A Minimally Invasive Approach to Bile Duct Injury After Blunt Liver Trauma in Pediatric Patients

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A 12-year-old boy presented with a large liver laceration after blunt abdominal trauma. He was treated nonoperatively and subsequently had bile peritonitis from a bile leak. Endoscopic retrograde cholangiopancreatography (ERCP) visualized the bile duct injury and allowed decompression of the biliary tree with an endoscopically placed biliary stent. A drain also was placed over the laceration through a small subcostal incision. The patient recovered rapidly after this minimally invasive procedure and went home 9 days later.

INDEX WORDS: Blunt abdominal trauma, bile duct injury, endoscopic retrograde cholangiopancreatography.

NONOPERATIVE MANAGEMENT of blunt liver injuries has become the standard of care in children with blunt abdominal trauma and stable vital signs.[1-4] Bile leak with subsequent bile peritonitis is a rare complication of these injuries that historically has required surgical intervention. We describe the successful treatment of a traumatic bile duct injury using endoscopic retrograde cholangiopancreatography (ERCP) and biliary stenting in a pediatric blunt trauma patient. The relevant literature is reviewed, showing that this is the first reported case of primary endoscopic decompression of a blunt traumatic liver injury in the pediatric population.

CASE REPORT

A 12-year-old boy was transferred to our institution from a peripheral hospital after being stepped on by a steer during a rodeo. He was hemodynamically stable and complained of abdominal pain. Tenderness was present in the right upper quadrant on physical examination, and a computed tomography (CT) scan of the abdomen showed a large liver laceration extending from the surface of the right lobe to the porta hepatis (Fig 1).

Given the patient's hemodynamic stability, a course of conservative management was decided on, and he was admitted for observation. Four days after admission, the patient had increasing abdominal pain and tenderness, a low-grade fever, and ileus. Hemodynamic parameters and hemoglobin level remained stable, but total bilirubin had increased to 66 μmol/L. A HIDA scan was performed, which showed abnormal activity scattered throughout the peritoneal cavity consistent with a bile leak (Fig 2). The patient was taken to the operating room where a Broviac catheter was placed in the left subclavian vein for ongoing total parenteral nutrition (TPN). Using a minimally invasive approach, the injury site overlying the liver then was visualized, and approximately 1L of bilious fluid was suctioned from the abdomen. A Jackson-Pratt drain then was placed through this incision and laid along the superior surface of the liver laceration. An ERCP was performed under the same anesthetic, which showed a leak from the posterior branch of the left hepatic duct (Fig 3). A 7F biliary stent then was placed endoscopically, bridging the site of the leak and decompressing the bile duct across the ampulla of Vater.

Postoperatively, the patient made a speedy and dramatic recovery.

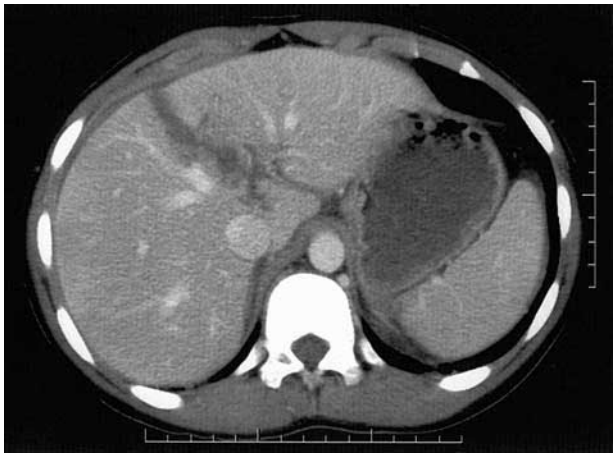

Fig 1. Initial CT (day 0) shows large liver laceration extending to the porta hepatis.

TPN was discontinued 7 days after surgery, and the patient was discharged home on postoperative day 9. The stent was removed uneventfully 6 weeks later, and a follow-up ultrasound scan done at 3 months was normal.

DISCUSSION

Nonoperative management of hemodynamically stable patients with blunt solid organ injuries is now accepted

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0022-3468/02/3705-0021$35.00/0
doi:10.1053/jpsu.2002.32284

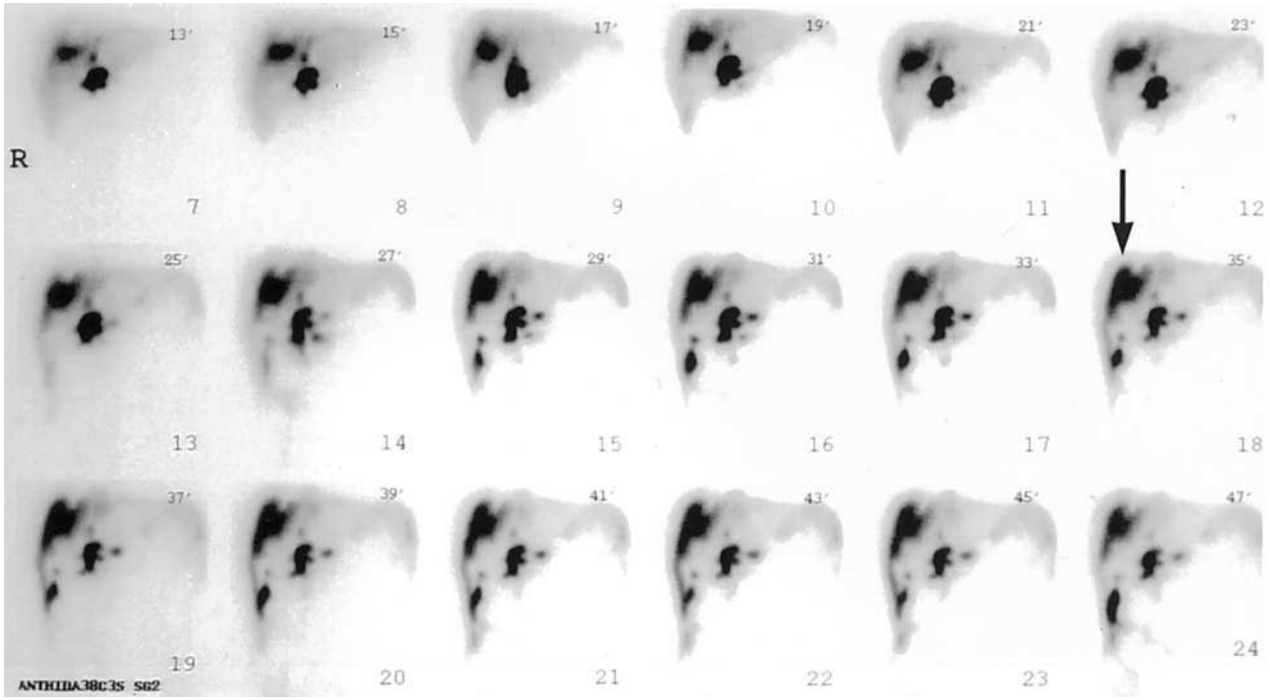

Fig 2. HIDA scan (day 4) shows scattered activity throughout the abdominal cavity.

as the standard of care. Bile duct injury with subsequent bile leak and bile peritonitis is a rare but serious complication of these injuries, occurring in 0.5% to 21% of patients according to the literature.[5-7] Traditionally, bile duct injuries have required surgical intervention with some form of resection or hepaticoenterostomy, which often is difficult and carries with it a significant morbidity.[7,8]

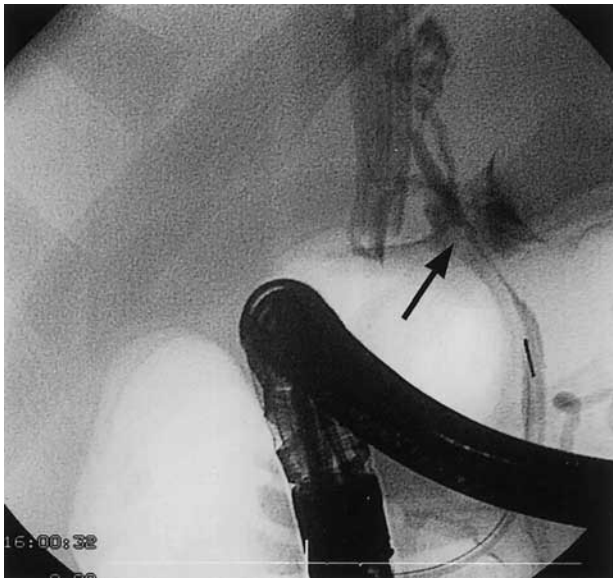

Fig 3. ERCP shows extravasation of contrast from a branch of the left hepatic duct (arrow).

ERCP with endobiliary stenting is well recognized as the first line treatment of bile leaks arising from the cystic duct stump and duct of Luschka after laparoscopic cholecystectomy.[9-12] The stent abolishes the pressure gradient between the bile duct and the duodenum, decompressing the biliary tree and allowing the leak to seal. The use of ERCP and endobiliary stenting in the management of bile duct injuries after blunt liver trauma also is well documented in the adult population.[7,13-15] In the pediatric literature, there is one case report of successful treatment of a post liver biopsy bile leak using ERCP and stenting.[16] However, to our knowledge, ours is the first report in which ERCP and placement of an endobiliary stent has been used successfully as the initial treatment modality in a pediatric patient with a bile duct injury secondary to blunt liver trauma.

Moulton et al[19] reported 1 case of a pediatric patient in whom a posttraumatic bile leak was treated successfully with ERCP and stenting, but this was done as a second line treatment after initial management with percutaneous drainage had failed. Poli et al[18] and Sanders and Andrews[19] report the use of ERCP to diagnose a posttraumatic bile leak; however, the patient in the study by Sanders and Andrews was treated with a laparotomy and cholecystostomy tube, whereas the patient in Poli et al was managed with a nasobiliary drain, which is obviously less desirable than an endobiliary stent from a patient comfort standpoint, especially in the pediatric population.

In our case, ERCP and endobiliary stenting, in combination with drain insertion through a small incision, was a safe, effective, and minimally invasive treatment of a traumatic bile duct injury. We were struck by the rapid resolution of the biliary drainage after stenting. This is significantly different then our past experience with this injury; typically we have seen biliary drainage for weeks after external drainage without stenting. We therefore propose that pediatric patients with blunt liver trauma who have signs and symptoms of bile peritonitis should first undergo a HIDA scan to confirm the presence of a bile leak followed by ERCP and endobiliary stenting in combination with a surgically or percutaneously placed drain as first-line treatment. This represents a convergence of treatment between the adult and pediatric populations. However, with very small patients (ie, <20 kg) there may be limitations in the ability to cannulate the common duct using ERCP. Finally, the basic principles of trauma surgery mandate that careful inspection of other organs should be part of the routine trauma laparotomy, whether done by conventional open technique, or minimally invasive adaptations.

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