



Transcatheter arterial embolization using n-butyl cyanoacrylate–Lipiodol mixture and metallic coils in a patient with biliary hemorrhage after removing a bile duct metallic stent: a case description

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Introduction

Although biliary hemorrhage is rare, its frequency has increased in recent years owing to the increasing application of minimally invasive procedures in the hepatobiliary and pancreatic regions (1). The frequency of iatrogenic biliary hemorrhage has been reported to be 65% (1). The main causes of biliary hemorrhage are percutaneous transhepatic treatment, surgical procedures within the hepatic hilum, and endoscopic placement of bile duct stents (2,3). Feng *et al.* reported that hemorrhage occurred from the hepatic artery in all 30 cases that underwent percutaneous transhepatic treatment or surgical procedure of the hepatic hilum (2). Kim *et al.* described that hemorrhage occurred from the hepatic artery in 15 of 19 patients who underwent endoscopic bile duct stenting, from the gastroduodenal artery in 3 patients, and from the posterior superior pancreaticoduodenal artery (PSPDA) in 1 patient (3). By contrast, biliary hemorrhage after removing a bile duct stent is extremely rare, and hemostasis was achieved using a covered stent in all prior reports (4). To the best of our knowledge, this is the first reported case of biliary hemorrhage after removing a metallic bile duct stent that was embolized using *n*-butyl-cyanoacrylate (NBCA)–Lipiodol mixture and metallic coils.

Case presentation

The patient, a male in his 70s, had previously undergone transpapillary implantation of a bare metal stent (BONASTENT® 10 mm/6 cm, MEDICO'S HIRATA Inc., Osaka, Japan) to treat obstructive cholangitis caused by a pancreatic head tumor. Biopsy revealed diffuse large B-cell lymphoma and chemotherapy was performed. Because chemotherapy reduced the size of the pancreatic head tumor by 56%, the stent was removed using forceps 38 days after the end of chemotherapy. There was no obvious hemorrhage immediately after removing the stent. However, 3 hours after stent removal, he developed extensive melena and abdominal pain. Because abdominal contrast-enhanced computed tomography showed a 9 mm pseudoaneurysm in the common bile duct (*Figure 1A*) and his blood pressure was decreased, transcatheter arterial embolization was performed. A 4 Fr sheath (Radifocus Introducer II H, Terumo Clinical Supply, Gifu, Japan) was inserted via the right femoral artery, and a 4 Fr catheter (Pig tail, Medikit, Tokyo, Japan) was inserted for computed tomography during aortography. The three-dimensional reconstructed images indicated that the posterior pancreaticoduodenal artery was responsible for the pseudoaneurysm (*Figure 1B*). First, a 4 Fr guiding catheter (RC2, Medikit, Tokyo, Japan

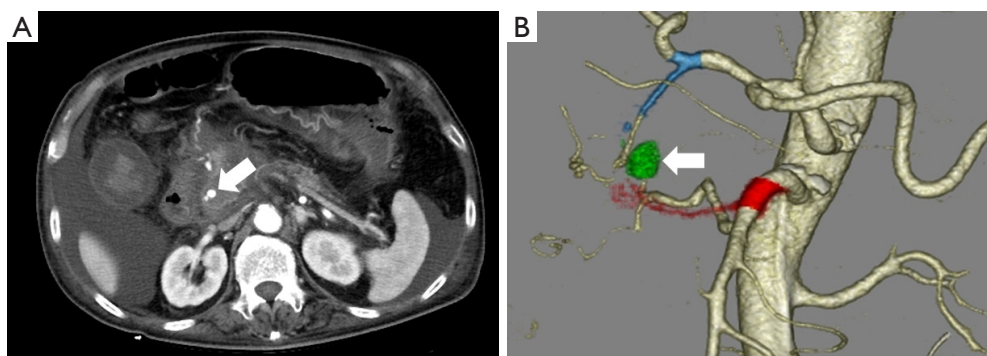


Figure 1 Preoperative imaging. (A) Contrast-enhanced computed tomography shows a pseudoaneurysm near the pancreatic head (arrow). (B) Volume-rendered arteriogram created by computed tomography during aortography showing the gastroduodenal and posterior superior pancreaticoduodenal arteries (blue), the inferior pancreaticoduodenal and posterior inferior pancreaticoduodenal arteries (red), and a pseudoaneurysm (green, arrow).

or 1CJ, Hanako Medical, Saitama, Japan) was inserted to cannulate the superior mesenteric artery. The posterior inferior pancreaticoduodenal artery was embolized with three metallic coils (Target XL 2 mm/6 cm, Boston Scientific, Natick, MA, USA) as close as possible to the pseudoaneurysm using a microcatheter (Tellus, Asahi Intecc, Aichi, Japan; *Figure 2A,2B*). Next, a 4 Fr guiding catheter was cannulated into the celiac artery, but it was difficult to advance the microcatheter close to the pseudoaneurysm due to spasm of the PSPDA. To avoid proximal embolization, NBCA (Histoacryl[®], B. Braun, Melsungen, Germany)–Lipiodol (Ultra-Fluide[®], Guerbet, Roissy, France) mixture (NBCA:Lipiodol =1:3) was injected to embolize the PSPDA (*Figure 2C,2D*). Angiography after embolization showed no obvious extravascular leakage of contrast medium and his blood pressure increased. The immediate postoperative computed tomography showed a high attenuating area in the common bile duct consistent with the NBCA–Lipiodol mixture (*Figure 2E*). Non-contrast computed tomography on postoperative day 4 showed that the NBCA–Lipiodol mixture had disappeared from the common bile duct and was excreted into the duodenum (*Figure 2F*). His total bilirubin and direct bilirubin levels were elevated on postoperative day 1, and had decreased to normal levels on postoperative day 4 (*Figure 3*). Postoperatively, the patient's anemia and cholangitis improved, and there was no evidence of pancreatitis or organ necrosis. The patient was transferred to another hospital 2 months later.

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committees and with the Helsinki Declaration (as revised in 2013). Written informed consent

was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

Discussion

The clinical success rate of transcatheter arterial embolization for biliary hemorrhage is high, ranging from 80% to 100%, and it is a treatment that should be actively considered for such events (5). Liquid embolic materials such as NBCA and metallic coils are often used for embolization of biliary hemorrhage (6,7). Advantages of NBCA are that embolization is independent of its coagulation ability and it allows a shorter procedure time. However, because of its liquid property, it is difficult to control the extent of embolization, and there is a risk that liquid embolic materials may inflow into non-target areas. It was reported that NBCA–Lipiodol mixtures with lower concentrations of NBCA are more likely to reach distal sites (8,9). Therefore, in this patient, it was deemed necessary to increase the NBCA concentration in the NBCA–Lipiodol mixture to prevent inflow into the common bile duct. However, in a prior study of aneurysms, it was reported that migration was less likely to occur if the NBCA concentration was $\geq 30\%$ (10). In other words, if the concentration of NBCA exceeds 30%, polymerization of NBCA can be too fast or too hard (11,12). For these reasons, we used NBCA–Lipiodol mixture comprising 25% NBCA for embolization of the biliary hemorrhage. Excretion of the NBCA–Lipiodol mixture into the duodenum was observed 4 days after embolization.

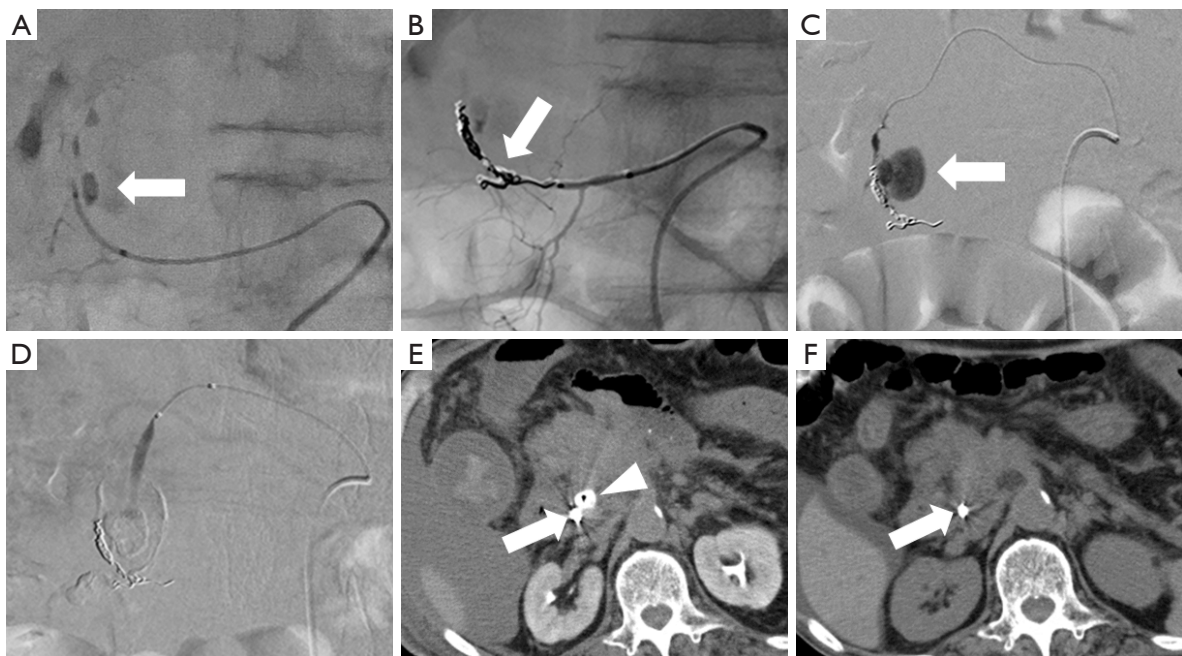


Figure 2 Transcatheter arterial embolization and postoperative computed tomography. (A) Angiography from the PIPDA shows extravascular leakage of the contrast medium (arrow). (B) Angiography from the inferior pancreaticoduodenal artery shows the metallic coils implanted in the PIPDA (arrow). (C) Angiography from the PSPDA shows a pseudoaneurysm (arrow). (D) Angiography from the gastroduodenal artery after injection of the *n*-butyl cyanoacrylate–Lipiodol mixture into the PSPDA shows the pseudoaneurysm has disappeared. (E) Computed tomography immediately after embolization shows the metallic coils in the PIPDA (arrow) and the *n*-butyl cyanoacrylate–Lipiodol mixture in the common bile duct (arrowhead). (F) Computed tomography 4 days after embolization shows the metallic coils in the PIPDA (arrow) and the disappearance of the *n*-butyl cyanoacrylate–Lipiodol mixture from the common bile duct. PIPDA, posterior inferior pancreaticoduodenal artery; PSPDA, posterior superior pancreaticoduodenal artery.

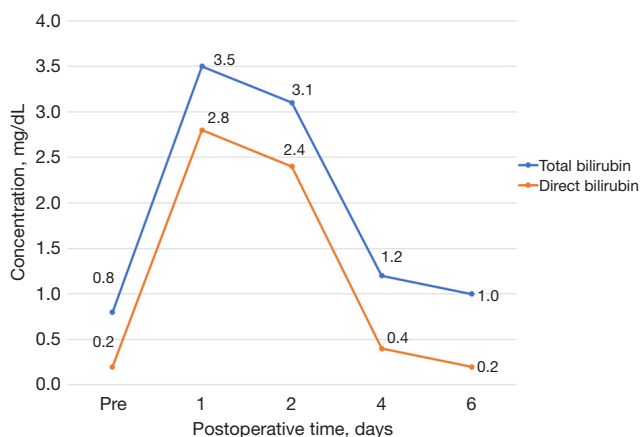


Figure 3 Serum bilirubin levels. The total bilirubin and direct bilirubin levels decreased to normal levels 4 days after embolization. Normal ranges: total bilirubin, 0.3–1.2 mg/dL; direct bilirubin, 0.0–0.4 mg/dL.

Although a liquid embolic material was chosen due to spasm of the PSPDA, embolization with metallic coils was preferred because of the risk of inflow of the embolic material into the common bile duct.

Conclusions

This rare case of biliary hemorrhage, which occurred after removing a metallic stent from the bile duct, demonstrates that hemostasis can be achieved by transcatheter arterial embolization using NBCA–Lipiodol mixture and metallic coils.

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Footnote

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <https://qims.amegroupp.com/article/view/10.21037/qims-22-95/coif>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committees and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

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