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Case Report

Segmental bile duct leakage after hepatic resection managed with percutaneous ablation by N-butyl cyanoacrylate

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A biloma is a rare abnormal accumulation of intrahepatic or extrahepatic bile caused by a traumatic or spontaneous rupture of the biliary tree. The reported incidence of postoperative biloma ranges from 4.8% to 7.6%. Biliary drainage is usually important and necessary for the treatment of biloma, but sometimes bile leakage fails to improve despite prolonged conservative drainage. We report a case of postoperative refractory biliary leakage managed with percutaneous ablation by N-butyl cyanoacrylate. **(Korean J Hepatobiliary Pancreat Surg 2012;16:115-119)**

Key Words: Biloma; Biliary leakage; N-butyl cyanoacrylate

INTRODUCTION

A biloma has been reported to occur as a result of biliary surgery, endoscopic retrograde cholangiopancreatography (ERCP) procedures, laparoscopic cholecystectomy, trauma, and occasionally spontaneously.[1,2] The amount of bile leakage from small ducts on the raw cut surface of a liver is usually small and the site of the leakage may close spontaneously, although it may need facilitation by a temporary percutaneous or endoscopic drainage to divert bile from the leakage site.[2,3] But in patients with bile leakage from a transected, isolated bile duct, surgery should sometimes be performed.[4] We report a case of postoperative refractory segmental bile duct leakage, managed successfully by intrahepatic biliary ablation with N-butyl cyanoacrylate.

CASE

A 70-year-old man was admitted to our hospital for further management of a 15 cm-sized abdominal fluid collection. He was diagnosed with hepatocellular carcinoma and underwent a central lobectomy fifteen months prior. At follow-up, he underwent a CT scan every three months. Fifteen months after surgery, computed tomography (CT) imaging studies revealed a 15×12 cm-sized fluid collection located on the resected liver surface (Fig. 1). He was admitted for a possible rupture of the biloma. On admission, his vital signs and physical examination

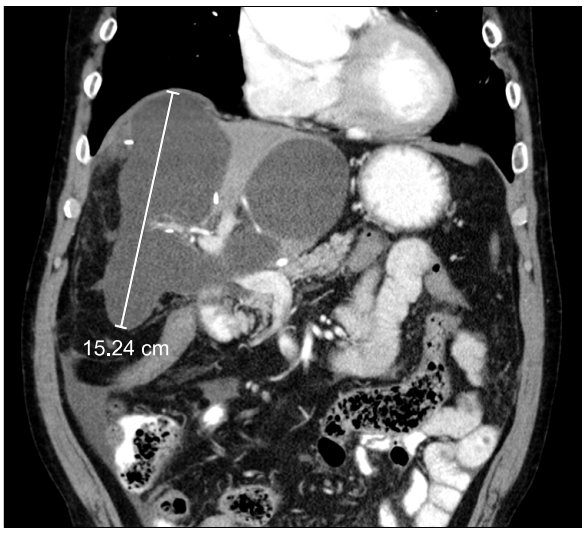

Fig. 1. Postcontrast abdominal computed tomography shows a large intrahepatic fluid collection at the resected bed.

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were normal. The laboratory studies were as follows: leucocyte 5,160/mm^3, hemoglobin 10.8 g/dl, platelets 139,000/mm^3, AST 20 IU/L, ALT 11 IU/L, alkaline phosphatase 68 IU/L, total bilirubin 0.48 mg/dl, total protein 5.9 g/dl, albumin 3.5 g/dl, BUN/Cr 20.5/0.84 mg/dl, C-reactive protein 1.0 mg/dl, alpha-fetoprotein 1.26 ng/ml, and prothrombin time of 13.4 seconds. The viral marker tests, including HBsAg, anti-HBs Ab and anti-hepatitis C virus (HCV), were all negative.

On the third day after admission, percutaneous drainage (PCD) with a 10-Fr pigtail catheter, under the guidance of an abdominal ultrasound, was performed for diagnosis and treatment. We removed 1,000 ml of fluid that was dark green in color. For a diagnosis, biochemical tests were carried out on the bile, and these tests revealed a total bilirubin of 9.35 mg/dl and a direct bilirubin of 7.45 mg/dl that was thought to be caused by bile leakage. We then performed a right percutaneous transhepatic biliary drainage (PTBD) procedure (8 Fr) to divert bile from the site of the injury. But the cholangiogram image did not demonstrate segmental contrast (bile) leaks. On the seventh day after admission, no communication to the biloma was found in a cholangiogram via the right PTBD catheter. Bile continued to drain from the catheter for 1 week, at approximately 20-40 ml daily after PTBD clamping. Because there was no communication between the biloma and the common hepatic duct, the right PTBD was removed.

On the seventeenth day after admission, the patient was discharged with a percutaneous biloma drainage catheter for spontaneous closure of the biliary leakage during outpatient follow-up. However, the patient inadvertently pulled out his external drainage catheter one month later.

He was admitted to the emergency room with abdominal pain, nausea and febrile sensation. A percutaneous fluid drainage under ultrasonograhic guidance was done again. Approximately 50-100 ml per day of bile continued to drain for 17 days. For bile diversion, a percutaneous right transhepatic biliary drainage procedure (8.5 Fr) was performed. On the seventh and fifteenth day after PCD reinsertion, tubograms were performed and no communication to the bile ducts was found at that time. On seventeenth day after PCD reinsertion, the communication between the biloma and the isolated right superior intrahepatic bile duct was noted via a third tubogram performed with a PCD catheter (Fig. 2). For cessation of bile production from that segment and its subsequent atrophy, we did additional selective catheterization (6 Fr) of the actual leaking bile duct. The next day, 2 ml of cyanoacrylate combined with lipiodol was injected into an isolated bile duct as the selective catheter was withdrawn under real-time fluoroscopic control. This immediately achieved fistula closure (Fig. 3). On the nineteenth day after PCD reinsertion, the volume of bile juice decreased markedly and ceased. Then the PTBD was clamped and removed

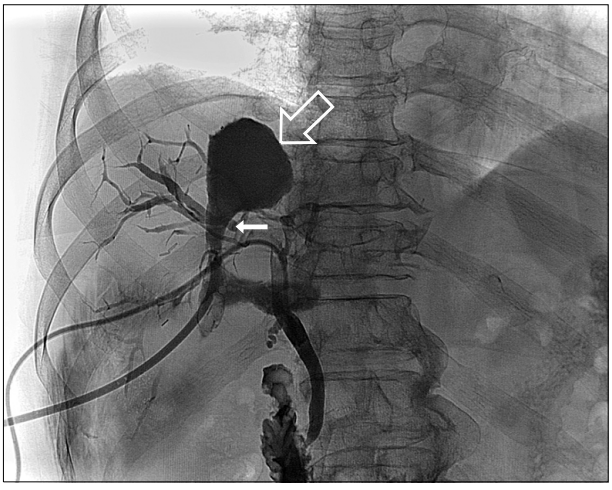

Fig. 2. Fluoroscopic spot film of a tube cholangiogram demonstrating contrast (bile) extravasation (bile leak site; open arrow) from a dehisced isolated right intrahepatic bile duct segment (arrow). An adjacent biloma is seen with a drain in it.

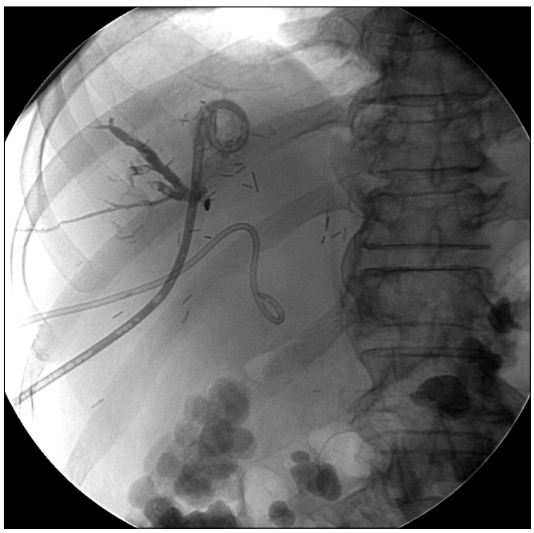

Fig. 3. Image obtained during an N-butyl cyanoacrylate (glue) injection for ablating a fistula. It shows obliteration of the communication between the biloma and the bile duct.

Fig. 4. Follow-up contrast-enhanced computed tomography image demonstrating the hardened N-butyl cyanoacrylate casting the ablated right intrahepatic bile duct. Marked decrease in the size of the biloma is shown.

two days later. The percutaneous catheter was removed after five days and the patient had no complaints or symptoms.

The patient has been carefully monitored every three months since discharge. A CT scan obtained 10 months later showed significant decreased collection in the cavity (Fig. 4). The patient's recovery was uneventful.

DISCUSSION

A biloma is defined as an encapsulated collection of bile outside the biliary tree. Bile leaks can be classified as either due to biliary discontinuity with biliary spillage into the peritoneal cavity or due to biliary cutaneous fistulae. A biloma is most commonly caused by surgery, percutaneous transhepatic cholangiography (PTC), PTBD, and abdominal trauma.[1,2,5] The clinical presentation of a biloma varies greatly from non-specific abdominal pain to biliary sepsis.[6] Encapsulation of bile within the omentum and mesentery prevents generalized peritonitis in most cases.[7] Abdominal ultrasonography is the first modality to evaluate the nature of a biloma and the underlying pathology. However, an abdominal CT can define the disease, the cause and the relationships with adjacent structures more accurately.[8] A differential diagnosis should include hematoma, seroma, liver abscess, cysts, pseudocysts, and lymphocele.[9] Helpful distinguishing features are clinical history, anatomy and location of the lesion, CT number, and character of the material obtained by aspiration. Most bilomas have CT numbers of less than 20H, but may be higher when the bile is mixed with blood or exudates.[7] Ultrasonography or CT scan of the abdomen is useful in locating a fluid collection but does not indicate the site of leakage. Percutaneous aspiration under radiologic guidance can also aid in diagnosis and treatment. Typically, bilomas contain clear, greenish bile, but the bile may be discolored by a secondary infection, exudates, or blood. When necessary, the presence of bilirubin may be documented by chemical techniques.

Management of the biloma in a patient includes appropriate measures such as intravenous hydration and initiation of antibiotic treatment if sepsis is present. Some bilomas, especially those that are small in size and asymptomatic, can be followed without intervention, but most cases require treatment.[8] A bile leak may persist because of an elevated intrabiliary pressure caused by a distal stone obstruction or simply due to the normal positive intrabiliary pressure maintained by the Sphincter of Oddi. Thus, it is important to lower the intrabiliary pressure in order to promote closure and healing of the injured bile duct.[10]

In the past, surgery was the main approach to treatment. Surgery is now performed only in cases with a persistent bile leak or for treatment of an underlying disease. Today, there is a much wider variety of options such as percutaneous catheter drainage and/or endoprosthesis placement, endoscopic sphincterotomy (EST), endoscopic nasobiliary drainage (ENBD) and endoscopic drainage.[2,6,11] However, biliary decompression will not be effective when the leaking ducts do not communicate with the common bile duct. In such cases, bile leak site embolization/sclerosis, and leaking biliary segment ablation are useful. This report indicates that N-butyl Cyanoacrylate ablation may be effective in the unfortunate cases of refractory biliary leakage after hepatectomy.

There are two scenarios for biliary ablation. The first is an actual bile leak site ablation or embosclerosis to reduce an aperture or ablate a fistula (block a hole). The second is ablating an entire biliary segment to cease bile production and induce hepatic segmental atrophy (cease bile production).[12] The most common biliary segment to be inadvertently transected in hepatic resection (left hemi-

hepatectomy or left lobectomy or laparoscopic injury) is the right posterior bile duct. This is due to its not uncommon aberrant anatomy where the right posterior duct drains into the left biliary system.

When approaching from the biliary tract in an acute bile leak setting, ablative materials that may be used include absolute (98-99%) alcohol, acetic acid, and cyanoacrylate (glue).[12] Absolute alcohol requires that the biliary system be purged of anything that would dilute the alcohol. Fifty percent acetic acid is made by combining one-part absolute acetic acid with one-part of contrast. Both 50% acetic acid and absolute alcohol are left to dwell for approximately 5 minutes and then the biliary system is lavaged with saline.[3,13] Cyanoacrylate (glue) requires the biliary system to be irrigated with a dextrose solution. The cyanoacrylate is combined with ethiodol for fluoroscopic visualization and does not require dwell time.[14] In fact, the administering catheter is removed before it can adhere to the glue. The literature is limited regarding this subject; however, it appears that cyanoacrylate requires fewer sessions (one to two sessions) than the other ablative agents that are required to dwell in the biliary system (four to six sessions).[3,13,14] It should be noted that, in the acute setting with no fistulous tract formation, ablative substances (acetic acid, alcohol, and cyanoacrylate) may cause intense pain if they come in contact with the peritoneum.[12] Unfortunately, biliary leakage is sometimes encountered, and it can be complicated when it does occur.[4,15,16] An N-butyl cyanoacrylate injection into the bile duct provides a management option in cases in which conservative treatment has failed and a surgical approach is relatively difficult.

Although we have no data how large a leakage could be sealed with the N-butyl cyanoacrylate, we believe that leakages of less than 50 ml/d could be blocked by the procedure. Once the glue seals the fistula completely, the effect is immediate and safe. Cyanoacrylate glue, which polymerizes on contact with biologic tissue, may arrest leaks by plugging fistulous tracts arising from the bile duct lumen. The contrast agent lipiodol is used for increasing the viscosity of the mixture applied and for precise radiographic localization.[17] In one series of patients with biliary leaks that were sealed with cyanoacrylate, treatment was successful in 7 of 9 cases with a single injection.[18] But one article reported a serious complication of cyanoacrylate where there was ascending venous thrombosis from the middle hepatic vein to the left pulmonary artery and it was removed surgically.[19] Other complications are the potential risk of catheter and stent adherence, occlusion, biliary obstruction, and atrophy of the liver.

We reported a case of hepatic resection of hepatocellular carcinoma that was complicated by an intrahepatic biloma. Because external biliary drainage continued despite prolonged conservative management, a repeated tubogram was done to find the site of the bile leakage. A repeated tubogram or fistulogram may be helpful in assessing the nature of the bile leak because a communication may not always be demonstrated until a fistula is established, or any associated intra-abdominal collection has been resolved. We found an isolated bile duct and performed cyanoacrylate ablation of the isolated bile duct.

In summary, intrahepatic biliary ablation with N-butyl cyanoacrylate is effective in controlling bile leak and offers an alternative treatment to surgical repair.

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