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Case Report

Intraparenchymal Stenting in Blunt Liver Trauma: A Case Report of a Simultaneous Damage-Control and Tissue-Sparing Surgical Technique

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Background

Hepatic trauma is a common condition found in setting of abdominal injuries. Mostly, surgical techniques to deal with liver trauma are planned to control the parenchymal bleeding and bile leaking. In this paper, our Trauma Team describes an innovative surgical technique to control a complex intrahepatic bile duct injury, avoiding simultaneously the resection of a significant parenchymal mass

Case Report

The patient is a 15-year-old man, who sustained a high-speed motorcycle crash (35 mph) three days before the arrival to our military trauma center. Outside from our hospital, the patient underwent the first step of a staged abdominal operation for trauma (START I), where a grade IV (American Association for the Surgery of Trauma-Organ Injury Scale) blunt hepatic injury was detected -deep parenchymal laceration near the site of insertion of falciform ligament, extended to the site of insertion of coronary ligament- being packed and drained by some closed-drains placed in the sub-diaphragmatic space. Two days later, he underwent a START II laparotomy, where hemostasis was assured; surgeons placed two closed peri-hepatic drains and the abdominal skin was sutured to allow the patient´s transference to our trauma center.

On presentation, he was wake and alert with Glasgow Coma Scale of 15, and a blood pressure of 109/61, His heart rate was 98, respirations were 22, and temperature was 102.2°F. Oxygen saturation on room air was 99%. The abdomen was nontender, but through the abdominal suction-drains clear bile was returning. Subsequent computed tomography confirmed a grade IV AAST-OIS blunt hepatic injury and a large peri-hepatic fluid collection. On hospital day 1, the total drainage from the tubes was 1400 mL, and 1600 mL were obtained on hospital day 2. On day 3, the patient presented continuous fever (100.4-103.1°F), and the decision of surgical treatment (START III) was taken. He underwent opening of the skin, evacuation of perihepatic biloma and non-anatomic resection of devitalized liver parenchyma. During the liver injury evaluation, our surgical team discovered a laceration of the proximal segment of intrahepatic portion of the left hepatic duct, near the porta-hepatis (Figure 1).

Figure 1: Deep hepatic laceration showing a total transection of the proximal segment of the left hepatic duct in the bottom of the injury.

Due the tenuous consistence of hepatic tissue, primary repair was not technically possible. A Kehr (T-shaped) tube was used for shunting the defect, allowing bile flow from the distal to proximal extreme of the duct (Figure 2).

Figure 2: Insertion of a Kehr (T-shaped) tube for shunting the bile flow through the laceration.

An omental patch was used to fill the parenchymal defect and a complex hepatorrhaphy using interrupted sutures with caliber 1 chromic-catgut was performed (Figure 3).

Figure 3: External aspect of the biliary diversion taken out directly through the hepatic laceration, omental patch and complex hepatorrhaphy using calibre 1 chromic catgut.

Once more, perihepatic suction-drains were placed and the patient underwent definitive fascial and skin closure. The patient´s postoperative course was complicated by postoperative ileus and a right-side pneumonia that responded well to antibiotic therapy. There was no clinical evidence, including serial blood-cell count examinations that further abdominal complications were developed. Postoperative cholangiogram on post-discharge day 15 showed restoration of continuity on intrahepatic left hepatic duct (Figure 4).

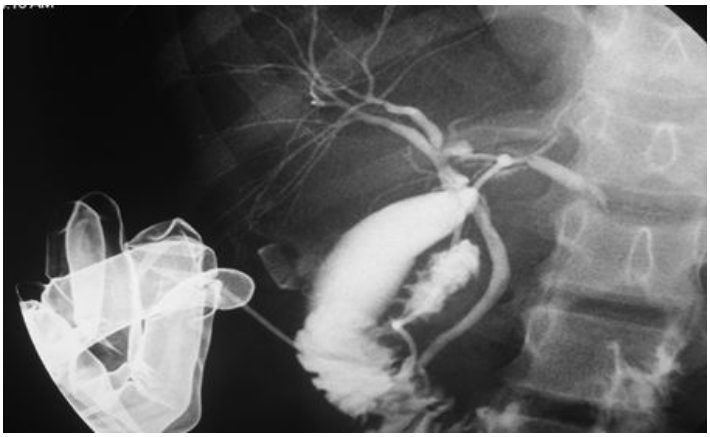

Figure 4: Contrasted cholangiogram obtained on post-discharge day 15, showing restoration of biliary flow through the duct laceration.

He was discharged uneventfully after a full course of antibiotics. Outpatient´s follow-up has not revealed alterations in laboratory functional examinations of liver.

Discussion

Significant intrahepatic bile duct injury caused by blunt abdominal trauma is relatively uncommon (0.5-8% of severe hepatic injuries-III to V scaled by AAST-OIS) [1-3]. Complications of this type of injury include complex bile fistulas (a complex biliary fistula is defined as greater than 50 mL of bile drainage per day, from an injury of a major biliary duct), bilomas, bile peritonitis, and sepsis [1]. Most reports recommend operative -usually resectional- management of these bile duct injuries, citing increased risks of complications and mortality with other type of management. However, few data have been published documenting the optimal means of managing these challenging injuries [4]. Some strategies (i.e. endoscopic retrograde cholangiopancreatography, extrahepatic stenting, endoscopic sphincterotomy), have long been used as adjuncts to diagnose and treat traumatic abnormalities of intrahepatic biliary tree [1,3,5-7]. However, to the best of our knowledge, intrahepatic shunting associated to omental patch and complex hepatorrhaphy has not been reported as a hepatic parenchymal-sparing surgical technique and definitive therapeutic maneuver in the medical literature, to deal with severe blunt hepatic injuries. Shunting and controlling the adequate flow of bile in cases of intrahepatic biliary defects, the functionality of affected zones of liver is conserved, and the bio-dynamic character of the large omentum helps to reach an effective hemostatic and bilostatic pa-

renchymal seal. Although some non-surgical and operative interventions are capable to control and evacuate intrahepatic bilomas [4,8], they do not restore the free-flow of bile, predisposing the patient to develop vascular and infectious complications -like liver abscess, hepatic atrophy and functional-losses, liver necrosis, parenchymal hematoma, and bile peritonitis [1-10]. Other cases demand surgical non-anatomic resections, segmentectomies or even lobectomies to reach the bilostasis of uncontrolled complex biliary fistulas, increasing the rates of morbidity and mortality [2,3]. The success of our technique was demonstrated by the clinic and paraclinic follow-up (computed tomography and laboratory liver tests) in which the total restoration of anatomy and functional recovery were assured.

Conclusion

In patients with severe blunt hepatic injuries, our surgical team strongly recommends obtaining an early routine computed tomography for evaluating these injuries [3]. The presence of a complex biliary fistula should be ruled-out by every available diagnostic adjunct [4,7,9]. In patients with detected major intrahepatic biliary trauma on surgical intervention, a bile-duct shunting associated to omental patch and deep hepatorrhaphy is a simple, effective technique to deal with these injuries. In this era of non-operative management, trauma surgeons should be trained in advanced operative management of hepatic trauma to favour the survival of these patients [2].

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