 days after the trauma, the patient is discharged from the hospital with a biochemical balance towards normalization. Liver injuries remain the main cause of death among internal organ injuries with a relative mortality of 10 to 15%. The management of liver trauma has undergone a significant revolution in recent decades [31].

Conclusion

The thoraco-abdominal complex trauma needs a multidisciplinary follow up, a very well-trained trauma staff and the disponibility of all medical equipments. Beside accurate management this trauma still has a high morbidity and mortality. The selective ligature of hepatic artery, it's an alternative under the conditions of limited.

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