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CLINICAL CASE

Severe liver trauma with vascular compromise and biliary leak. Report of two cases

Severe liver trauma with vascular compromise and biliary leak. Report of two cases

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Abstract

Introduction: The liver is more frequently injured in high-energy abdominal trauma, with an incidence between 1% and 8%. Traumatic injuries to the bile ducts are infrequent.

Clinical cases: We present two patients with severe liver trauma and extrahepatic vascular and bile duct involvement and the surgical approach to preserve both lobes functionally:

1-year-old male, grade V liver trauma, incomplete injury to the right portal vein, at the level of the bifurcation and the left hepatic bile duct. The portal and bile duct damage was repaired. Two-year-old female, blunt abdominal trauma, injury to the parenchyma of the right lobe of the liver, whole section of the left hepatic duct, and associated pancreatic contusion. In both cases, a Roux-en-Y hepatic jejunostomy was performed, and both lobes were preserved.

Conclusion: In complex liver trauma involving both lobes, the evolution depends on the quality of the residual mass. Conservative surgery with vascular and biliary reconstructions avoids acute liver failure and allows time to gain until the function recuperation.

Keywords:

MESH: Child; Liver; Hepatectomy; Anastomosis, Roux-en-Y; Abdominal Injuries; Case Reports.

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Introduction

The liver is the most commonly injured organ in high-energy abdominal trauma, with a reported incidence of between 1% and 8%. Traumatic injuries of the bile ducts are infrequent, occurring in 0.1% of trauma in general, of which bile leakage has a frequency of 0.5% to 21% [1, 2]. Vascular injuries occur in 7% of liver injuries; they can be arterial, portal, or vena cava; isolated arterial injuries are infrequent [3].

There are two mechanisms of liver injury: the first is compression, which causes a partial or total section of the parenchyma, portal triad, and hepatic veins, and the second is deceleration that produces rupture of the liver at its attachment points. Liver injuries can be superficial and deep and tend to radiate away from the point of impact [4]. The Liver Organ Injury Scale allows us to better guide behavior to classify liver trauma. Mortality rates for serious liver injuries, grades IV and V, range between 35% and 80% [5].

Treatment depends on the clinical status; surgical indications are hemodynamic instability that does not respond to adequate initial resuscitation and generalized peritonitis, particularly in IV and V lesions. Angioembolization is a minimally invasive option that can be offered with adequate resources and personnel for certain types of injury [4].

Clinical cases

Case 1

A male patient, one year old, presented with blunt trauma to the upper abdomen due to a moving car and significant hemodynamic instability that persisted despite fluid resuscitation. Simple computed axial tomography (CAT) in the emergency room showed a large amount of free fluid in the cavity, and due to the poor response to resuscitation, emergent surgery was performed. Right lobe trauma was found, portal vein injury between the level of the bifurcation and the branch to segment IV, in addition to biliary injury at the level of the left hepatic duct (Figure 1A).

Resection of segments VI and VII was performed, and repair of the right portal lesion with 6/0 polypropylene suture was performed. It was also decided to preserve the left lobe for which a Roux-en-Y hepaticojejunostomy was performed on the left hepatic bile duct (Figure 1B).

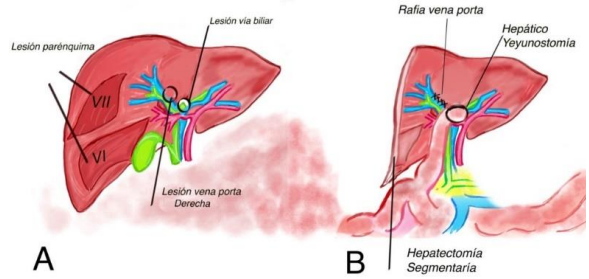

Figure 1. A: Diagram of the trauma in segments VI and VII, portal vein injury between the level of the bifurcation and the branch to segment IV, in addition to biliary injury at the level of the left hepatic duct. B: Roux-en-Y biliodigestive anastomosis to the left hepatic duct, portal vein raffia, and segmental hepatectomy.

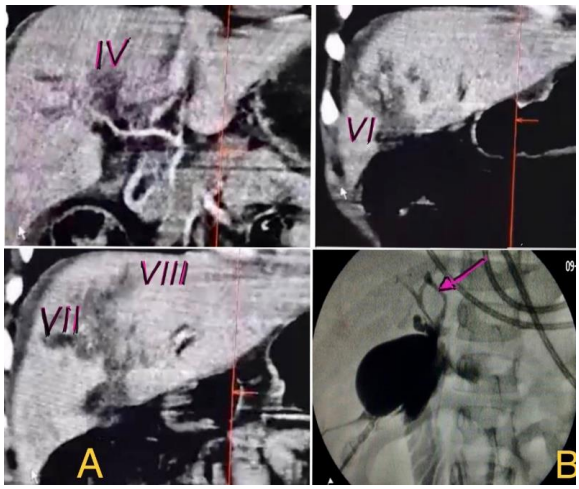

Figure 2. A: CAT scan showing trauma to segments IV, VII, and VIII. B: Above segment VI lesions, below Intraoperative cholangiography showing a section of the left bile duct.

Evolution

Conservative surgery was preferred to maintain viable liver parenchyma if the bilioenteric derivation presented future complications. In the immediate postoperative period, the patient presented bile leakage on the cut surface in the right lobe, added to elevated liver

enzymes and mild liver dysfunction. Conservative management with laboratory control was performed, which decreased to normal. At the moment, the evolution of the patient is favorable at five years of follow-up, without evidence of cholangitis, stenosis, or dilation of the bile duct, with standard quality of life.

Case 2

Two-year-old female patient with closed abdominal trauma due to a fall from a swing and on admission with a hypovolemic shock that was compensated with fluid resuscitation. The CT described trauma involving the four segments of the right lobe of the liver, segment IV, free fluid in the cavity, and signs of pancreatic contusion (Figure 2A) classified as grade IV liver trauma, so conservative management was decided.

At 72 hours, the girl's hematocrit continued without decreasing, but the paralytic ileus persisted, with a progressive increase in the abdominal circumference and jaundice appearing in the mucous membranes. Abdominal ultrasound reported an increase in free fluid, and abdominal puncture obtained 1000 ml of bilious fluid. Given the impossibility of performing resonance cholangiography, intraoperative cholangiography was decided to define the lesion of the left bile duct (Figure 2B). Surgery found a sizeable destructive lesion of the parenchyma in the right lobe of the liver, with significant fracture of segments IV, VI, VII, and VIII, as well as an entire section of the left hepatic duct and disruption in the neck of the pancreas, with a collection of approximately 5 cm in diameter (Figure 3A).

It was decided to perform a Roux-en-Y biliodigestive anastomosis to the left hepatic duct. Despite the extensive destruction of the right parenchyma, it was completely preserved to await regeneration, which would protect against future dysfunction if there were significant left biliary complications. External drainage of the pancreatic collection was placed (Figure 3B)

Evolution

Subsequently, he presented a medium-volume pancreatic fistula that resolved with total parenteral nutrition and continuous octreotide infusion for fifteen days. At the two-year follow-up, he was in perfect clinical and humoral condition.

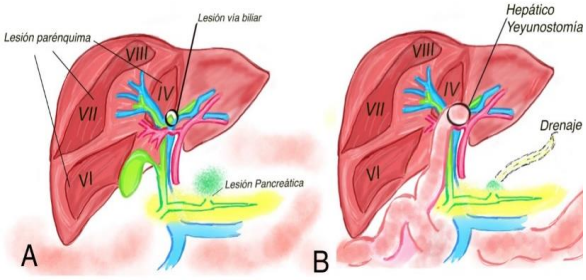

Figura 3. Diagram of the trauma in segments IV, VI, VII, VIII, biliary injury at the level of the left hepatic duct, injury to the neck of the pancreas. The biliodigestive anastomosis in Roux-en-Y is represented in the left hepatic duct and external drainage of the pancreatic collection.

Discussion

Severe liver injuries are treated with early or late resection depending on the clinical course, with good results and low mortality and morbidity rates if performed in a specialized center [6, 7]. Biliary tract injury remains a rare complication of blunt abdominal trauma, and variability in behavior depends on vascular and biliary injuries, the anatomy, and the clinical impact of the damage [8].

Biliary injuries are of two types: extrahepatic or intrahepatic; severe injuries, usually extrahepatic, potentially lead to decompensation or infections and are best treated with laparotomy [3]. The incidence of hepatic vascular injury has been reported in more than one-third of pediatric blunt abdominal injuries. Its treatment includes conservative, embolization, or surgical therapies [7].

Liver necrosis or extensive resection are causes of fulminant liver failure, so the viability of arterial and portal blood supply must be considered, as well as the amount of available residual liver mass; liver resections of up to 75%, or six liver segments, can be safely performed in patients with normal liver parenchyma to avoid acute postoperative liver failure; however, in our hospital, we prefer to keep up to 30% [9, 10].

When one lobe has a vascular injury and the other has biliary damage, the biliodigestive bypass can keep the parenchyma functional until, if complications such

as hepaticojejunostomy stenosis occur, with lobar cirrhosis, regeneration of the tissue of the other lobe that had a vascular injury would allow hepatectomy of cirrhotic tissue, without risk of acute liver failure.

If the portal vein inflow is injured, there is a potential risk of late severe complications of ischemia and atrophy. Late resection may be necessary when an entire lobe of the liver is substantially reduced due to total parenchymal destruction. It should be performed before secondary complications develop due to hepatic necrosis [7, 11].

Conclusions

Although nonsurgical treatment is the method of choice for most isolated liver injuries, in a hemodynamically stable patient, certain complications, such as bile leakage and possible hepatic devascularization, should be managed surgically. In complex liver trauma involving both lobes, the course depends on the quality of the residual hepatic mass. Conservative surgery in both lobes with vascular and biliary reconstruction is preferred to avoid acute liver failure and gain time until functional regeneration of the liver parenchyma protects against eventual postoperative liver failure and, therefore, subsequent resection.

Abbreviations

CT: computerized axial tomography.

Supplementary information

None declared by the authors.

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Author contributions

Julia Marcela Quizhpi Lazo: Conceptualization, Data Retention, Funding, Research, Resources, Software, Writing - original draft.
Mónica Eulalia Galarza Armijos: conceptualization, data conservation, supervision, acquisition of funds, research, resources, and writing: revision and editing.
Miurkis Endis Miranda: Data curation, research, fundraising, supervision, methodology.
Luis Enrique Marcano Sanz: conceptualization, data conservation, supervision, visualization, methodology.
All authors read and approved the final version of the manuscript.

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Availability of data and materials

The data sets generated and analyzed during the current study are not publicly available due to participant confidentiality but are available through the corresponding author upon reasonable academic request.

Statements

Ethics committee approval and consent to participate

Not required for clinical cases.

Publication consent

The authors have permission for publication by the guardians of patients who appear in the photographs duly unidentified.

Conflicts of interest

The authors declare no conflicts of interest

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