

Penetrating Abdominal Trauma with Associated Gallbladder Injury: Diagnostic Challenges and Surgical Management

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Abstract

Case Report

Penetrating abdominal wounds are a common surgical emergency. Although hepatic injuries are frequent, associated gallbladder trauma remains rare and is often difficult to diagnose. We report the case of a 35-year-old man who sustained a penetrating abdominal stab wound. Computed tomography revealed a hepatic laceration with suspected gallbladder injury. Exploratory laparotomy confirmed a segment IV liver laceration with spontaneous hemostasis and an associated gallbladder perforation. An antegrade cholecystectomy and drainage were performed. The postoperative course was uneventful. This case highlights the diagnostic challenges of gallbladder injuries associated with liver trauma, the value of CT and laparoscopy, and the need for conversion to laparotomy when digestive injuries are suspected. Timely and appropriate management improves prognosis, particularly in the presence of associated biliary lesions.

Keywords: Penetrating abdominal trauma; Gallbladder injury; Antegrade cholecystectomy; Exploratory laparotomy; Computed tomography.

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INTRODUCTION

Penetrating abdominal trauma, particularly from stab wounds, represents a major challenge in emergency surgery. Among affected organs, the liver is the most frequently involved due to its size and anatomical position [1,2]. Hepatic injuries carry a risk of severe hemorrhage and biliary complications. In contrast, gallbladder injuries although rare (1–2%) are clinically significant because they may lead to bile leaks and severe infectious complications [3–5].

Preoperative diagnosis of gallbladder injuries remains difficult. Clinical manifestations are often subtle, and bile leakage may initially be paucisymptomatic [5]. Imaging, especially computed tomography (CT), plays a central role in identifying hepatic lesions and suggesting associated biliary injuries [6].

We report a clinical case illustrating these diagnostic challenges and the appropriate therapeutic approach.

CASE REPORT

A 35-year-old male, chronic smoker, regular cannabis user, and chronic alcohol consumer, was admitted to the emergency department five hours after sustaining a stab wound to the right hypochondrium.

The patient was conscious, hemodynamically and respiratorily stable. Examination revealed a 3-cm linear penetrating abdominal wound with localized pain, without signs of shock or vomiting.

CT of the chest, abdomen, and pelvis showed a segment IV hepatic laceration in intimate contact with the gallbladder wall, without excluding a breach of the gallbladder, along with small pre-hepatic air bubbles and a moderate intraperitoneal effusion particularly in Morison's pouch. Laboratory tests were normal.



Figure 1: CT image showing the segment IV liver injury.

A decision was made to perform exploratory laparotomy via a supraumbilical midline incision. Upon opening, a small hemoperitoneum was identified along

with a 2-cm liver laceration in segment IV with spontaneous hemostasis.

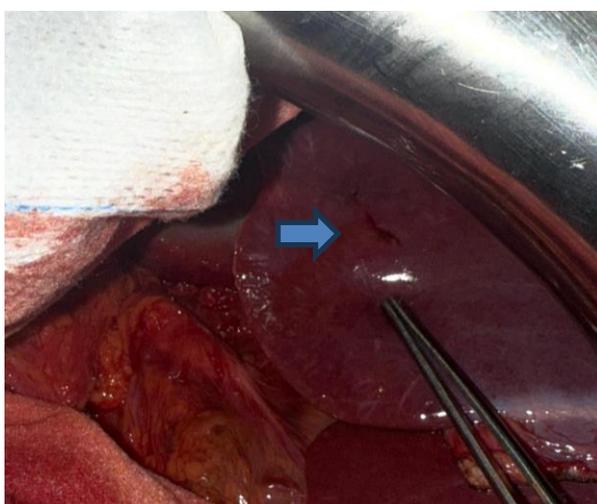


Figure 2: Intraoperative image showing the segment IV liver laceration.

The gallbladder exhibited a perivesicular biliary collection suggestive of a perforation on its hepatic surface.

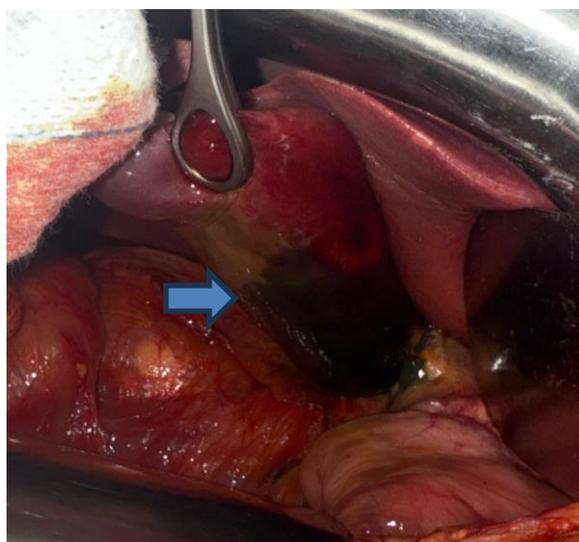


Figure 3: Intraoperative image showing a perivesicular biliary effusion at the infundibulum.

A Kocher maneuver was performed, confirming the integrity of the duodeno-pancreatic block. An antegrade cholecystectomy was then carried out,

allowing optimal identification of the cystic duct and thorough exploration of the main bile duct, which was found to be intact.

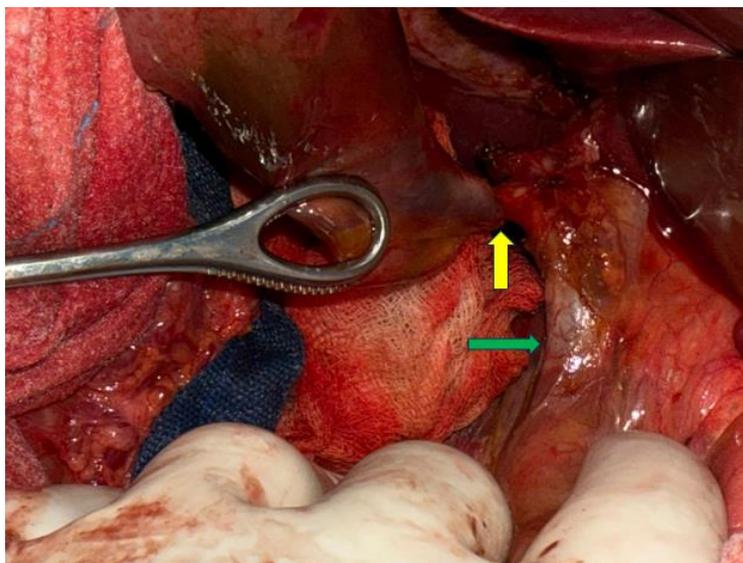


Figure 4: Intraoperative image showing the cystic duct (yellow arrow) and the intact common bile duct (green arrow).

A Salem drain was placed in the subhepatic space; postoperative drainage was minimal and the tube was removed on day 3. The patient was discharged on postoperative day 4 with a favorable outcome.

DISCUSSION

Gallbladder injuries are rare in penetrating abdominal trauma, with an incidence of 1–2% [3,4]. This rarity is largely due to the protective effect of the liver and rib cage [7]. These lesions are frequently underdiagnosed because their clinical presentation is nonspecific and often overshadowed by symptoms of associated injuries [5,8]. In our case, the absence of vomiting, major hemorrhage, or hemodynamic instability illustrates these diagnostic challenges.

CT is currently the imaging modality of choice in abdominal trauma for accurate assessment of hepatic injuries and detection of biliary effusions [6,9]. The presence of air bubbles within a hepatic hematoma or free intraperitoneal bile should raise suspicion of gallbladder or biliary tract injury [6]. However, CT sensitivity for detecting gallbladder perforation itself remains limited, making surgical exploration essential [9].

Laparoscopy offers rapid and minimally invasive assessment of penetrating abdominal injuries, significantly reducing unnecessary laparotomies [1,10]. It also allows immediate management of limited lesions, including antegrade cholecystectomy [11].

Nevertheless, conversion to laparotomy remains necessary when digestive injuries are suspected,

as in our case where a suspected gastrocolic ligament injury required conversion. This strategy aligns with current recommendations favoring a stepwise approach that minimizes surgical aggression while ensuring adequate management [10,12].

Antegrade cholecystectomy is the recommended procedure for gallbladder perforation, as it eliminates the source of bile leak and prevents severe infectious complications such as peritonitis or subphrenic abscess [3,5]. Preservation of the main bile ducts is crucial for prognosis, as confirmed in our observation [4].

Major complications of hepatic trauma remain hemorrhage and bile leakage. Early management combining hemodynamic resuscitation, appropriate imaging, and tailored surgical intervention is essential to reduce morbidity and mortality [2,13].

Our findings are consistent with those of Velmahos *et al.*, (2001), who emphasize the key role of CT in the evaluation of hepatic injuries and the need for individualized surgical strategies [2]. Schulman *et al.*, (2007) highlight laparoscopy as a major advancement in the management of penetrating trauma, reducing unnecessary laparotomies, with justified conversion rates of 20–30% [1]. Lucas *et al.*, (1992) reported that early management of post-traumatic bile leaks through cholecystectomy significantly improves outcomes, supporting the therapeutic approach adopted in our case [5].

CONCLUSION

Penetrating abdominal trauma involving gallbladder injury is a rare and complex situation requiring accurate diagnosis and appropriate surgical management. CT plays a central role in detecting these lesions. Exploratory laparoscopy is a valuable tool, but conversion to laparotomy remains mandatory when digestive lesions are suspected. Antegrade cholecystectomy is the treatment of choice for gallbladder perforation, enabling favorable postoperative outcomes.

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