ACG CASE REPORTS JOURNAL

CASE REPORT | INFLAMMATORY BOWEL DISEASE

Novel Use of EndoFLIP to Characterize Kock Pouch Stricture Before and After Endoscopic Intervention

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ABSTRACT

Stricture formation is a common complication after restorative proctocolectomy and Kock pouch surgery. Endoluminal functional lumen imaging probe (EndoFLIP) is a balloon catheter device that uses impedance planimetry to provide luminal pressure and dimension measurements. This case describes the first use of EndoFLIP to quantify the distensibility and diameter of a Kock pouch stricture before and after endoscopic balloon dilation and needle knife stricturotomy. EndoFLIP may be useful to more accurately define and quantify the technical success of endoscopic treatment of pouch strictures.

KEYWORDS: K-pouch; endoscopy; stricture; EndoFLIP

INTRODUCTION

The Kock pouch (K-pouch), the common form of continent ileostomy, offers an alternative to ileal pouch-anal anastomosis in select patients after proctocolectomy.[1] Between 7% and 12% of patients with a K-pouch will experience strictures, typically at the level of the nipple valve, exit conduit, or pouch inlet.[2] Endoscopic therapies such as through-the-scope (TTS) balloon dilation, needle-knife stricturotomy, and intralesional corticosteroid injection have been demonstrated as safe and effective methods to treat strictures without surgical revision.[3]

The flow of bowel content through an area of stricture is limited by decreased lumen diameter and poor distensibility. Endoscopy and radiography can assess the former but not the latter and cannot evaluate response to dilation in real time.[4–6] Endoluminal functional lumen imaging probe (EndoFLIP; Medtronic, Minneapolis, MN) uses impedance planimetry to measure luminal diameter and distensibility; its use has been described in multiple sphincteric and nonsphincteric regions in the gastrointestinal tract.[7–10]

We describe the first reported use of EndoFLIP to measure the diameter and distensibility of K-pouch stricture before and after endoscopic balloon dilation (EBD) and needle-knife stricturotomy.

CASE REPORT

A 38-year-old man with a history of ulcerative colitis status post restorative proctocolectomy presents for treatment of a recurrent K-pouch stricture. Pouchoscopy performed February 2023 demonstrated ulcerations in the pouch valve with an intrinsic stenosis at the skin level, requiring EBD to 10 mm. Repeat pouchoscopy in December 2023 revealed recurrent stenosis requiring repeat EBD up to 13 mm followed by needle-knife stricturotomy with subsequent passage of a gastroscope with resistance.

In this presentation, a recurrent stricture was appreciated at the skin level that was not traversable to a standard flexible, single-channel upper gastroscope (GIF H-180 series; Olympus Optical, Tokyo, Japan). With the patient in the supine position, an 8-cm-long, 3-mm-diameter EndoFLIP catheter with a volume-based barostat bag was introduced through the K-pouch valve and

ACG Case Rep J 2024;11:e01555. doi:10.14309/crj.0000000000001555. Published online: November 20, 2024

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advanced into the body of the K-pouch. Saline was infused into the barostat bag to a volume of 30 mL. The distensibility at the apparent stricture was approximately 0.4 mm^2/mm Hg with a maximum diameter of 4.8 mm (Table 1). The barostat bag was then inflated to 40 mL, with a distensibility of 0.7 mm^2/mm Hg and a maximum diameter of 7.7 mm. The stricture measured 1.5 cm in length (Figure 1).

After withdrawal of the catheter, EBD was performed for the stricture using a TTS balloon (controlled radial expansion balloon; Boston Scientific, Natick, MA) to 13.5 mm. The FLIP catheter was again introduced through the nipple valve, and the following measurements were observed after dilation: At 30 mL of inflation, the distensibility of the stricture was 1.0 mm^2/mm Hg with a diameter of 6.5 mm. At 40 mL of inflation, the distensibility was 0.8 mm^2/mm Hg with a median diameter of 8.4 mm.

For therapy of the valve stenosis at skin level, a "fish-mouthing" stricturotomy was performed using a needle knife (RX Needle Knife XL, Boston Scientific) followed by excision of granular tissue over the valve. After intervention, the FLIP catheter was introduced for a third time through the K-pouch valve with the following measurements: At 30 mL of inflation, the distensibility was 1.1 mm^2/mm Hg with a diameter of 6.5 mm. At 40 mL of inflation, the distensibility was 1.0 mm^2/mm Hg with a diameter of 8.8 mm. The gastroscope was then able to be advanced through the valve and into the K-pouch to complete the endoscopic examination.

DISCUSSION

This case represents the first reported use of the EndoFLIP system to objectively characterize the properties of a K-pouch stricture before and after endoscopic therapy. We demonstrated that the length, diameter, and distensibility of the observed stricture were successfully measured at 30 mL and 40 mL of saline infusion. Stepwise improvements in both measured parameters were noted immediately after EBD and needle-knife stricturotomy.

Interestingly, although a relative increase in diameter occurred after each endoscopic intervention, the observed diameter of the stricture measured with EndoFLIP did not improve as traditionally graded by the resistance to the passage of an endoscope.[5] Despite EBD of 13.5-mm diameter and stricturotomy, the maximal observed diameter after intervention was 8.8 mm at 40-mL distention. A similar result has been demonstrated in a previous case report in which the final diameter of an esophageal web was measured using EndoFLIP at 5.2 mm despite dilation using an 8- to 10-mm controlled radial expansion balloon.[11] The authors in that report postulate that mucosal swelling immediately after dilation may have transiently reduced luminal size. Another possible explanation for this result may be due to the compliance of the lumen wall and the insufficient pressure applied by the EndoFLIP barostat bag at a volume of 40 mL. Further inflations to the maximum 50 mL for the 8-cm catheter may be performed in the future to better elucidate maximal diameter.

The discrepancy between the diameter of the stricture through TTS balloon measurement vs EndoFLIP readings also calls into question the true effectiveness of EBD in improving luminal narrowing. In this case, EndoFLIP measurements can be used to more accurately define and quantify the technical success of endoscopic treatment. Previous work has demonstrated a positive relationship between postintervention improvement in

Table 1. Summary of EndoFLIP results before and after endoscopic therapy

	Pouch stricture before intervention	After endoscopic balloon dilation	After endoscopic stricturotomy
Distensibility index (median, mm^2/mm Hg)			
@ 30 mL	0.4	1.0	1.1
@ 40 mL	0.7	0.8	1.0
Diameter (median, mm)			
@ 30 mL	4.8	6.5	6.5
@ 40 mL	7.7	8.4	8.8
Compliance (mm^3/mm Hg)			
@ 30 mL	23.3	X	46.0
@ 40 mL	22.1	28.6	31.1
Cross-sectional area (mm^2)			
@ 30 mL	18.0	X	33.0
@ 40 mL	46.0	56.0	61.0
Pressure (mm Hg)			
@ 30 mL	40.1	X	29.0
@ 40 mL	66.7	65.6	61.7

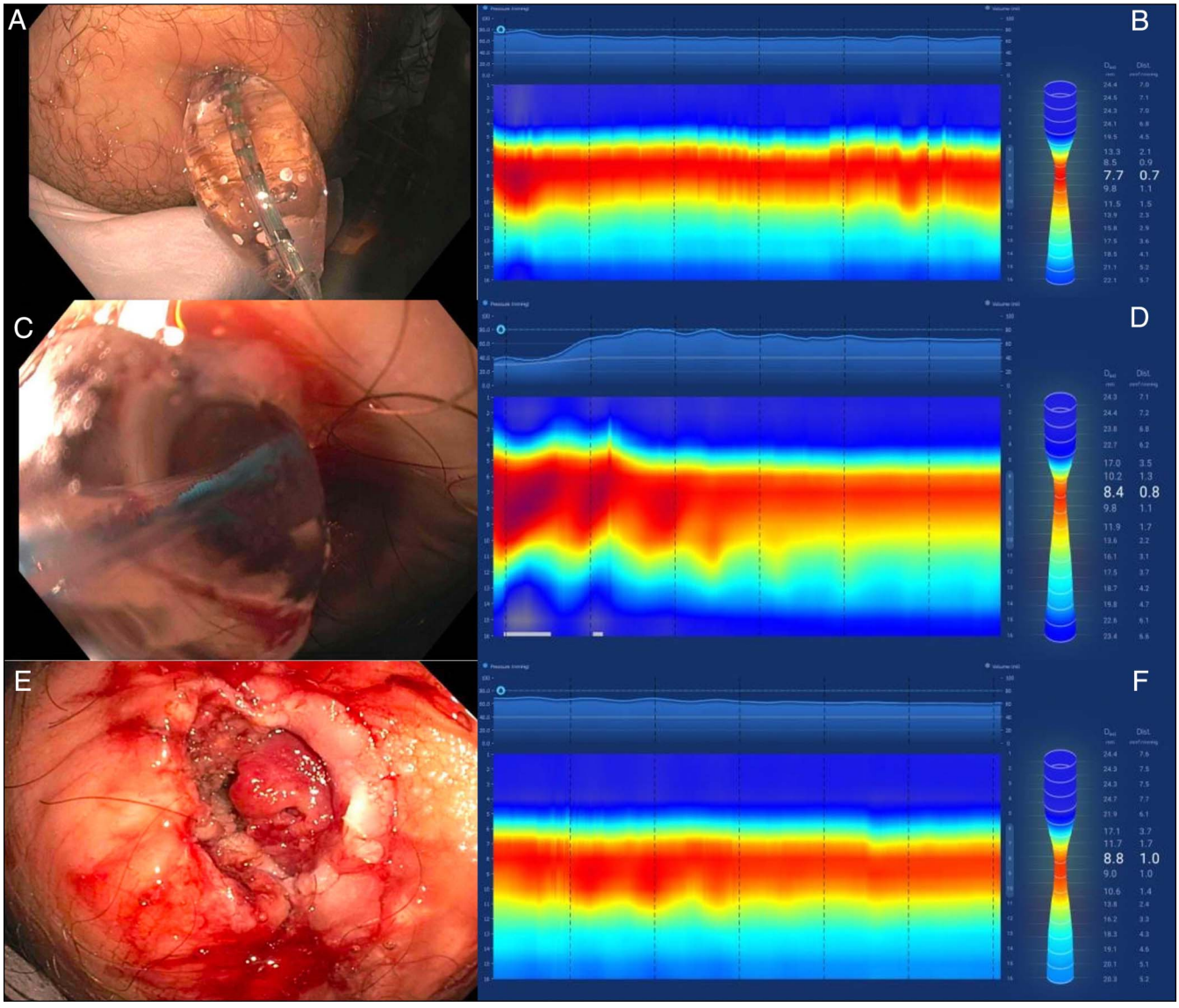

Figure 1.(A) EndoFLIP catheter placed through K-pouch stricture before interventions. (B) EndoFLIP at 40 mL of inflation before endoscopic interventions. (C) Endoscopic balloon dilation of K-pouch stricture. (D) EndoFLIP at 40 mL of inflation after balloon dilation. (E) K-pouch after needle-knife stricturotomy. (F) EndoFLIP at 40 mL of inflation after needle-knife stricturotomy. EndoFLIP, endoluminal functional lumen imaging probe; K-pouch, Kock pouch.

symptoms and an increase in luminal diameter and distensibility index among patients with gastric sleeve stenosis.[12,13] Real-time evaluation of biomechanical properties may, therefore, be useful to identify inadequately treated strictures and predict the need for early follow-up intervention.

Despite its potential, widespread use of EndoFLIP in inflammatory bowel disease has not yet become standard practice. The main limitation is the absence of standardized reference values, which complicates interpretation for clinicians. In addition, passage of the EndoFLIP catheter through some ileal pouch strictures may be technically challenging because of anatomic location and/or pouch angulation, adding procedural time and cost without clear evidence that the results will change management.

In summary, this case demonstrates that EndoFLIP provides a novel, safe, and more objective assessment of a K-pouch stricture before and after endoscopic therapy than traditional, subjective measurement by endoscopy. Further study is warranted to validate these findings and assess the accuracy of EndoFLIP in predicting response to endoscopic therapy of pouch strictures.

DISCLOSURES

Author contributions: AM Choy: manuscript preparation and is the article guarantor; S. Pomenti, DA Katzka, and B. Shen: manuscript review.

Financial disclosure: AM Choy, S. Pomenti, and B. Shen: no relevant disclosures. DA Katzka: Research for Medtronic.

Informed consent was obtained for this case report.

Received August 22, 2024; Accepted October 15, 2024

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