

## Case Report

# Biloma secondary to blunt liver trauma in a pediatric patient: case report

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## ABSTRACT

Liver is the organ most frequently injured after blunt or penetrating abdominal trauma, being in pediatrics a pathology that has an increasing incidence; Non-operative management is the hallmark of treatment, however cases of secondary biliary leakage have been described, which may affect the intrahepatic or extrahepatic track. A male 8 years old, with blunt trauma in the right hypochondrium, presenting acute abdomen and hemodynamic instability, requiring exploratory laparotomy with a grade III liver injury in VI and VII hepatic segments. Four weeks after discharge, he presented as a complication a giant biloma in VII and VIII hepatic segments, performing percutaneous drainage guided by ultrasound. The incidence of biliary complications related to hepatic trauma is low, 4% in pediatric patients, dividing into bilomas or biliary fistulas; the presentation of biliary leakage is very non-specific and early diagnosis difficult; in the bilomas, the tomography allows to define precisely its size, nature, distribution and regional anatomy in relation to adjacent structures, as well as underlying cause. The approach of choice is percutaneous or endoscopic drainage, with surgical management being the last option.

**Keywords:** Liver trauma, Biloma, Liver

## INTRODUCTION

In a general context of abdominal trauma, the liver is the organ most frequently injured after blunt or penetrating abdominal trauma.<sup>1,2</sup> Hepatic trauma in children is a pathology that has a growing incidence mainly because children are increasingly involved in potentially dangerous games and adventure sports, and to constant car accidents.<sup>2</sup> The most frequent cause of death in children is usually associated with trauma, so timely treatment and complications are particularly important.<sup>3</sup> Liver injuries in children occur as a result of compression of the abdomen and thorax due to high energy trauma, such as traffic accidents and falls in height; originating mainly from trauma in the upper right quadrant of the abdomen or right hemithorax, most often injuring the right hepatic lobe, due to its location and size.<sup>4</sup> Non-operative management is the

hallmark of treatment for the vast majority of children suffering from blunt liver injury; guidelines for the proper use of resources based on the tomographic grade of liver injury have existed for more than a decade, but recent literature reports management based primarily on the hemodynamic state of the patient.<sup>5</sup> Despite the optimal results and the minimal morbidity derived from non-operative management, cases of secondary bile leakage have been described, which can affect the intra or extrahepatic tract and, depending on their presentation, are divided into bilomas, which are collections of bile contained, or biliary fistulas that may be bilioarterial, biliovenous, biliocutaneous or leaking to peritoneum.<sup>6</sup> Due to the low incidence of biliary complications secondary to hepatic trauma in pediatrics and the importance of its early recognition, we consider it important to report the case of a pediatric patient who presented with a biloma secondary

to blunt trauma of abdomen, being handled by the General Surgery service at the University Hospital of Puebla.

## CASE REPORT

An 8-year-old male, originally from Puebla, with no significant personal history. He began his condition, 4 hours prior to admission, when he fell from a bicycle and presented contusive trauma with the manubrium in right hypochondrium, later with moderate-intensity abdominal pain, 7/10 on the Analog visual scale (EVA), accompanied by nausea, so he goes to the pediatric emergency department.

At admission he encounters vital signs: blood pressure 90/60 mmHg, heart rate 124 beats per minute, respiratory rate 26 breaths per minute, temperature 36°C, paleness of teguments, moist oral mucosa, pulmonary fields with adequate transmission of vesicular murmur, rhythmic cardiac noises, with tachycardia, globose abdomen at the expense of adipose panicle, generalized pain to superficial and deep palpation, present rebound, absence of peristaltic noises. With laboratories at admission that showed: hemoglobin 8 g/dl, hematocrit 25%, leukocytes 12,000, neutrophils 95%, bands 10%, platelets 120,000, prothrombin time 15.2 seconds, thromboplastin part time 35 seconds.

Evaluated by the general surgery service and given data of hypovolemic shock with acute abdomen, it was decided to perform exploratory laparotomy with the diagnoses of blunt trauma of abdomen and probable liver injury, being: 900 ml hemoperitoneum, grade III hepatic lesion due to subcapsular hematoma rupture with active bleeding in hepatic segment VI and VII (Figure 1), initial, transient packing and later hemostasis with hepatorrhaphy and electrocoagulation, gelfoam placement and drainage.



**Figure 1: Exploratory laparotomy with findings of grade III liver injury due to subcapsular hematoma rupture with active bleeding in hepatic segment VI and VII.**

He underwent the immediate postoperative period, hemodynamically stable, without support of amines, adequate urinary volumes, without signs of systemic inflammatory response or signs of peritoneal irritation,

with Hb control at 11 g/dl; progressing satisfactorily, with penrose type soft abdominal drainage with serous expenditure, reiterándose a las 48 hrs. It is decided to discharge for clinical improvement at 5 days postoperative. Four weeks after his discharge, he presented in pediatric emergencies for mild to moderate abdominal pain, abdominal distension, early postprandial fullness and intermittent fever.

Abdominal ultrasound was performed with report of giant hematoma in hepatic segment VII and VIII, so we requested a contrast abdominal tomography, finding cystic lesion, in relation to probable biloma, delimited within hepatic parenchyma, quantified in 750 ml (Figure 2 and 3).



**Figure 2: Abdominal contrast tomography showing: axial cut, finding cystic lesion, in relation to probable biloma.**



**Figure 3: Abdominal contrast tomography showing: coronal cut, delimited within hepatic parenchyma, quantified in 750 ml.**

Evaluation by interventional radiology was requested and it was decided to perform ultrasound-guided puncture, obtaining 300 ml of purulent bile fluid, and placing pig tail catheter of 12 Fr. With adequate clinical evolution, magnetic cholangioresonance is performed without reporting alterations in intrahepatic or extrahepatic bile ducts, so it is discharged with functional catheter and expenditure of 20 ml in 24 hours. During follow-up by outpatient consultation, the percutaneous catheter is removed 20 days after its placement and control abdominal

tomography is performed without intra-abdominal collections.

## DISCUSSION

The liver is one of the main organs that are injured in blunt abdominal trauma and because it takes its blood supply from the systemic circulation and portal, its injury can cause significant blood loss.<sup>4,5</sup>

The rate of liver injury after abdominal blunt trauma is 2-3%, being the non-operative management the choice of first instance (achieving up to 50-80% of patients) and having a success rate of 70-98%, based mainly on the hemodynamic state of the patient.<sup>4,5,7,8</sup> A mortality rate of 5-52% is reported in patients with hepatic lesion and in children is the most important cause of mortality after contusive trauma of abdomen, so its early diagnosis and correct treatment is essential.<sup>4</sup>

In our case, he is a pediatric patient who at admission presented hemodynamic instability, as well as signs of peritoneal irritation and decrease in hemoglobin, so it was decided to perform exploratory laparotomy. Factors associated with the need for a surgical procedure or failure in nonoperative management are described in the literature and include age (over 55 years), male sex, hypotension, low Glasgow coma score, high Injury severity score (ISS), under initial platelet count, high fluid requirements and concomitant abdominal injuries; indications for a surgical intervention as a therapeutic option is in those patients who present with hemodynamic instability (associated with evidence of intraabdominal bleeding such as FAST or positive peritoneal lavage), generalized peritonitis (which may be related to hollow viscal lesion), no response to initial resuscitation management or continuous blood transfusion requirements (transfusions greater than 40 ml/kg).<sup>2,5,7,8</sup>

The incidence of biliary complications related to hepatic trauma is low, usually occurring in 2.8-7.4% of patients with non-operative management, in high-grade liver lesions present in the 11-range 13.9, 10 however may occur in up to 25% of patients with surgical management; 10 in the pediatric patient biliary complications may occur in up to 4%. 11 It can affect the intrahepatic or extrahepatic bile duct and depending on its presentation are divided into bilomas, which are collections of bile contained, or biliary fistulas that may be bilioarterial, biliovenous, bilio-cutaneous or leaking bile to peritoneum.<sup>6</sup>

The term biloma was first introduced in 1979 by Gould and Patel, and describes a well demarcated collection, encapsulated or not, located outside the bile duct, extending the term by Kuligowska to include intra and extrahepatic bile collections.<sup>12-14</sup> The main causes are iatrogenic, traumatic or spontaneous: within the iatrogenic can be after abdominal surgery (it is the most frequent cause, especially in cholecystectomy) or non-surgical (percutaneous drainage, ERCP, transhepatic

cholangiography or liver biopsy).<sup>12-14</sup> In 1979, Gonsalves reported one case secondary to the use of Prednisolone 5 mg daily for 10 years in a patient with rheumatoid arthritis and another case was reported with the use of steroid therapy for two months due to nephrotic syndrome in a 27-year-old patient; spontaneous biloma is very rare, most commonly associated with choledocholithiasis in adults and congenital biliary malformations in pediatric age, being other rare causes bile duct tumors, hepatic and idiopathic infarction.<sup>12-14</sup> Our patient did not have the aforementioned history, so its origin is considered post-traumatic (presented 4 weeks before the appearance of biloma).

The detergent activity of bile acids has been considered to cause chronic inflammation that promotes adhesion, causing the lobed appearance of the collection.<sup>12</sup> Most collections are located in subhepatic space (mainly) and right subphrenic space, although they may be in the upper left quadrant in up to 40% of cases or be subcapsulated less frequently.<sup>13,14</sup>

Although the clinical symptomatology is very unspecific, the most common is that it occurs with pain in the upper right quadrant, abdominal distension and associated with fever, persistent bile drainage or jaundice, agreeing the main symptoms with what is referred to in our case.<sup>12-14</sup>

The presentation of a biliary leak is very unspecific and an early accurate diagnosis is very difficult; Endoscopic retrograde cholangiopancreatography (ERCP) is the suggested evaluation modality after liver trauma, However it is usually used only when there is an obvious clinical jaundice, not before, which could condition a late treatment and the development of complications such as biloma, infection or intra-abdominal sepsis.<sup>15</sup>

In the specific case of bilomas, abdominal ultrasound is the method of first line research, however the contrast tomography allows to define in a precise way its size, nature (unilocular or septate) regional distribution and anatomy in relation to adjacent structures, as well as the underlying cause.<sup>12,13</sup> Biloma can have different sizes, from a few centimeters to 40 cm, with the largest presenting a maximum of 5700 ml of bile; differential diagnosis should be made with hematomas, seromas, liver abscess, cyst, pseudocyst or lymphocele.<sup>12-14</sup> Magnetic cholangioresonance or ERCP are very useful when there is an active or persistent bile leakage, but if this leakage is not continuous it usually hinders the diagnosis.<sup>13</sup> Another diagnostic option is percutaneous aspiration under radiological guidance, since the liquid obtained is sent for biochemical analysis and culture.<sup>12,13</sup> It is mentioned that the management of bilomas of few centimeters could be conservative, only with surveillance, however most of the bilomas require some type of treatment. The current treatment is suggested either by guided percutaneous drainage and use of pigtail or endoscopic catheters (nasobiliary drainage or endoscopic sphincter and stent use), leaving surgical management only for few patients,

in general, those in which endoscopic or percutaneous management is not satisfactory or there is an underlying cause that merits it (definitive treatment of bile tumors or persistent bile leakage despite previous management). Our pediatric patient had as a treatment percutaneous drainage guided by ultrasound and with pigtail catheter placement, having complete resolution of biloma and avoiding surgical procedure.<sup>13</sup>

## CONCLUSION

Blunt liver trauma has a low incidence of biliary complications, especially in pediatric patients, and early diagnosis of these requires a high rate of suspicion. The diagnosis is made with a contrast tomographic study and the best treatment approach is guided or endoscopic percutaneous drainage, with surgical management as the last option.

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