

## THE EXPERT'S CORNER

# Balloon Dilation of Colonic Strictures

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(Am J Gastroenterol 2007;102:2123–2125)

As gastrointestinal endoscopic technology continues to advance, colonic strictures, which once necessitated surgery for definitive treatment, are now commonly treated using less invasive endoscopic methods. Many colonic strictures can now be treated using balloon dilation. Endoscopic dilation of colonic strictures offers many advantages over surgical management, including the preservation of intestinal length. This “minimally invasive” therapeutic option for the treatment of colonic strictures continues to evolve and has taken much of its lead from the treatment of esophageal strictures. Thus, no “new” equipment is required for the treatment of colonic strictures, and gastroenterologists are able to easily manage most colonic strictures. In this review, we will discuss our approach to the endoscopic dilation of colonic strictures.

### ETIOLOGY

The etiology of colonic strictures includes inflammatory bowel disease (Crohn's and ulcerative colitis), anastomotic, ischemia, malignancy, radiation injury, nonsteroidal antiinflammatory drugs (NSAIDs), and as a consequence of diverticulitis. The etiology-specific prevalence of colonic strictures is not known for all of these conditions but is as high as 13.5% in Crohn's disease.

### PATIENT SELECTION

Proper selection of patients for dilation of colonic strictures is extremely important in order to achieve a positive outcome. Predictors of a successful outcome include: a relatively narrow stenosis (<10 mm), a short segment stricture (<4 cm), and anastomotic strictures. Poor predictors include: numerous strictures, complete obstruction, associated fistulas within the stricture, active inflammation around the stricture, recent surgery, a tight angulation, and malignancy (1).

### EQUIPMENT

Two types of dilators are available: a fixed-diameter push dilator and an expanding radial balloon dilator. Balloons exert

a radial vector force against the strictured tissue compared with a longitudinal and shearing force of the bougie type dilators. The balloon can only be expanded to a fixed diameter and maintains a low compliance, which helps to prevent perforation since only the balloon will break if overinflated (2). Balloon dilator systems with the option for through-the-scope (TTS) wire-guided positioning are particularly helpful. Wire-guided, fixed-diameter push dilators are rarely used for colonic strictures but can be useful in distal colonic strictures under fluoroscopic guidance, once a guidewire has been endoscopically positioned.

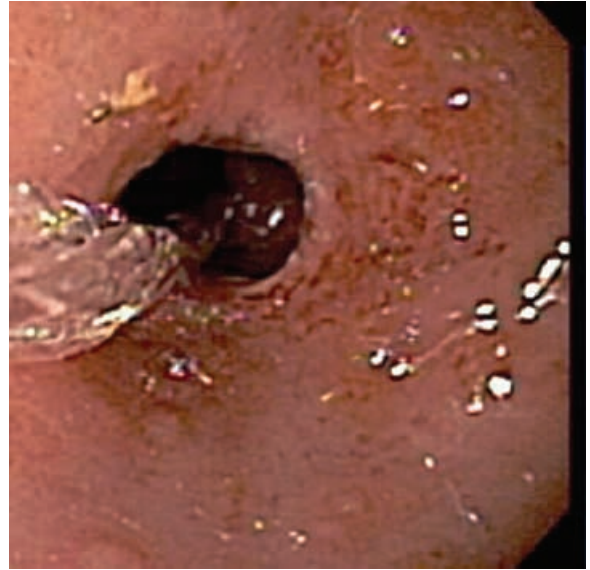
### DEVELOP A “GAME-PLAN”

Strictures do not necessarily always cause symptoms. Patients will often present with obstructive symptoms such as nausea, vomiting, bloating, abdominal distention or pain, or decreased frequency of bowel movements; however, strictures are routinely incidental findings. Depending on the clinical context, asymptomatic strictures may not require immediate treatment. However, if the patient is symptomatic, an endoscopic, medical, or surgical intervention should be sought. Knowing the cause of the stricture is important, as this may influence the method of treatment. Preprocedure radiographic studies may help to determine the length of the stricture, the degree of narrowing, and rule out extrinsic compression. In addition, important information is obtained during the endoscopy that may not be readily available prior to the procedure. The length of the stricture can be determined by traversing the stenosis and then measuring its length, or if the stricture cannot be traversed, a radiographic contrast agent can be injected through the stricture to better visualize its characteristics using fluoroscopy. Fluoroscopy is not required for simple strictures, but can be advantageous as it may provide a greater sense of safety and may be required for more complex strictures. Guidewires may be placed through very narrow strictures to allow the passage of a balloon dilator over the guidewire and through the stricture under fluoroscopic guidance. One of the advantages of dilation with the TTS balloon is that this procedure does not require fluoroscopy.

Thus it may be performed in a regular endoscopy suite. Often, to achieve long-term success, the stricture may need to be dilated using sequentially larger balloons over two to three endoscopic sessions. However, this may not be determined until the results of the first dilation are known. Immediate symptomatic relief has been reported in 77% of patients and long-term relief in 44% of patients (3).

## TECHNIQUE

Once the stricture is encountered with the endoscope, its characteristics determined, and it is deemed to be a candidate for endoscopic treatment, the correct size of balloon catheter to be used can be determined (Fig. 1). Prior to insertion, each balloon should be tested for any mechanical dysfunction by the endoscopy assistant. Then, the catheter is advanced through the accessory port of the endoscope through the stricture under direct visualization (Fig. 2). Once it is felt that the deflated balloon is traversing both ends of the stricture, it is inflated with saline (or in the case of fluoroscopic assistance, a mixture of standard IV contrast with sterile water) using the guide attached to the catheter shaft (Fig. 3). The proximal portion of the catheter remaining outside of the endoscope should be held firmly against the head of the endoscope using the endoscopist's left little finger in order to prevent the balloon from slipping out of the stricture as it is inflated. Failure to do so may cause the balloon to "slip out" of the stricture and only part of the stricture may be dilated. In general, a slow inflation of the balloon to anchor to its initial diameter will anchor it in the stricture and minimize the risk of migration. In addition, use of the longer, 8 cm balloon will help to minimize the likelihood of slipping out of the stricture. The time

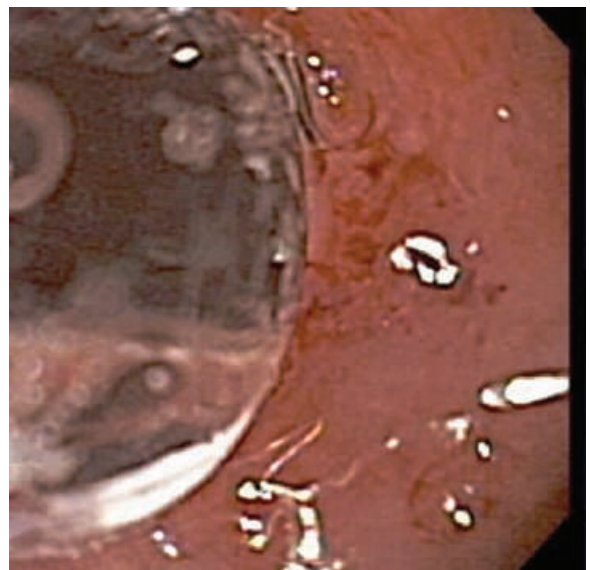


**Figure 2.** Insertion of the through-the-scope (TTS) dilating balloon.

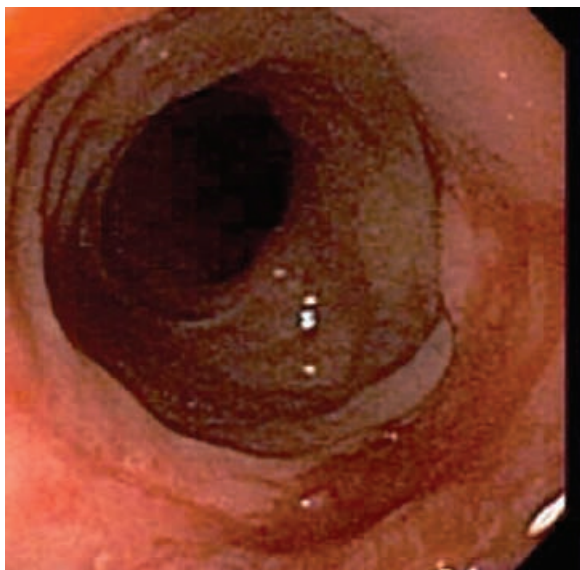
that the balloon should be left inflated for each diameter is unknown. Given the minimal "waisting" of current balloon polymers, we employ a rapid inflation sequence, allowing only 10–15 seconds for each diameter. The stricture should not be dilated using more than three sequentially larger diameters at any single session. The importance of duration of inflation is not known, however, and longer inflation times (>20 seconds) may often be painful (4). Once the stricture is dilated allowing easy passage of the endoscope, the remaining proximal colon should be inspected to evaluate for any additional strictures. If there is any concern for malignancy, the stricture should be brushed and biopsied.



**Figure 1.** Predilation appearance of a colorectal anastomosis in a patient with a previous resection for Crohn's disease.



**Figure 3.** Inflation of the TTS balloon. Note the ability of the balloon to provide a "keyhole" view of the stricture and more proximal colonic mucosa.



**Figure 4.** Completion of a series of TTS balloon dilations.

We typically employ an upper endoscope for high-grade left-sided strictures and a pediatric colonoscope for more proximal strictures. For longer strictures and those which cannot be traversed with an endoscope, fluoroscopy is used. Wire-guided TTS balloons are helpful for high-grade strictures and those associated with an end-to-side anastomosis. If difficulty is encountered in passing the guidewire across the stricture, we will employ a more flexible hydrophilic 0.035 or 0.021 mm ERCP guidewire. In the extreme cases of near total colonic obstruction when the proximal colonic anatomy is unknown, a standard ERCP catheter will be placed over the guidewire and standard contrast will be used to determine the length and geometry of the stricture.

Short colo-colonic anastomotic strictures can be aggressively dilated to 15–18 mm in one treatment setting (Fig. 4). In the setting of ileal or neo-terminal strictures, the initial dilation is taken to 10–12 mm. If there is no symptomatic response, a second dilation to 15 mm is undertaken during another session. The approach to fibrotic strictures stemming from inflammatory bowel disease diverticulitis, ischemia, and radiation therapy are rarely taken past 10–12 mm during the first treatment session. The presence of active inflammation leads to a more aggressive dilation, but these cases are almost always accompanied by injections of 40% triamcinolone via a standard sclerosing needle.

## STEROIDS OR NO STEROIDS?

Studies in the late 1960s by Ashcraft and Holder (5) and more recently by Kochhar and Makharia (6) have shown that intralesional injection of steroids into benign esophageal strictures may decrease the frequency of dilation. Corticosteroids are thought to alter collagen synthesis and fibrin deposition in scar tissue and presumably should prevent the restenosis of strictures (7, 8). Kochhar showed a significant reduction in the mean number of esophageal dilations in the group of patients who received steroid injections. We routinely use steroid injections in patients with colonic strictures. The procedure involves using triamcinolone, 40 mg/mL diluted 1:1 with saline. Using a standard sclerotherapy catheter, 0.5-mL aliquots are injected into the distal margin of the stricture in a four-quadrant fashion.

## COMPLICATIONS

Fortunately, endoscopic balloon dilation remains a relatively safe procedure. With proper patient selection, complications can be kept to a minimum. Most series (albeit most have a small number of patients) report a complication rate of 5%.

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