REVIEW ARTICLE

Endoscopic closure of esophageal, gastric, jejunal, and rectopelvic fistulas with cardiac septal occluder devices: a case series

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Background and Aims: Treating GI fistulas and anastomotic leaks is a challenge. Traditionally, these adverse events have been treated with conservative measures or surgical interventions, both of which have been associated with high rates of morbidity. Although endoscopic techniques are available and commonly minimally invasive, their success can be variable and oftentimes require repeat interventions. Cardiac septal occluder (CSO) devices have emerged as an alternative for managing these complex GI fistulas and anastomotic leaks after the more conservative endoscopic options fail.

Methods: Before the introduction of the CSO device into the body, a CSO delivery system must first be created. After integrating this system with an endoscope, argon plasma coagulation is used on each of the fistulas, and the CSOs are then deployed under fluoroscopy.

Cases: We present 4 cases of CSO device placement throughout the GI tract: in the esophagus, jejunum, stomach, and rectosigmoid colon. Each of these cases presents unique challenges in maneuvering the anatomy, ensuring the CSOs fully occlude the fistulas, and are successful in causing tissue in-growth postplacement.

Conclusions: This study presents a case series of 4 successful closures of GI fistulas using CSO devices after the failure of more conservative therapies. Each of these cases takes place in a different part of the GI tract—the esophagus, stomach, small intestines, and large intestines—indicating the broad application of CSO devices. CSOs offer a promising alternative for managing complex GI fistulas and postsurgical anastomotic leaks endoscopically throughout the entire GI tract. (VideoGIE 2025;10:163-6.)

GI fistulas can occur anywhere throughout the GI tract and often are caused by chronic inflammation, the effects of chemoradiation therapy, or surgical interventions. Untreated, these fistulas can become infected or create long-term leaks that are prone to hemorrhage or significant pain.[1] Historically, treating GI fistulas and anastomotic leaks involved both conservative management (eg, appropriate nutritional intake) and surgical intervention; however, these approaches are associated with high rates of morbidity and can lead to repeat or prolonged hospital stays.

Although endoscopic techniques like clips, self-expandable metal stents, endoscopic sutures, endoscopic vacuum therapy, and tissue adhesives are available, the use of these tools is often challenging, and given their variable success rates, there is often a need for repeat intervention.[2-6] Cardiac septal occluder (CSO) devices provide an alternative to these conventional techniques after failure. Although they were originally conceived as a tool to close atrial septal defects, these bell-shaped, self-expanding, double-disc devices have started to be used for off-label purposes including the closure of pseudoaneurysms, arteriovenous fistulas, and GI fistulas.[7] Here, we present 4 cases of successful closure of GI fistulas and postsurgical anastomotic leaks with CSOs throughout the length of the GI tract. In addition, we describe the process and show video evidence of how to create the CSO delivery system.

Abbreviations: APC, argon plasma coagulation; CSO, cardiac septal occluder.

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CASES

Patient 1 (hepaticojejunostomy)

A 74-year-old man with a history of cholangiocarcinoma with a Klatskin tumor status-post open liver resection, cholecystectomy, resection of the right and extrahepatic bile ducts, and left hepaticojejunostomy presented with a persistent anastomotic jejunostomy leak. Failed closure attempts included multiple attempts at abscess drainage both surgically and under fluoroscopy, use of pigtail stents, and fully covered biliary metal stents. Given the persistence of the leak and progressively worsening symptoms, including abdominal pain, fevers, and emesis, the patient had a CSO placed with resolution of his symptoms with evidence of tissue ingrowth 3 months' postplacement (Fig. 1).

Patient 2 (gastric)

A 46-year-old man with a history of severe acute necrotizing pancreatitis requiring intubation and PEG tube for nutritional management presented with a persistently draining 10-mm enterocutaneous fistula along the previous PEG tube tract. Multiple attempts were made to close the fistula over 4 months with various suturing techniques and clips along with the use of argon plasma coagulation (APC), but they were unsuccessful. A CSO was then placed with resolution of PEG site leakage and evidence of granulation tissue growth on follow-up more than 1 month after placement (Fig. 2).

Patient 3 (esophageal)

A 63-year-old man with a distant history of multiple esophageal dilations secondary to recurrent strictures presented with a large, 6-cm midthoracic esophageal perforation after eating a sausage. He underwent a right thoracotomy with an attempted repair of the defect using a muscle flap; however, the leak was persistent. The patient then underwent placement of multiple esophageal stents and esophageal suturing with persistence of the leak. A CSO was then placed with significant improvement noted. A barium swallow study 2 months later showed continued resolution of his esophageal leak, and he has not reported any further leakage (Fig. 3).

Patient 4 (colonic)

A 63-year-old woman with a history of rectal adenocarcinoma and subsequent lower anterior colon resection with the creation of a diverting loop ileostomy presented with recurrent pelvic leakage secondary to a rectopelvic fistula with a presacral fluid collection. After multiple attempts at fistula closure and fluid collection drainage with surgical suture ligation, endoscopic suturing, over-the-scope clips, APC, and percutaneous drainage of the fluid collection without improvement in rectal drainage, the patient had a CSO placed with complete resolution of her symptoms. Continued resolution was identified on follow-up 11 months after CSO placement (Fig. 4).

METHOD

CSOs are self-expanding double discs that can be used to close GI fistulas and anastomotic leaks. Their design as a 2-sided bell-shaped stent made from nitinol and interwoven polyester promotes tissue in-growth and decreases the likelihood of stent migration postdeployment (Fig. 5). To deploy a CSO device, a CSO delivery system must first be created (Video 1, available online at www.videogie.org). To do this, a biliary pushing catheter is cut to match the length of a pediatric biopsy forceps. The pediatric biopsy forceps is then loaded into the biliary catheter and is used to grasp the CSO device (Video 1). The delivery system is then loaded onto an endoscope, which is advanced to the level of the fistula. Before deployment of the CSO, an extraction balloon catheter is passed through the fistula (esophageal, gastric, hepaticojejunal, or colonic) over a guidewire to estimate the fistula size and ensure easy traversability. APC is

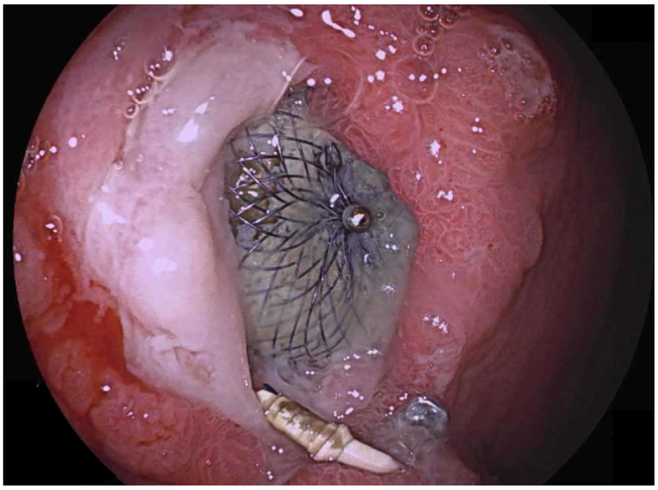

Figure 1. Endoscopic visualization of tissue ingrowth and complete occlusion of the gastrocutaneous fistula 3 months after cardiac septal occluder placement.

Figure 2. Evidence of complete occlusion of the hepaticojejunostomy anastomosis and tissue ingrowth 3 months after cardiac septal occluder placement.

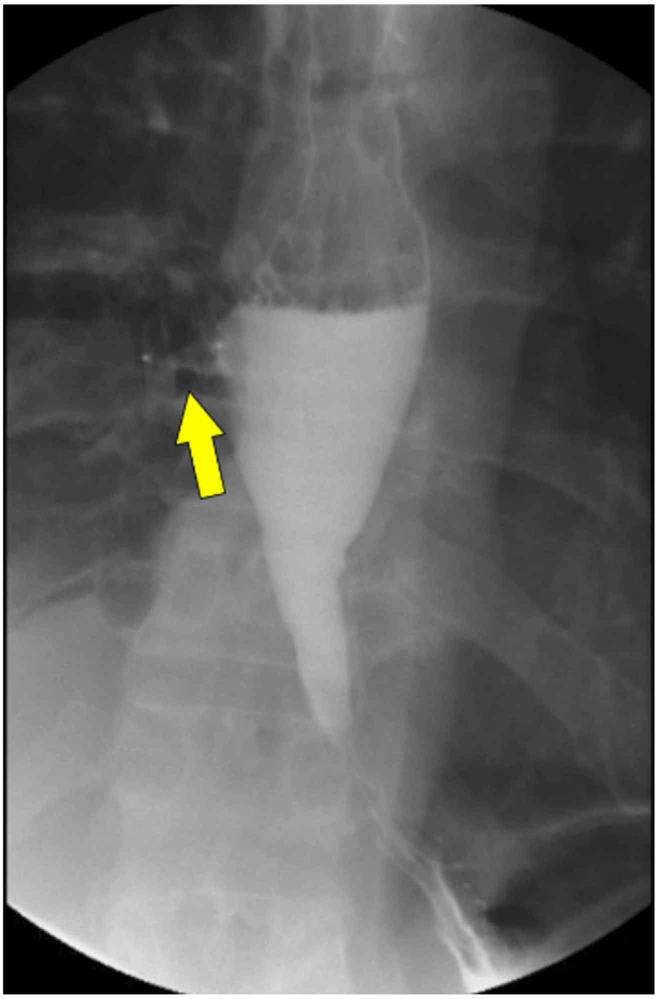

Figure 3. A barium swallow study that shows complete resolution of the esophageal fistula post-CSO placement. The CSO device is seen at the *yellow arrow*. *CSO*, Cardiac septal occluder placement.

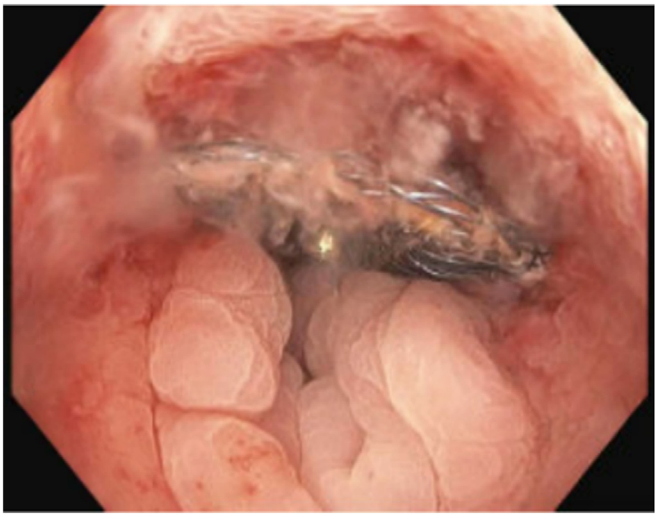

Figure 4. Endoscopic visualization of complete occlusion of the rectopelvic fistula with tissue ingrowth 11 months after cardiac septal occluder placement.

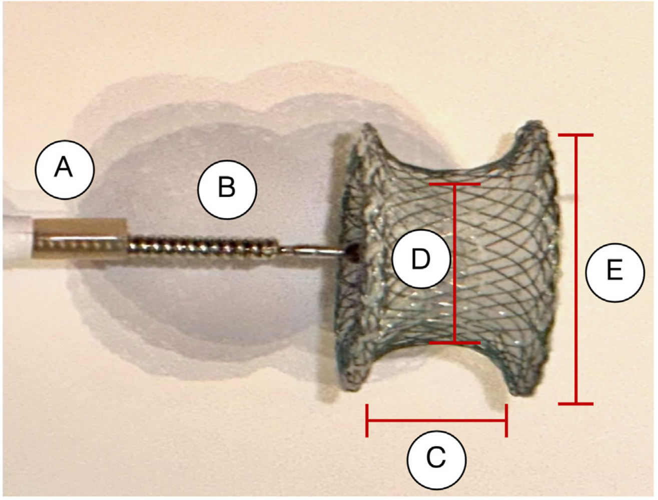

Figure 5. Close-up visualization of a cardiac septal occluder device. **A,** Sheath. **B,** Delivery cable. **C,** Waist length. **D,** Device size (waist diameter). **E,** Disc diameter.

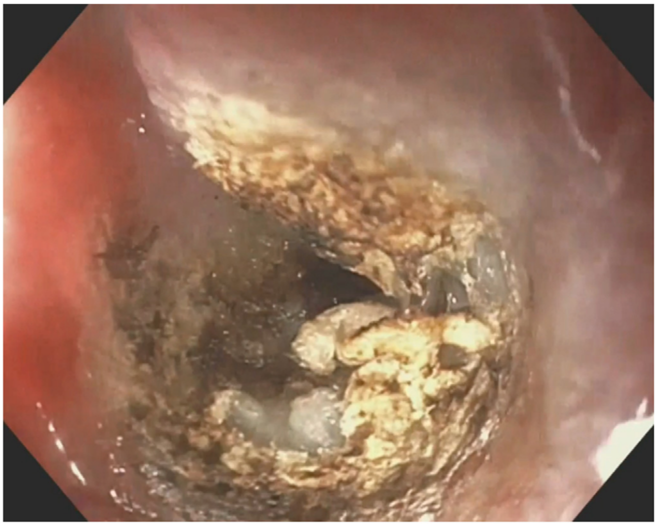

Figure 6. Evidence of a fistula postargon plasma coagulation before placement of a CSO device. This is done to promote tissue ingrowth post-CSO placement. *CSO*, Cardiac septal occluder placement.

selectively used to ablate the fistula tract and fistula margins to facilitate better tissue approximation and ingrowth over the CSO (Fig. 6). The CSO is then deployed across the fistula under endoscopic guidance with the pediatric biopsy forceps advancing within the biliary catheter pushing the CSO device into the fistula. The CSO is then released by the pediatric forceps, causing the CSO to self-expand within the fistula, occluding the opening[7,8] (Video 1). Antibiotics are not normally given during CSO deployment.

DISCUSSION

Endoscopic closure of GI fistulas and anastomotic leaks has emerged as a promising minimally invasive approach, offering a significant advancement in patient management. Even so, the off-label use of CSOs is only reported after other more proven fistula-closure techniques have failed. Endoscopically, this includes techniques like clips, self-expandable metal stents, endoscopic sutures, and tissue adhesives. Although effective in closure of the fistulas acutely, these techniques often require multiple reinterventions to close the fistulas chronically and even then, they may not be successful. Conversely, CSOs have a greater one-procedure success rate and chronically have been found to close fistulas at a greater rate.[9]

Our case highlights the use of CSOs in managing refractory fistulas of various sizes and at different, challenging angles throughout the entire GI tract. CSOs decrease morbidity, the number of repeat endoscopic procedures, and prevent progression to surgical intervention. CSOs should be used in patients after traditional endoscopic fistula closure techniques have failed.

DISCLOSURE

All authors disclosed no financial relationships.

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