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CASE REPORT | BILIARY

Proximal Biliary Stent Migration Causing Cardiac Tamponade

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ABSTRACT

Plastic biliary stents are commonly placed during endoscopic retrograde cholangiopancreatography for various indications, and stent-related complications are uncommon. We describe a case in which a plastic biliary stent migrated proximally through the liver capsule and diaphragm after endoscopic retrograde cholangiopancreatography, leading to pericardial effusion and cardiac tamponade. It is important for clinicians managing patients with biliary stents to be aware of this significant adverse event.

INTRODUCTION

Endoscopic biliary stent placement during endoscopic retrograde cholangiopancreatography (ERCP) is a common technique used to manage benign and malignant biliary pathology. Migration of flanged plastic stents occurs in roughly 8%–11% of cases, with approximately half of these cases (3%–6%) related to proximal stent migration, typically without untoward effects.[1–3] The occasional stents that migrate proximally can usually be retrieved using standard ERCP techniques. However, a handful of cases of transdiaphragmatic stent migration leading to abdominal wall, pulmonary, or pericardial injury have been described.[4–8]

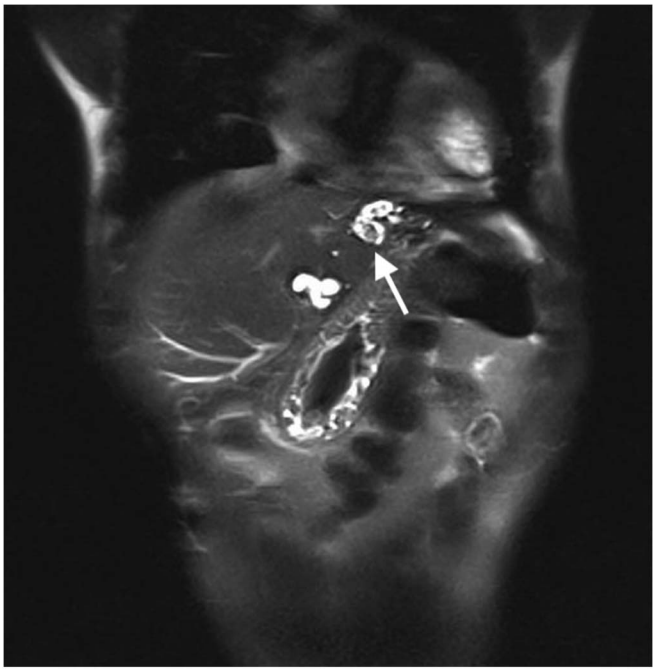

Figure A. Magnetic retrograde cholangiopancreatography image showing dilated left intrahepatic ducts with a stone (arrow).

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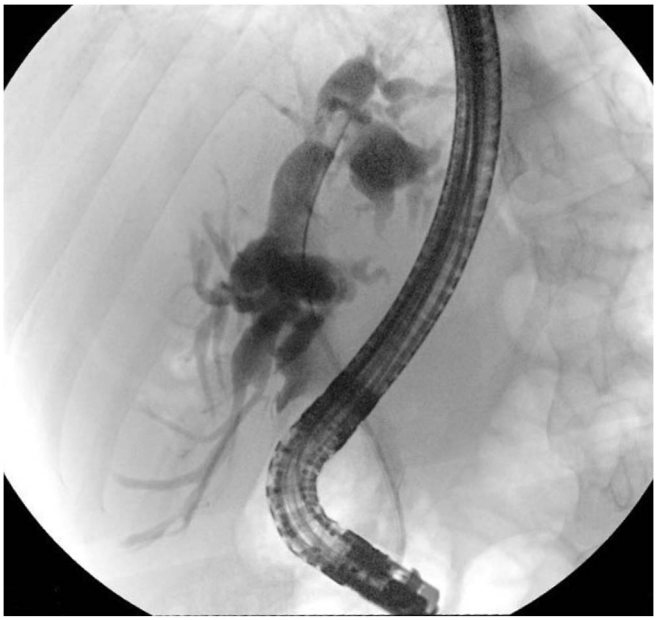

Figure B. Endoscopic retrograde cholangiopancreatography showing left intrahepatic ducts after dilation and stone clearance.

CASE REPORT

A 47-year-old Hispanic man presented to the University of Colorado Hospital Emergency Department with severe epigastric and chest pain. He had a history of complicated gallstone disease treated with cholecystectomy, followed by recurrent biliary colic and elevated liver chemistries for which he presented to a local hospital 2 months earlier. Magnetic retrograde cholangiopancreatography showed scattered intrahepatic stones and strictures consistent with recurrent pyogenic cholangitis (Figure A). ERCP confirmed the diagnosis, and the main duct stones were removed. At the follow-up ERCP 1 month later, a left intrahepatic duct stricture was dilated, followed by balloon extraction of the left-sided stones (Figure B). At the end of this procedure, a 10 French (F) × 15 cm long plastic biliary stent (Boston Scientific, Marlborough, MA) was placed across the stricture for drainage. Malignancy and immunoglobulin G (IgG)-4 cholangiopathy were ruled out with cholangioscopy and a normal serum IgG-4 level.

Three weeks later, the patient presented to the Emergency Department with severe chest and abdominal pain, as noted above. Vital signs were normal. Laboratory test results were notable for leukocytosis with a leftward shift, aspartate aminotransferase 28 U/L (normal 12–39 U/L), alanine aminotransferase 35 U/L (normal 7–52 U/L), alkaline P 142 U/L (normal 39–117 U/L), T bili 0.6 mg/dL (0.1–1.3 mL/dL), and D bili 0.1 mg/dL (0–0.2 mg/dL). Serum troponin was 3.8 ng/L (normal ≤19.8 ng/L). Electrocardiogram showed sinus rhythm with prolonged PR interval and diffuse ST interval elevations (Figure C). Abdominal and chest computed tomography showed a proximally migrated biliary stent penetrating the liver capsule, the diaphragm, and possibly the pericardial space (Figure D) with a new pericardial effusion. Within 3 hours, the patient became tachycardic, hypotensive, and hypoxic. His vitals stabilized with intravenous fluids, pressor support, broad-spectrum antibiotics, and he was admitted to the intensive care unit. An echocardiogram showed a moderate pericardial effusion but no evidence of stent penetration through the pericardium (Figure E). Early diastolic right ventricular collapse and respiratory

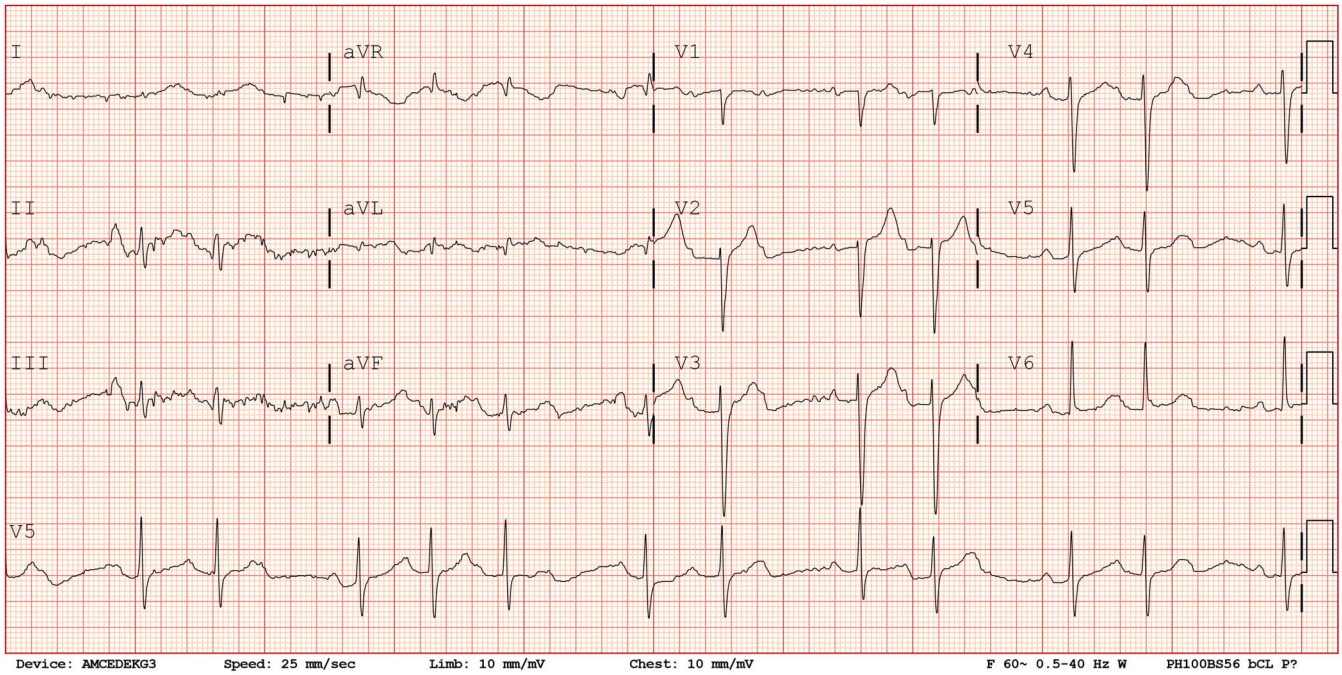

Figure C. Electrocardiography with normal sinus rhythm, multiple ventricular and supraventricular premature complexes, prolonged PR interval and diffuse ST interval elevations.

Figure D. Extracapsular migration of the biliary stent with possible pericardial penetration (arrow).

variation across the atrioventricular valves were noted, concerning for early cardiac tamponade.

The patient was taken emergently to the operating room with the cardiothoracic surgery, hepatobiliary surgery, and interventional gastroenterology services present. A pericardial window and drain placement were performed. Subsequently, a limited laparotomy was performed, which revealed adhesions and a fibrous tract extending from Segment II of the liver to the diaphragm. An attempt was made to remove the biliary stent endoscopically but was unsuccessful because of the patient's supine position, tortuous duodenum, degree of stent migration, and anchoring of the stent in the diaphragm. The hepatobiliary surgery team removed the intact stent through the fistula tract through the abdominal incision with a long forceps. A percutaneous drain was also placed. Cytology of the pericardial fluid revealed abundant neutrophils and no malignant cells. The pericardial fluid grew *Morganella morganii*, *Enterococcus faecalis*, Serratia species, methicillin-resistant *Staphylococcus aureus*, and *Candida albicans*. The patient recovered from surgery uneventfully, without evidence of biliary leak. The pericardial and intra-abdominal drains were removed 1 week later. A repeat echocardiogram on postoperative day 10 showed no evidence of pericardial effusion. The remainder of his postoperative course was unremarkable, and he was treated with a 4-week course of antibiotics. At the 3-month follow-up, he was asymptomatic and liver chemistries were normal.

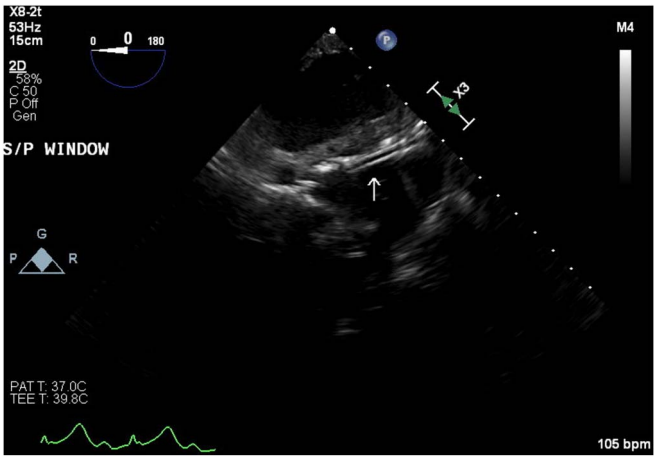

Figure E. Transthoracic echocardiogram with the biliary stent (arrow) in the pericardial space.

DISCUSSION

Adverse events related to biliary stent placement occur in 8%–10% of patients and include symptomatic stent occlusion, pancreatitis, cholangitis, cholecystitis, bleeding, duodenal perforation, stent fracture, and stent migration.[1] Migrated biliary stents typically cause no symptoms unless they migrate completely above the target stone/stricture. Proximally migrated stents can usually be removed during standard ERCP using a balloon or basket. Extrahepatic stent migration is very rare, but bronchobiliary fistula, biliary pneumonitis, hepaticogastric fistula, pleural effusion, and abdominal wall abscess have been reported after stent migration through the liver capsule.[7–11] To the best of our knowledge, there are only 3 reported cases of stent migration involving the pericardium.[4–6]

The first 2 published cases described patients with IgG-4-associated cholangitis who presented with chest pain and echocardiogram changes after ≥10F stent placement.[4,5] Cross-sectional imaging revealed pericardial effusions and penetration of the pericardium by the stents. In the first case, urgent pericardiocentesis was performed revealing bilious fluid, and then, ERCP was performed to retrieve the biliary stent.[4] In the second case, pericardiocentesis revealed serosanguineous fluid before ERCP with stent removal.[5]

In the third case, a patient with choledocholithiasis presented with chest pain, fevers, chills, tachycardia, and leukocytosis 1 month after ERCP with 7F double plastic stent placement.[6] Imaging revealed the stent penetrating the liver, diaphragm, and pericardium. The patient was treated surgically with pericardiectomy, cholecystectomy, partial hepatectomy, and choledocholithotomy with T-tube insertion.

Risk factors of proximal biliary stent migration include benign stenosis, ductal dilation >10 mm, straight (rather than pigtail) plastic stents, stent size ≥10F, and stenting duration longer than 1 month.[3] Our patient had 3 of these risk factors, namely a benign stenosis, ductal dilation, and 10F stent. Interestingly, only 1 prior case report described the intended stent location (left intrahepatic duct), which was the same stent target of with our patient. Given the location of the left liver lobe beneath the heart, logic states that left-sided, stiff (≥10F) stents carry a higher risk of pericardial injury.

Extrahepatic stent migration with pericardial injury can have significant consequences. All reported cases have developed

life-threatening pericarditis or tamponade, and our patient developed both before undergoing emergent surgery. Although this adverse event is rare, early detection is imperative to ensure timely and effective management. Transabdominal ultrasound could be considered to monitor patients with high risk of stent migration based on the risk factors above.

DISCLOSURES

Author contributions: SK Pokala contributed to the drafting of the initial manuscript. All authors contributed to the concepts, design, literature review, and editing of the manuscript. AR Attwell is the article guarantor.

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Informed consent was obtained for this case report.

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