Case Report

Percutaneous biodegradable stent insertion for a benign biliary stricture complicating choledochojejunostomy

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ABSTRACT

Benign biliary strictures are traditionally managed with balloon dilatation or plastic stents. The use of temporary metal stents in benign strictures is less well established and requires a removal procedure. Management can be particularly difficult in cases of altered surgical anatomy. We describe our first experience with percutaneous placement of a biodegradable stent for an anastomotic biliary stricture. Following an iatrogenic bile duct injury managed with choledochojejunostomy, a 66-year-old female patient developed a stricture at the implantation site, causing biliary obstruction. Endoscopic access was precluded because of the surgery, necessitating percutaneous transcatheter biliary intervention. The stricture was unresponsive to percutaneous balloon dilatation, requiring external drainage. A biodegradable stent was placed easily across the stricture to attempt long-term stricture remodeling. The stent maintained patency while in situ, but cholangitis occurred during stent degradation. Long-term patency was not achieved owing to the nature of the stricture. Percutaneous biodegradable stenting of biliary strictures is technically feasible with standard methods. Intuitively, this is an appealing concept for treating anastomotic biliary strictures and warrants further research.

Keywords: absorbable implants, anastomosis, bile duct obstruction, interventional radiology, stents

Introduction

Benign biliary strictures can occur as a result of cholelithiasis, pancreatitis, or iatrogenic injury. Benign strictures are traditionally managed with balloon dilatation and insertion of plastic stents during endoscopic retrograde cholangiopancreatography.1 To avoid blockage and sepsis, plastic stents should be replaced every 3 months. Although long-term stricture remodeling can be achieved in up to 80% of cases, this requires multiple endoscopic retrograde cholangiopancreatography procedures and multiple balloon dilatations over several months.2,3 Covered or uncovered self-expandable metal stent (SEMS) insertion is traditionally reserved for long-term in situ palliation of malignant biliary obstruction, where removal of the stent is less of a concern. Uncovered SEMS should not be placed through benign strictures as removal is not possible once the stent has embedded.4–6 Short-term, retrievable, covered SEMS have recently been used in the management of benign biliary strictures with some success.7,8 However, stents may migrate or become trapped by mucosal overgranulation at the ends of the stent,9 and endoscopic removal cannot be guaranteed. If endoscopic access is precluded owing to altered anatomy, both placement and removal can be challenging or impossible. In addition, some studies suggest an increased change in stent migration with covered SEMS.10 Thus, ideal features of a stent for benign disease should include: reduced migration rates, reduced requirement for reintervention, and the ability to be placed in cases of altered surgical anatomy. Biodegradable stents meet these criteria. They are licensed for benign esophageal strictures, but are not yet licensed for use outside of the esophagus. Custom-made biliary stents are available on request from the manufacturer. We report on a case of biodegradable stent insertion for the management of a benign biliary stricture at a biliary-enteric anastomosis.

Case report

A 66-year-old lady required a choledochojejunostomy following iatrogenic bile duct injury during cholecystectomy. One year later, she developed obstructive jaundice because of a stricture at the biliary-enteric anastomosis. Percutaneous transcatheter cholangiography was performed; the 1-cm stricture was easily dilated with a 10 mm x 40 mm Evercross balloon dilatation catheter (ev3 Inc., Plymouth, MN, USA), but there was immediate recoil of the segment resulting in ongoing obstruction.

Permission was obtained from the Hospital Institutional Review Board and the national Medicines and Healthcare Products Regulatory Agency for insertion of a custom-made biodegradable polydioxanone stent on a named patient basis.

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The stent was a smaller version of the currently licensed biodegradable esophageal stent Ella-SX BD (Ella-CS, Hradec Kralove, Czech Republic). This was supplied separate from the 13F delivery system and—similar to the esophageal version—required hand loading beforehand (Fig. 1).

At the time of the procedure, a 10F percutaneous internal–external drain was in situ across the anastomosis (Fig. 2). A Super Stiff Amplatz wire (Boston Scientific, St Albans, UK) was placed, the drain removed, and a 13F vascular sheath inserted.

The radiolucent stent was placed centered on the anastomosis with the two radiopaque markers above and below (Fig. 3). Following stent deployment, there was good expansion and free antegrade flow of contrast.

A 10F internal–external drain was again placed across the anastomosis. Two months after the procedure, the patient developed signs of biliary sepsis with debris evident within the stent on cholangiography. The debris was easily displaced with injection of saline, and the patient commenced regular saline flushes at home.

Four months after the procedure, the stent had begun to disintegrate as evidenced by the fact that only the upper markers were still visible in situ.

Following complete disintegration of the stent 5 months after the procedure, the strictured segment collapsed again, resulting in ongoing obstruction. Subsequently, the patient underwent further surgery and revision of the anastomosis.

**Discussion**

Biodegradable stents are constructed with woven polydioxanone, a biodegradable synthetic polymer that has been more traditionally used in absorbable surgical sutures. Biodegradable stents have been successfully placed in various hollow organs throughout the human body. The stents degrade by hydrolysis. Although in vitro the stent disintegration is accelerated in an acidic environment, in practice in the human body, stents tend to stay intact for at least 3 months with evidence of further stent disintegration over the ensuing weeks.

The 13F biodegradable stent delivery system is larger than a conventional 8F biliary SEMS system; however, with appropriate measures to fashion a slightly larger than normal transhepatic track, biodegradable stents can be readily deployed with a very conventional approach. Operators need to be aware to use an extra...
stiff guide wire to allow free passage of the 13F system, and be cognizant of the fact that the stent is radiolucent, with radiopaque markers at both ends.

Stents placed in the biliary tree above an intact sphincter may be at risk of biliary colic and sepsis during stent disintegration. This should be less of an issue with patients receiving stents across a biliary-enteric anastomosis as the stent fragments should simply fall into the bowel. Our patient, however, developed cholangitis—raising the question whether prophylactic antibiotics should be given routinely until stent degradation is complete.

Biodegradable stents are placed in benign strictures with an aim of achieving stricture expansion and long-term stricture remodeling, while disintegration occurs over a 12- to 16-week period, thus potentially avoiding repeated intervention.

In our patient, there was no sustained success from the biliary-enteric biodegradable stent insertion; however, this was probably because the narrowed segment was of a long floppy nature, possibly due to anastomotic dehiscence and remodeling rather than a focal fibrotic stricture.

As a consequence of the increasing number of patients receiving radical pancreaticoduodenectomy as well as liver transplantation, in the future more patients will present with anastomotic strictures of the bile duct reimplantation site. These are often not endoscopically accessible and will mandate a percutaneous approach for stent placement and removal. Percutaneous SEMS removal is technically possible but is not yet widely reported.17 Biodegradable stents may provide a valuable addition to the options available, but improved delivery systems and revised licensing is required to make this a standard approach.

Conflicts of interest

The authors declare no conflicts of interest.

References


