

Approach to trauma biliary lesions at the João XXIII Hospital

Abordagem das lesões de vias biliares no trauma no Hospital João XXIII

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ABSTRACT

Trauma biliary lesion is not common. It is observed, regardless of its mechanism, in 0.1% of admissions to trauma services. The gallbladder is the segment of the biliary extra-hepatic pathway most often affected. Lesions of bile ducts constitute a challenge to medical expertise, with significant morbidity; treatment is dependent on several factors such as degree of lesion, time of diagnosis, and medical staff experience in their approach. Due to the rarity of these lesions, surgical correction is difficult and controversial. This review presents the perspective on this topic from the Service of General Surgery and Trauma at the João XXIII Hospital and the Hospital Foundation of the State of Minas Gerais highlighting its incidence, mechanism of lesion, and treatment.

Key words: Bile Ducts/injuries; Wounds and Injuries; Therapeutics.

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RESUMO

A lesão da via biliar no trauma não é comum. É observada, independente do seu mecanismo, em 0,1% das admissões nos serviços de trauma. A vesícula é o segmento da via biliar extra-hepática mais frequentemente acometida. As lesões dos canais biliares constituem desafio à perícia médica, com morbidade significativa; e tratamento dependente de vários fatores, como grau da lesão, momento do diagnóstico e experiência da equipe médica em sua abordagem. Devido à raridade dessas lesões, a correção cirúrgica, além de controversa, é difícil. Esta revisão apresenta a ótica do Serviço de Cirurgia Geral e do Trauma do Hospital João XXIII e da Fundação Hospitalar do Estado de Minas Gerais sobre esse tema, ressaltando sua incidência, o mecanismo de lesão e seu tratamento.

Palavras-chave: Duetos Biliares/lesões; Ferimentos e Lesões; Terapêutica.

INTRODUCTION

Biliary lesions, resulting from blunt or penetrating traumas, are rare. It occurs, due to trauma, in 0.1% of hospital admissions.¹ The extra-hepatic biliary tract lesion is seen between 3 and 5% of abdominal trauma victims.² In 80% of cases, the lesion is in the gallbladder as a function of size and anatomical position, with reference to the diminutive dimension and location of the extra-hepatic biliary tree.³ It can occur at any age. Morbidity is significant and the result of extra-hepatic biliary lesion treatments depends on the lesion's degree, other injuries, time of diagnosis, and, especially, the experience of the surgeon in the reconstruction of this delicate anatomical structure. Surgical correction is controversial and difficult due to the small diameter of bile ducts.^{3,4}

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The lesion can happen in any segment of the biliary tree. Presentations are varied according to the vulnerable agent and associated lesions. Hepatic lesions are most frequently associated with biliary tract lesions. Duodenum, pancreas, and hepatic hilum vascular lesions are also in frequent association with lesions in the extra-hepatic biliary tree. Exsanguination by associated vascular lesion is the leading cause of death in trauma victims with extra-hepatic biliary tree lesions. Lesions in other intra-abdominal organs in association with biliary tract lesions are considered the rule by many, occurring in more than 97% of cases.^{1,5} As a consequence, there are several ways to treat biliary tract lesions, and many are the variables that must be considered.

There are few publications in the literature on treatment outcomes of biliary lesions resulting from blunt or penetrating trauma. Thomson et al.¹ report that there are only eight publications in the English literature with more than 10 patients with extra-hepatic biliary lesions, excluding those natural and related to the gallbladder. A little more than 250 cases of blunt bile tract traumas have been documented in the literature until the end of the last century.²

INCIDENCE AND MORTALITY

The actual incidence of biliary tract lesions is unknown. It is estimated that many patients die on their way to the hospital due to biliary tract lesions and bleeding caused by often associated vascular lesions.^{1,3,5}

At the João XXIII Hospital, 70 biliary lesions (1.5%) occurred out of the 4,526 laparotomies performed between 1990 and 1998. These included 63 cases of bladder lesions and seven of extra-hepatic bile duct lesions. The gallbladder superficial location and its size explains this prevalence.³

Mortality caused by bile duct traumas is directly related to a delayed diagnosis, type of treatment employed and, of course, the trauma severity.

TRAUMA MECHANISM AND PATHOPHYSIOLOGY

Trauma mechanisms capable of harming biliary ducts are variable. Lesions can occur through motor vehicle accidents, injuries by firearms or melee weapons, or even falls from heights. In blunt traumas,

the diagnosis becomes difficult when presented in isolation. Penetrating trauma, on the other hand, can compromise the integrity of the biliary tract in any anatomical site of its length.

Because of the gallbladder's location, size, and tension, naturally caused by its contents, it is the most often injured segment, both by blunt and penetrating traumas.³

Considering all structures contained in the hepatoduodenal ligament, the biliary tract is the most frequent injured element in blunt traumas because the extra-hepatic biliary duct is short and fixed at the ends. The liver, when pulled towards the cranial side, can cause stretching of channels (right and left) and laceration, considering that the channel distal segment is fixed in the duodenum-pancreatic block. The bile duct segment at the duodenum pancreatic junction can suffer this kind of injury by the same mechanism.^{2,4}

In penetrating traumas, lesions caused by melee weapon are simpler to treat. These can produce partial or total lesions in the bile duct. The associated lesions are caused by low energy vulnerable agents, and their primary remediation does not constitute a complex procedure in most cases.

The extra-hepatic biliary tree injured by a firearm projectile is a complex problem. The damage is extensive and usually results in the loss of a channel segment. The association with vascular lesions is common, and many patients do not arrive alive at a hospital. When they survive, major surgery is required not only for the correction of channels and adjacent structures.

CLASSIFICATION OF BILIARY LESIONS

The Abbreviated Injury Scale (AIS) represents an anatomic index and, although it is not used in isolation, it constitutes the basis for calculating other prognostic indexes (ISS) and is useful for a descriptive comprehension of the biliary lesion and guidance in the treatment of choice (Table 1).^{6,7}

DIAGNOSIS

Trauma mechanisms and associated lesions usually determine the need for surgical treatment, which is performed during laparotomy. Extravasation of bile in the intra-hepatic and hepatic duodenal ligament lesions, and bile in the head of the pancreas are indicators of lesions.

Table 1 - Classification of bile duct lesions

Degree	Description of lesions (AIS 90)
I	Bladder contusion (2) Portal triad contusion (2)
II	Partial avulsion of the gallbladder with intact cystic duct (2) Gallbladder perforation (2)
III	Complete avulsion of the gallbladder in the liver bed (3) Laceration of the cystic duct (3)
IV	Partial or complete laceration of the right hepatic duct (3) Partial or complete laceration of the left hepatic duct (3) Partial laceration of the common hepatic duct < 50% (3) Partial choledochal laceration < 50%
V	> 50% transection of the common hepatic duct (3-4) > 50% choledochal transection (3-4) Combined injury of the right and left hepatic ducts (3-4) Retroduodenal or choledochal intra-pancreatic lesions (3-4)

Table reproduced from the book *Protocols in Trauma*. Rio de Janeiro: Medbook; 2009.165-92p.

Conversely, the lesion may be identified postoperatively by the presence of bile in the abdominal drain (biliary fistula), coliperitoneum, biloma, or bile duct stenosis. Hemobilia, bilemia, and biliopleural fistula are rare complications but deserve special attention.

A biliary isolated lesion is rare. It is almost always related to blunt traumas when it occurs, and the diagnosis is often difficult.²

Its clinical manifestation is subtle and, whereas sterile bile does not initially cause chemical irritation in the peritoneum, the diagnosis can take hours, days, or weeks after the trauma.

The increase in ascites content and paracentesis confirm coliperitoneum. From there, the Endoscopic Retrograde Cholangiopancreatography (ERCP) should be part of the propaedeutics before any surgical decision is made because it is often decisive in the identification and definition of treatment. It can be performed through the gallbladder or cystic. Stewart and Way noted that 96% of repairs made without cholangiography presented complications.⁸

When not recognized in the peri-operative period, the bile duct transection makes the hepatic transcholangiography a requirement. The exam defines the proximal anatomy and allows the placement of a catheter to decompress the biliary pathway, treating and preventing cholangitis.

TREATMENT

According to the vision of the General Surgery and Trauma Service at the João XXIII Hospital, bile duct lesions are considered based on their approach as:

- a. **treatment of intra-hepatic biliary lesion:** it is secondary to control bleeding in the liver. Bile leakage through the lesion is often self-limited. The infra-hepatic drainage resolves most cases.

The sphincterotomy with endoscopic placement of a stent in the main biliary ducts of fistulas with high debit (200 mL/day) is prudent.^{1, 9,10} Konstatkos et al.⁵ manifest a contrary opinion by stating that such procedure increases the incidence of iatrogenic lesions.

- b. **treatment of gallbladder lesion:** cholecystectomy is the gold standard for treatment of lesions in the gallbladder. The damage control surgery for gallbladder only contemplates the rafia or cholecystectomy for further definitive repair (Figure 1).^{11,12}



Figure 1 - Gallbladder lesion by penetrating trauma. The desirable treatment is cholecystectomy.

- c. **treatment of lesions in bile ducts:** bile duct lesions (right and left) are considered critical. The perioperative cholangiography must be conducted in all patients with a high index of suspicion. The channel ligation has been defended;^{3, 13, 14} being fundamental the broad peri-hepatic drainage depending on the bile leak that will occur through the hepatic lesion (Figure 2).^{3, 4, 14}

Hepatic resection has been recommended, however, it is the exception strategy depending on the trauma's magnitude. In combined lesions between the left and right hepatic duct, the treatment includes the implantation of ducts in a excluded loop. The use of trans-anastomotic stent is defended in current publications (Figure 3).^{3, 4, 5, 15, 16}



Figure 2 - Gallbladder cholangiography shows left hepatic duct lesion by a firearm projectile. The treatment consisted of hepatic duct ligation of the injured hepatic duct. On the side, control cholangiography through the trans-cystic drain showing only the right biliary duct.

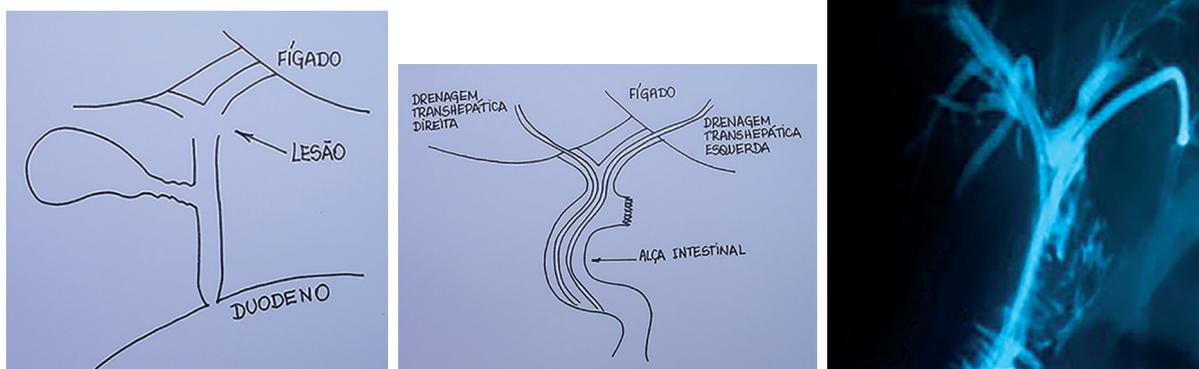


Figure 3 - Lesion at the junction of channels. Anastomosis of the junction with an excluded loop. The stent positioned in the biliary duct is observed, both on the right and left.

d. treatment of lesions in the hepato-cholechocha: the complete transection of extra-hepatic biliary ducts should be treated with the Y-of-Roux hepaticojejunostomy in stable patients. Skeletization of the common bile duct must be avoided, especially in locations of vascular supply (3 and 9 h).¹⁶

In patients undergoing damage control surgery, the biliary route is not a priority. The simple infra-hepatic drainage does not seem to be the best option. Bile in this region provides intense inflammatory reaction, which complicates its reconstruction (Figure 4).⁴

Drainage must be conducted with a "T" drain, through the lesion, considering the principle of controlling contamination in the cavity. The

channel ligation above the lesion may be alternative if the lesion is easily seen.⁷ A definitive repair should be carried out when the patient regains his normal physiologic state. The partial extra-hepatic biliary lesion should be sutured. The placement of the "T drain", in or outside the lesion, depends on the position of the bile duct lesion. The exteriorization of the "T drain" can be made through the lesion itself, when the lesion is located in the anterior wall. It must be remembered that the T drain externalized through the lesion may cause stenosis.² The decompression of a very thin bile duct can be made from the positioning of a nelaton probe or silastic type drain through the cystic (Figure 5).

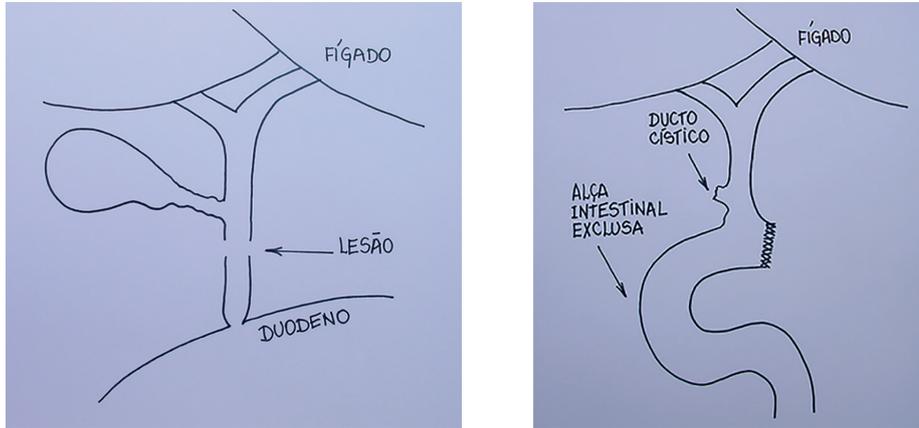


Figure 4 - Complete transection of the bile duct. The treatment includes a choledochal-jejunal anastomosis in excluded loop.



Figure 5 - Bile duct lesion in the anterior wall. The treatment consisted of partial lesion suture and placement of a “T” drain through the lesion, in addition to infra-hepatic drainage.

The time of “T” drain usage is controversial.² It can vary from weeks to months, 4 generally four to six weeks. The drain can be removed when cholangiography no longer shows alterations.

- e. treatment of the intra-pancreatic bile duct: the retroduodenal or intra-pancreatic bile duct lesion,

along with the duodenum pancreatic lesion, deserves special consideration. The treatment falls into the rare indication of pancreaticoduodenectomy in the trauma if there is duodenum pancreatic avulsion and consequent devitalization. The procedure can be done in stages (abbreviated laparotomy). The reconstruction of biliary drainage involves one of the most varied possibilities of bile pancreatic reconstruction in this type of operation. The possibility of a retroduodenal or justaduodenal bile duct ligation must be considered, precisely if the lesion is at this level. Drainage of the biliary tract from a colecisto-jejunal anastomosis can be performed if there are chances of preserving the duodenum pancreatic block, taking care in performing a Braun enteroenteroanastomose to prevent the gastroduodenal content to cross into the biliary anastomosis. This procedure is easily and rapidly implemented.^{3,5} However, the peri-operative cholangiography is essential to define the cystic convergence, ensuring that the choledochal ligature will be made below that site of convergence (Figure 6).²

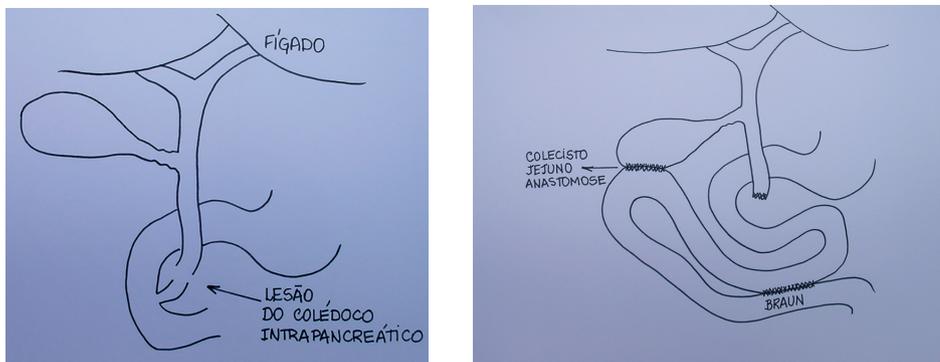


Figure 6 - Choledochal intrapancreatic lesion. choledochal-jejunal anastomosis may be a reliable alternative, associated with enteroenteroanastomosis according to Braun.

CONCLUSION

Bile duct lesions are rare in traumas. Morbidity and mortality are directly related to associated injuries, mainly bleeding. The treatment persists as a major challenge to the trauma surgeon because its variety and complexity include many modalities of surgical treatment.

It requires experience in the team, and its strategy depends on the location, lesion severity, and patient's clinical condition.

Channel stenosis represents one of the most feared complications. Hence, the importance of a late postoperative control to evaluate this undesirable development.

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