

# Severe Primary Sclerosing Cholangitis Biliary Stricture Managed With a Small-Caliber Cardiac Angioplasty Balloon: Looking Outside the Endoscopic Retrograde Cholangiopancreatography Toolbox

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## ABSTRACT

Primary sclerosing cholangitis leads to biliary obstruction through a dominant biliary stricture. Endoscopic management of biliary strictures with balloon dilation is preferred over percutaneous radiological or surgical interventions. High-grade biliary strictures can be challenging to manage endoscopically because the traditional endoscopic retrograde cholangiopancreatography accessories fail to traverse these severely stenotic strictures. We describe a case of endoscopic management of a severe primary sclerosing cholangitis-related distal biliary stricture managed with a cardiac angioplasty balloon after failed attempts using the standard endoscopic retrograde cholangiopancreatography accessories and percutaneous radiological intervention.

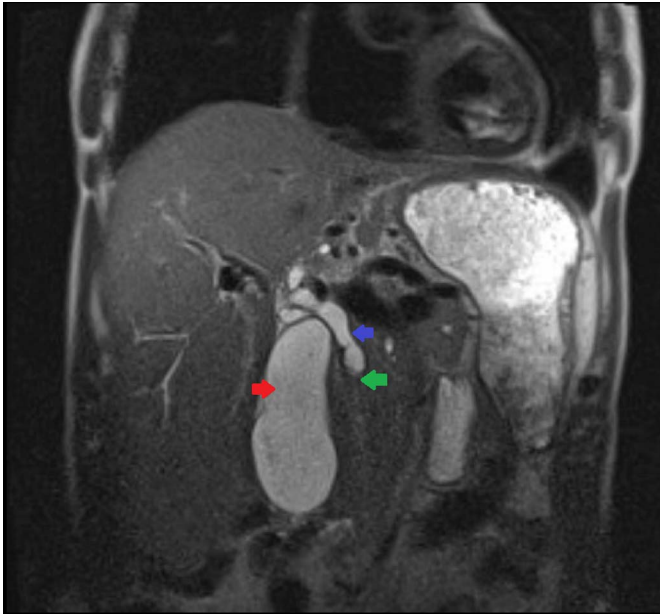
## INTRODUCTION

Primary sclerosing cholangitis (PSC) is a chronic fibroinflammatory disease of intrahepatic and extrahepatic bile ducts leading to biliary obstruction.<sup>1</sup> Approximately 60% of patients can develop a dominant biliary stricture, and 20%–30% of these patients can develop cholangitis.<sup>1–3</sup> Endoscopic management of symptomatic biliary strictures with balloon dilation is usually preferred over percutaneous radiological or surgical interventions.<sup>3</sup> However, sometimes the traditional endoscopic retrograde cholangiopancreatography (ERCP) accessories fail to traverse these severely stenotic strictures. We describe a case of endoscopic management of severe PSC-related distal biliary stricture managed with a cardiac angioplasty balloon after failed attempts using standard ERCP accessories and percutaneous radiological intervention.

## CASE REPORT

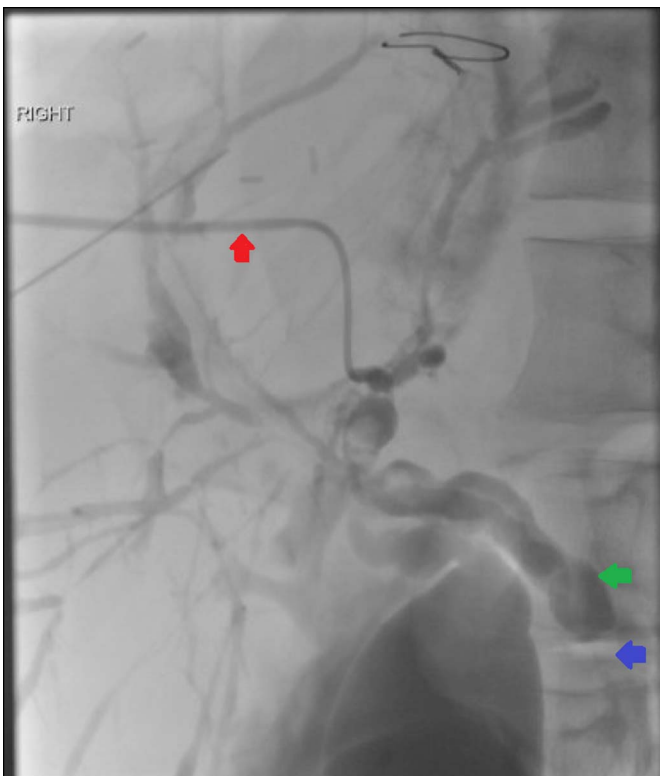
A 62-year-old man with a previous history of ulcerative colitis and PSC presented with 5 days of worsening jaundice. He denied abdominal pain or other symptoms and his baseline liver chemistries were normal. The admission laboratory analysis was remarkable for total bilirubin 21.6 mg/dL, alkaline phosphatase 1,345 mg/dL, alanine aminotransferase 276 mg/dL, and aspartate aminotransferase 238 mg/dL. Magnetic resonance imaging revealed a severe distal biliary stricture with proximal common bile duct dilation of 12 mm (previously 7 mm) (Figure 1). He was afebrile and had a normal white blood cell count, and there was no evidence of cholangitis. He underwent ERCP, but the endoscopist failed to traverse the high-grade distal biliary stricture with a 0.025 guide wire (Wilson-Cook Medical, Inc., Winston-Salem, NC). No other standard biliary accessory could be passed.

The patient subsequently underwent interventional radiology-guided percutaneous access of his biliary system but this failed to traverse the distal biliary stricture. The percutaneous transhepatic cholangiography tube was left in place draining externally (Figure 2).

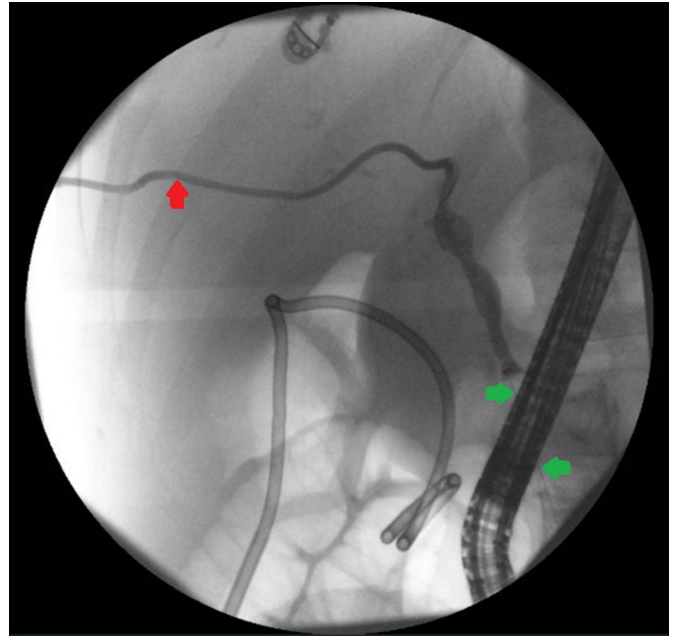


**Figure 1.** Coronal magnetic resonance imaging showing dilated common bile duct with high grade distal stricture.

After 2 days, he was brought back for another attempt of ERCP (Figure 3). After prophylactic antibiotics, repeat ERCP was performed and eventually after using different caliber wires, a 0.018-inch wire (Wilson-Cook Medical, Inc.) was advanced



**Figure 2.** Percutaneous cholangiography demonstrating non-passage of contrast through distal stricture and placement of external drain.



**Figure 3.** Cholangiography showing high-grade distal biliary stricture.

across the distal high-grade stricture. The standard 4-mm biliary dilating balloon failed to traverse the stricture along with standard dilators, dilating balloons, and accessories (Hurricane RX, Boston Scientific, Marlborough, FL; Soehendra, Cook Medical, Bloomington, IN). At this point, a 3-mm percutaneous transluminal coronary angioplasty balloon, 2-cm long, mounted on a 3-French catheter (Cordis Corporation, Hialeah, FL) was successfully passed over the wire and the stricture dilated. This subsequently allowed the passage of 4-mm dilating



**Figure 4.** Cholangiogram showing resolution of distal biliary stricture.

balloon, and eventually, a 7 French  $\times$  10 cm stent (Boston Scientific) was deployed in excellent position. Brushings were obtained from the stricture for cytology and fluorescence in situ hybridization analysis, which were unremarkable. There were no immediate postprocedure complications; laboratory markers improved significantly (total bilirubin 4.1 mg/dL, alkaline phosphatase 663 mg/dL, alanine aminotransferase 36 mg/dL, and aspartate aminotransferase 28 mg/dL), and the patient was discharged 3 days later.

Two months later, the patient underwent routine percutaneous transhepatic cholangiography tube discontinuation, and the cholangiogram did not demonstrate the recurrence of the distal biliary stricture. At the 6-month follow-up, endoscopic ultrasound and ERCP revealed a complete resolution of the high-grade biliary stricture, and the biliary plastic stent was removed (Figure 4).

## DISCUSSION

This case highlights the utility of gathering knowledge of available accessories in other interventional specialties like cardiology. There is very limited literature on the adaptation of interventional cardiology angioplasty balloon for endoscopic dilation of biliary strictures. Baron et al described the dilation of a severe anastomotic stricture after liver transplantation, and Freeman et al described it in 3 chronic pancreatitis patients and in 1 PSC biliary stricture; in both cases, the endoscopist used the same cardiac angioplasty balloon that we described in this case (Cordis Corporation).<sup>4,5</sup>

In addition, there is 1 reported pediatric case of endoscopic treatment of a liver transplant biliary-enteric stricture with a similar small-caliber angioplasty balloon (1.5-mm and 2.0-mm width small-caliber angioplasty balloons with 2-cm lengths; Sprinter Over-the-Wire Semicompliant Balloon Dilation Catheter 138-cm length; Medtronic Inc., Minneapolis, MN).<sup>6</sup> The 4-mm biliary balloon is mounted in 5.8 French catheters (1.93 mm) or 4 French catheters (1.33 mm). However, the 3-mm angioplasty balloons can be mounted in a 4 French catheter (1.33 mm) or 3 French catheter (1 mm). The difference between standard biliary balloons and catheters (5.8 and 4 French) compared with the cardiac angioplasty (3 mm balloon, 3 French catheter) made a significant difference and allowed us to perform this procedure. In all discussed cases, the dilation of impassable biliary strictures with an angioplasty balloon was successful, and no significant complications were reported. Knowledge of very small-caliber angioplasty balloons allowed us to perform lifesaving ERCP successfully in this patient.

However, the use of interventional cardiology accessories for biliary or pancreatic indications is limited by the shorter length of these accessories, precluding their passage to the hilum and beyond. Therefore, innovation and creation of smaller caliber accessories compatible for biliary, pancreatic, and gastrointestinal intervention are needed. In addition, lack of gastroenterologists' exposure to the use of these interventional cardiology devices limits their use for endoscopic applications in challenging cases. As a result, these cases get referred to more invasive interventional radiology or surgical procedures.

Small-diameter cardiac angioplasty balloon dilators are useful for the endoscopic management of high-grade, tight biliary strictures not amenable to traditional ERCP accessories. Development of novel endoscopic accessories is needed for the expansion of the ERCP tool kit.

## DISCLOSURES

Author contributions: CR Simons-Linares wrote the manuscript. R. O'Shea and P. Chahal revised the manuscript. P. Chahal is the article guarantor.

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Informed consent was obtained for this case report.

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## REFERENCES

1. Ma MX, Jayasekaran V, Chong AK. Benign biliary strictures: Prevalence, impact, and management strategies. *Clin Exp Gastroenterol*. 2019;12:83–92.
2. Tischendorf JJ, Hecker H, Krüger M, Manns MP, Meier PN. Characterization, outcome, and prognosis in 273 patients with primary sclerosing cholangitis: A single center study. *Am J Gastroenterol*. 2007;102(1):107–14.
3. Ahmad J. Metal, magnet or transplant: Options in primary sclerosing cholangitis with stricture. *Hepatol Int*. 2018;12(6):510–9.
4. Baron TH, Poterucha JJ. Use of a small-caliber angioplasty balloon for the management of an impassable choledochcholedochal anastomotic biliary stricture. *Liver Transpl*. 2008;14(11):1683.
5. Freeman ML, Cass OW, Dailey J. Dilation of high-grade pancreatic and biliary ductal strictures with small-caliber angioplasty balloons. *Gastrointest Endosc*. 2001;54(1):89–92.
6. Chennat J, Azzam R, Testa G. Endoscopic treatment of pediatric living donor liver transplant biliary-enteric stricture with small-caliber guidewire and angioplasty balloon. *Pediatr Transpl*. 2011;15(3):344–6.

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