Endoscopy for Altered Anatomy in Inflammatory Bowel Disease

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KEYWORDS

• Crohn's disease • Pouch • Postoperative • Surgery • Ulcerative colitis

KEY POINTS

- Anatomic landmarks should be meticulously noted and photo documented. Validated scoring systems should be used whenever available in surgicallly altered bowel.
- A thorough comprehension of previous surgeries is necessary for the endoscopic description and interpretation of the surgically modified bowel.

INTRODUCTION

Both Crohn's disease (CD) and ulcerative colitis (UC) are classified under the term "inflammatory bowel disease (IBD)," referring to the chronic inflammatory condition of the gastrointestinal (GI) tract. The pathogenesis of the disease has yet to be fully elucidated. CD can affect any segment of the GI tract, whereas UC is confined to the large bowel. At the time of diagnosis, around 20% of patients with CD present complications such as stenosis or fistula, which may increase to 50% to 70% within the first decade after diagnosis.[1,2] UC can be complicated by severe acute colitis, or even toxic megacolon and perforation, necessitating eventually surgery. About 20% to 30% of hospitalized patients with UC receive colectomy.[3] Furthermore, chronic colonic inflammation, whether caused by active UC or CD, raises the risk of colorectal cancer. Therefore, despite the advent of biologic agents and small molecule inhibitors in the decade prior, a significant proportion of IBD patients will eventually require surgical interventions.[3]

The most common surgical procedures for CD are bowel resection with ileocolonic or ileorectal anastomosis, strictureplasty, diverting ostomy, and bowel bypass. The

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standard surgical treatment for UC is staged restorative proctocolectomy with ileal pouch-anal anastomosis (IPAA).[4] Consequently, these surgical procedures substantially modify the bowel anatomy. Despite its difficulty, recognizing and interpreting surgically altered bowel is critical for endoscopic assessment of disease activity, illness recurrence, treatment response, dysplasia surveillance, and endoscopic therapeutic delivery.

The prior consensus guidelines for the endoscopic evaluation of surgically altered bowel in inflammatory bowel disease were formulated by the Global Interventional Inflammatory Bowel Disease Group in 2021.[4] This review seeks to emphasize the anatomic landmarks and the clinical implications of endoscopic features based on the latest research and data published since the issuance of existing guidelines.

PREPROCEDURAL PREPARATION

Proper bowel preparation is essential for an accurate endoscopic assessment. Although there is a lack of randomized comparative studies to determine the optimal cleansing agent, several consensus guidelines advocate for polyethylene glycol-based preparations for patients with IBD undergoing lower gastrointestinal endoscopy.[4,5] Conversely, sodium phosphate-based agents, while approved by the Food and Drug Administration (FDA), are discouraged in this patient population due to the risk of bowel erosions and nephrotoxicity.[6]

Patients with surgical strictureplasty or stenosis of the proximal small bowel may require an extended period of bowel preparation due to their altered bowel anatomy. However, oral bowel preparation is typically unnecessary for individuals undergoing ileoscopy via stoma, lower gastrointestinal endoscopy for diverted large bowel, or examination of diverted ileal pouches.[4]

SURGERY FOR CROHN'S DISEASE

A variety of surgical modalities have been developed and utilized for patients with medically or endoscopically refractory disease or IBD-associated neoplasia (**Table 1**). The selection of the most suitable surgical therapeutic modalities depends on multiple factors, including the disease phenotype and location, degree and severity of underlying disease, general health conditions (especially nutrition, anemia, and immunosuppression), concurrent corticosteroid therapy, history of prior surgery, and local expertise.[7] Endoscopy stands as a key diagnostic and therapeutic tool for postoperative IBD patients. Although challenging, it is essential to inspect and photo-document anatomic landmarks. When available, validated endoscopic scores should be used for consistent evaluation. Furthermore, surgical-related complications such as stenosis or fistula must be carefully assessed and ruled out.

Traditional Ileocolonic Resection with Ileocolonic or Ileorectal Anastomosis

Ileocolonic resection (ICR) followed by ileocolonic anastomosis (ICA) stands as the most common surgical procedure for CD with ileal (L1) or ileocolonic (L3) involvement. The authors found ICR and ICA are particularly effective in the treatment of isolated ileocecal valve (ICV) CD with medically refractory inflammation, strictures, and fistula. We may consider isolated ICV CD a form of "achalasia". Over time, various types of anastomosis have been designed, including end-to-end anastomosis, side-to-side anastomosis, and Kono-S anastomosis (see below), with handsewn and/or stapled techniques. Novel anastomosis techniques such as wide-lumen stapled side-to-side or side-to-end anastomosis have been introduced. The results of the effect on disease recurrence remains controversial across different studies[8–12] While the third

Table 1
Endoscopic evaluation for surgically altered bowel

Disease	Location (Montreal Classification)	Surgeries	Configurations	Anatomic Landmarks	Endoscopic Scoring System	Potential Disease
Crohn's disease	Distal ileal (L1)	Ileocolonic resection	End-to-end anastomosis	Small bowel, anastomotic site, large bowel	• Rutgeerts Score • Modified Rutgeerts Score • REMIND score • Crohn's Disease Endoscopic Index of Severity • Simple Endoscopic Score for Crohn's Disease • Lewis score *for capsule endoscopy	• Disease recurrence • Ischemic stricture
	Ileocolonic (L3)		End-to-side anastomosis Side-to-side anastomosis	Neo-terminal ileum. Anastomotic site, colonic blind loop Neo-terminal ileum. Ileaal inlet, lleal body, anastomotic site, colonic blind loop		
	Proximal ileal (L1)	Small bowel resection	Enteroenteric	Proximal and distal small bowel	• Rutgeerts Score • Modified Rutgeerts score • REMIND score	
	Colonic (L2)	Partial colectomy	Colocolonic	Large bowel, anastomotic site		
			Colorectal	Small bowel and large bowel, anastomotic site		
		Ostomy	Ileostomy Loop Colostomy Loop-end Jejunostomy End Blowhole	Stoma, small and large bowel	• Rutgeerts score • CDEIS • SES-CD	• Stomal stenosis • Stomal fistula • Disease recurrence
		Diverted bowel	Sealed stump; efferent limb of diverting ostomy; mucous fistula	Diverted colon or rectum; diverted ileal pouch	Not recommended	
Ulcerative colitis		Proctocolectomy	J pouch S pouch K pouch	Afferent limb (neo-terminal ileum); inlet; pouch body; tip of the J; cuff; anal transitional zone	• Pouchitis Disease Activity Index (PDAI) • Modified PDAI • Pouchitis Activity Score	• Pouchitis • Crohn's disease of the pouch • Cuffitis • Leaks • Strictures

Modified from consensus guideline from the Global Interventional Inflammatory Bowel Disease Group.[4]

European Crohn's and Colitis Organisation consensus supports a wide lumen stapled side-to-side anastomosis, the Association of Coloproctology of Great Britain and Ireland leaves the choice to surgeon preference.[13,14] Despite surgical intervention providing symptom relief and improving patient quality of life, postoperative recurrence of CD is frequent, with approximately 35% of patients requiring a second intestinal resection within a decade.[15] Symptoms in those with postoperative recurrence are often silent[16] and are typically preceded by endoscopic mucosal changes. Hence, accurate postoperative endoscopic evaluation, including deep intubation of the neo-terminal ileum, at least 10 cm, is imperative.

Most recurrences in CD patients with ICA occur at and proximal to the anastomosis,[16] suggesting that the anastomotic configuration influencing fecal stasis may impact the postoperative disease course.[17] Active monitoring with a treat-to-target approach based on endoscopic findings has showed to reduce further surgeries.[18] Current guidelines recommend ileoscolonoscopy 6 to 12 months after ICR with ICA.[4,18,19] Endoscopic intubation of the neo-terminal ileum can be technically challenging, due to various configuration of ICA.[4] Intubation of the neo-terminal ileum in the side-to-side ICA may require endoscopic retroflexion (**Fig. 1**A). The transverse staple line at the neo-terminal ileum side may be mistaken at the lumen of the neo-terminal ileum (**Fig. 1**B, C). Ulcers or fistula in the area can be mistaken as the lumen of the neo-terminal ileum (**Fig. 1**D). End-to-side ICA with a circular stapler is also performed (**Fig. 1**E).

Several endoscopic scoring systems have been developed to assist physicians to monitor the disease recurrence. The Rutgeerts Score (RS), developed in 1990, stratifies the severity of postoperative lesions in the neo-terminal ileum and/or the anastomosis into 5 grades, ranging from i0 to i4[20] (**Fig. 2**A–F). Lesions confined to the anastomotic site are suspected to be related to reduced blood flow at the anastomosis or as a reaction to sutures or staples at the surgical site. Late on, the modified

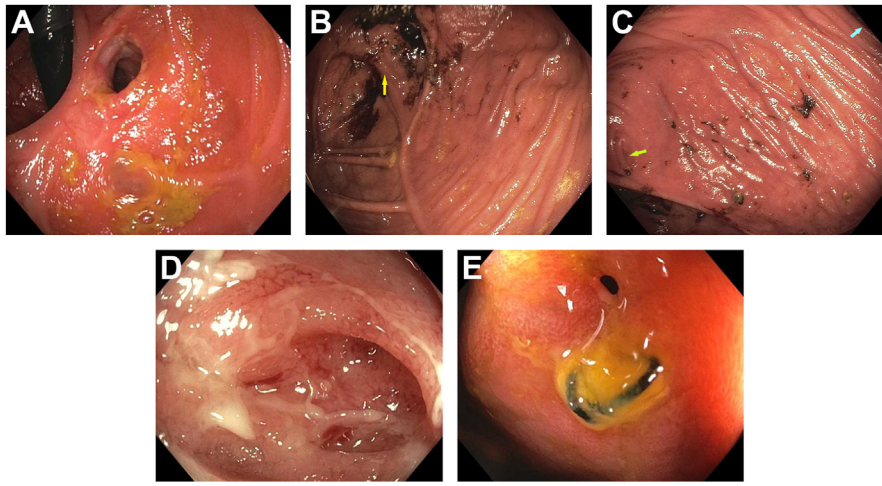

Fig. 1. Anatomic of ileocolonic anastomosis (ICA) after ileocolonic resection for Crohn's disease (CD). (*A*) Stapled side-to-side ICA with retroflex view of the neo-terminal ileum; (*B*) Transverse staple line at the colon (*Yellow arrow*) side at the side-to-side ICA; (*C*) Transverse staple line at the ileum side (*Green arrow*) and orifice of the neo-terminal ileum of side-to-side ICA (*Blue arrow*); (*D*) Ulcerated transverse staple line at the ileum side; (*E*) Strictured endo-to-side ICA.

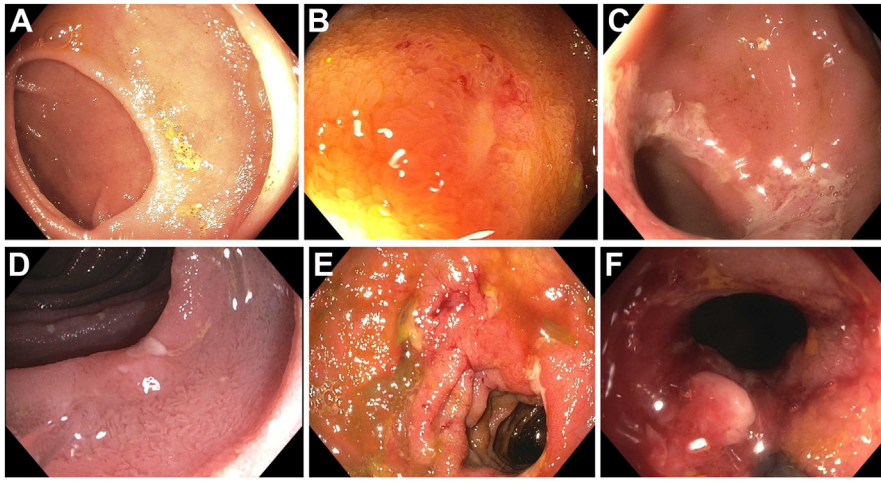

Fig. 2. Normal and recurrent CD of the neo-terminal ileum. (*A*) Normal neo-terminal ileum (the Rutgeerts' Score, RS) i0; (*B*) RS i1 lesion; (*C*) Modified RS i2a lesion; (*D*) Modified RS i2b lesion; (*E*) RS i3 lesion; (*F*) RS i4 lesion-stricture in the neo-terminal ileum.

RS was proposed to differentiate lesions confined to the ICA from those in the neo-terminal ileum, aiming to enhance its prognostic value.[21] (**Table 2**).

Although the original RS and modified RS are widely used to guide treatment escalation in postoperative CD patients, these scores have limitations. Firstly, both still require full validation with prospective studies. Secondly, the interobserver variability with a moderate reproducibility has been noted,[22,23] potentially leading to inappropriate treatment decisions in inaccurately scored patients. Moreover, since the score was constructed on patients with end-to-end anastomosis, certain anastomotic locations, including the inlet of the neo-terminal ileum and the ileal segment [ileal body] facing the colon, are disregarded.[24,25] The clinical relevance of active inflammation at these locations remains unclear. As mentioned earlier, the nature and clinical implication of isolated ulcerations along the anastomosis remains controversial.[12,25–28] The REMIND (recherche sur les maladies inflammatoires digestives) study group suggests describing anastomotic (**Fig. 3**A–D) and ileal lesions separately, as even mild neo-ileal lesions appear to have worse long-term outcomes than anastomotic ones.[12]

Despite limitations of current endoscopic scores and controversies of anastomotic lesions, a detailed description of endoscopic findings with photo documentation of anatomic landmarks is crucial for guiding therapeutic management in postoperative CD patients. Additionally, ileocolonoscopy can identify structural abnormalities like strictures and fistulas, enabling the delivery of endoscopic treatment. For assessing colonic involvement, the Crohn's Disease Endoscopic Index of Severity (CDEIS)[29] and the Simple Endoscopic Score for Crohn's Disease (SES-CD)[30] can be utilized, while capsule endoscopy, along with scores like the Lewis score[31] and concerns about capsule retention, is suitable for evaluating proximal small bowel involvement in those without small bowel obstruction.

Kono-S Anastomosis and Extended Mesenteric Excision

The observation that anastomotic recurrence tends to occur on the mesenteric side of the intestine has sparked recent interest in the construction of Kono-S anastomosis (KSA).[32] The concept involves mesenteric exclusion by constructing a supporting

Table 2
Endoscopic scores for postoperative recurrence

Rutgeerts Score	Modified Rutgeerts Score	REMIND Score
i0 = no lesions	Same as Rutgeerts Score (RS)	*Anastomosis*
i1 = $\leq$ 5 aphthous lesions	Same as RS	A0 = no lesions
i2 = >5 aphthous ulcers with normal intervening mucosa, skip areas of larger lesions, or lesions confined to ileocolonic anastomosis	i2a = lesions confined to the ileocolic anastomosis i2b = >5 aphthous ulcers with normal intervening mucosa or patchy areas of larger lesions	A1 = ulcerations covering <50% of the anastomosis circumference A2 = ulcerations covering more than 50% of the anastomosis circumference A3 = anastomotic stenosis
i3 = diffuse aphthous ileitis with diffusely inflamed mucosa	Same as RS	Neo-terminal ileum I0 = no lesions
i4 = diffuse inflammation with larger ulcers, nodules, and/or narrowing	Same as RS	I1 = $\leq$5 aphthous lesions I2 = >5 aphthous ulcers with normal intervening mucosa or patchy areas of larger lesions I3 = more than 5 aphthous lesions with diffusely inflamed mucosa in between I4 = diffuse ileal inflammation with larger ulcers, nodules and/or narrowing

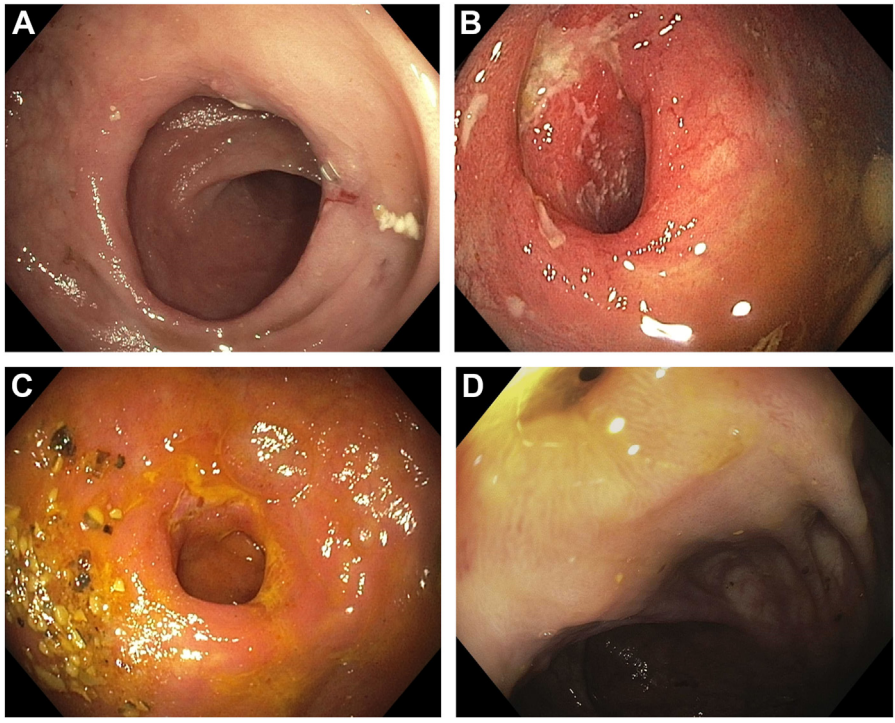

Fig. 3. Lesions at ICA in CD classified by REMIND. (*A*) A0 lesion (normal); (*B*) A1-ulcer lesion occupying less than 50% surface at the anastomosis; (*C*) A2 ulcer lesion occupying greater than 50% surface at the anastomosis; (*D*) A4-strictured anastomosis.

column, which positions the lumen of the KSA antimesenteric. KSA is characterized by the construction of an effective iso-peristaltic side-to-side but functional end-to-end anastomosis.[33] (**Fig. 4**A) The appearance is different from the stapled side-to-side ICA (**Fig. 4**B). The excision of mesentery associated with the diseased segment of the ileum is suggested to reduce the disease recurrence.[34] However, there are conflicting results regarding whether the Kono-S anastomosis with or without extended

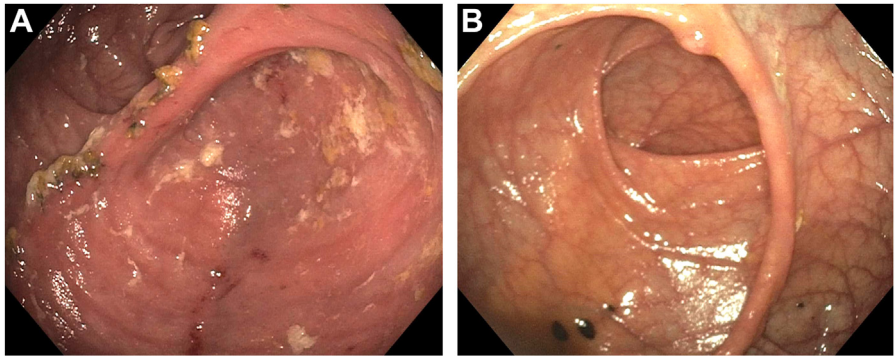

Fig. 4. Comparison of Kono-S and traditional ICA. (*A*) Characteristic handsewn side-to-side Kono-S anastomosis; (*B*) Traditional side-to-side stapled ICA.

mesenteric excision yields superior outcomes compared to conventional anastomosis.[35–38] Larger prospective randomized studies are needed to draw conclusions.

Partial Colectomy with Colocolonic or Colorectal Anastomosis

Partial colectomy with colocolonic anastomosis or colorectal anastomosis is performed for Crohn's colitis depending on the extent and location of the disease. Limited data are available for postoperative monitoring. Colonoscopy is recommended 6 to 12 months after surgery for disease activity monitoring, dysplasia surveillance, and possible delivery of endoscopic therapy.[4] Landmarks of the anastomosis and the large bowel segments distal and proximal to the anastomosis should be described and documented. The timing for a follow-up colonoscopy may vary between 1 and 3 years, contingent upon cancer risk factors[4]

Small Bowel Resection and Enteroenteric Anastomosis

Following small bowel resection, deep enteroscopy may be necessary to access the anastomotic site, in addition to ileocolonoscopy. The initial endoscopic evaluation is recommended to be performed at 6 months after the small bowel resection for disease monitoring.[4] Important landmarks to identify include the enteroenteric anastomosis and the segments of the small bowel both proximal and distal to the anastomosis. For assessing disease activity, endoscopic scores, such as the Rutgeerts score or SES-CD, may be adapted for the enteroenteric anastomosis and the small bowel.

Stricturoplasty

Surgical strictureplasties (Heineke-Mikulicz, Finney, and Michelassi) are techniques that address fibrostenotic obstructive disease, especially in cases where bowel preservation is critical, such as recurrent disease after extensive or multiple small bowel resections. The assessment of disease recurrence following surgical strictureplasty lacks clear definition. Some retrospective studies are based on the reoperation rate for long-term outcomes.[39,40] In the authors experience, for endoscopic evaluation, deep enteroscopy may be needed in addition to conventional ileocolonoscopy. Capsule endoscopy is discouraged due to concern about the risk of capsule retention. The anatomic landmarks are the inlet and outlet of the strictureplasty and lumen of the strictureplasty, mid-stricture lumen staple, or suture lines (**Fig. 5**A–C). The Global Interventional Group suggested that the disease activity (eg, erosions, ulcers, and strictures) in the lumen of the strictureplasty indicates recurrent CD, but ulcers and strictures at the inlet or outlet site do not necessarily indicate disease recurrence. Histologic findings of non-caseating granulomas in inflamed, ulcerated, or strictured areas outside of the suture line are suggestive of recurrent CD.[4]

Stoma

Fecal stream is thought to trigger tissue damage in CD; as a consequence, fecal diversion with the creation of ostomies may be needed for refractory perianal fistulas or abscesses, surgical complications, or disease in the downstream bowel segment. Fecal diversion can be temporary or permanent. In CD, end ileostomy or end colostomy (**Fig. 6**A, B) is more commonly constructed than loop ileostomy or colostomy. A gastroscope should be used for ileoscopy, jejunoscopy, or colonoscopy via the stoma. Before scoping, a digital examination of the stoma and peristomal skin should be inspected. Deep intubation of the afferent limb at least 10 cm beyond the fascia is recommended.[4] In the lack of validated scoring systems, the RS, CDEIS, or SES-CD can be used. Inflammation, strictures, and fistulas at the stoma or the bowel segment can result from the use of NSAIDs, surgical factors, and recurrent CD, making the

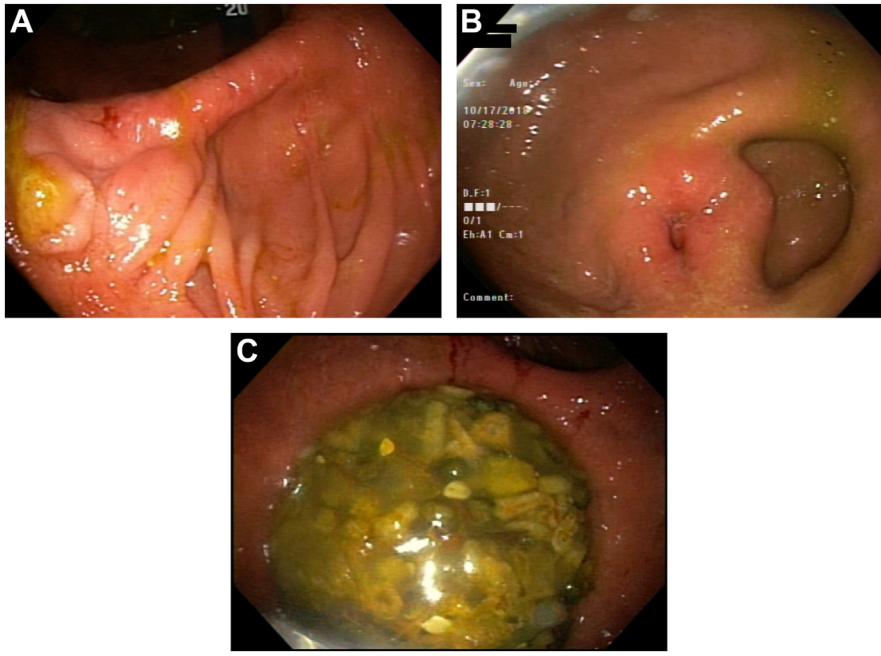

Fig. 5. Surgical strictureplasty site. (*A*) Strictured inlet of strictureplasty site on endoscopic retroflex view; (*B*) Strictured outlet of strictureplasty; (*C*) Retained bezoar in the lumen of strictureplasty.

differential diagnosis challenging. The role of histologic evaluation of the stoma with remanent bowel is yet to be clarified.

Diverted Bowel

Fecal diversion leads to diverted colon, rectum, or ileal pouch. The diverted bowel may present with diversion proctitis, or colitis characterized by mucous or bloody exudates and friable mucosa (Fig. 7A), or diversion-associated stricture (Fig. 7B). Excessive air

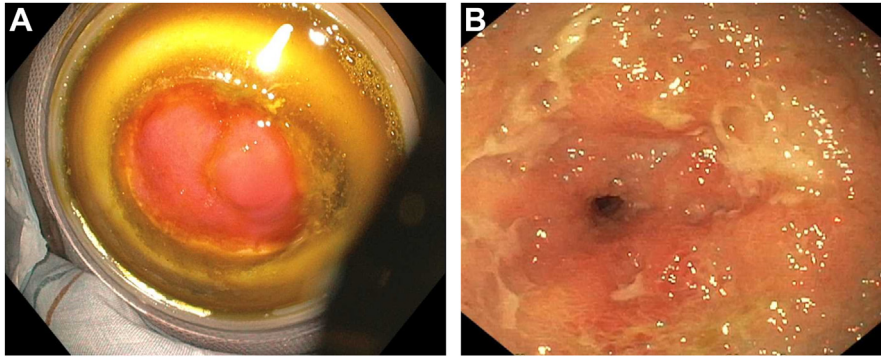

Fig. 6. Ileoscopy via stoma in CD. (*A*) Stenosis at the end ileostomy; (*B*) Mixed inflammatory and fibrotic stricture in the neo-terminal ileum.

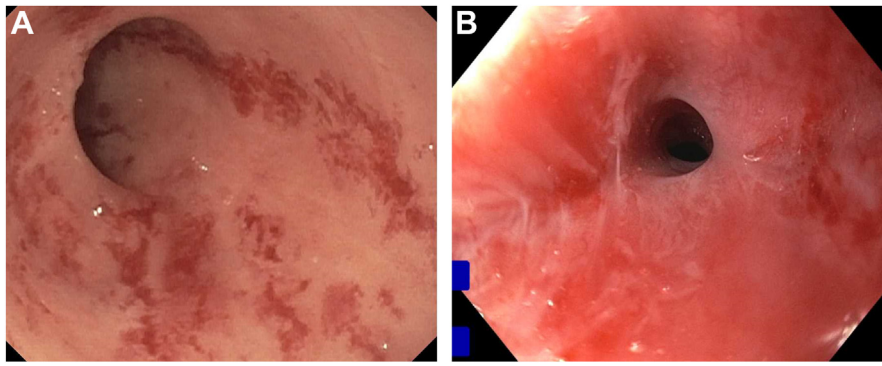

Fig. 7. Diversion-associated bowel diseases. (*A*) Diversion proctitis; (*B*) Diversion-associated web-like stricture.

insufflation should be minimal to avoid barotrauma. Differentiating inflammation of the diverted bowel from active IBD is challenging and can be helped with the histologic findings of extensive lymphoid aggregates, typical of diverted bowel.[41] There are scant data in the literature on the need for, frequency of, and techniques of endoscopy in the diverted bowel.

Bypass Surgery

Duodenounal bypass with gastrojejunal anastomosis constitutes a surgical option for foregut stricturing or fistulizing CD (**Fig. 8**A, B). Upper GI endoscopy is recommended to be done 6 months after surgery for disease monitoring.[4] Disease recurrence is frequent at the anastomotic site of a gastrojejunostomy or duodenojejunostomy, or in the areas of the digestive tract on either side of the anastomosis.

SURGERY FOR ULCERATIVE COLITIS

The proctocolectomy with IPAA was initially documented in 1978 and has become the preferred surgical options for patients with UC.[42] The delivery of this procedure may slightly change depending on whether it is performed electively or urgently, with the latter often associated with a high inflammatory burden. As consequence, urgent surgeries are frequently performed in 3 stages, encompassing subtotal colectomy,

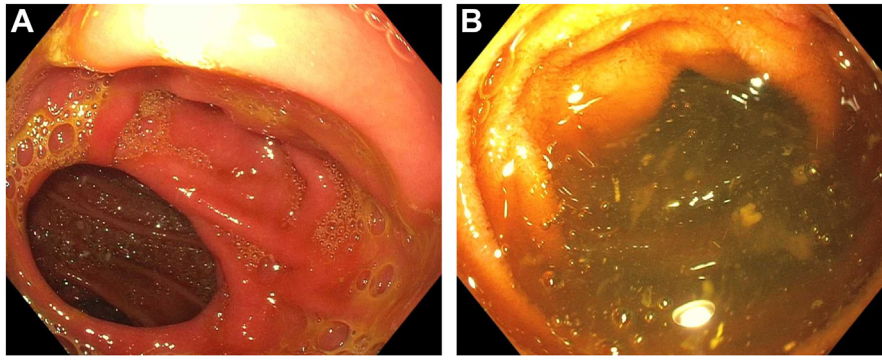

Fig. 8. Bypass surgery for CD. (*A*) Gastrojejunostomy; (*B*) Severely strictured duodenum.

followed by the creation of an ileal pouch with IPAA, and finally the closure of protective ileostomy. In contrast, elective surgeries can be accomplished in 2 or 3 stages. Ileal pouches are divided into pelvic pouch (ie, J pouch or S pouch), abdominal pouches, or continent ileostomy (ie, Kock pouch or Barnett continent ileal reservoir). Continent ileostomy has been constructed for patients who are not candidates for the pelvic pouch due to poor anal sphincter function.[43] While the creation of an ileal pouch significantly improves patients' quality of life, postoperative complications, including structural, inflammatory, and functional disorders, are frequent.[44] Endoscopy plays a key role in diagnosis, disease monitoring, therapy, and dysplasia surveillance. Conventional gastroscopes are recommended for pouchoscopy.

J and S Ileal Pouches and Its Disorders

Total proctocolectomy with ileal pouch-anal anastomosis is indicated for patients with severe flare-up of UC, colitis-associated neoplasia, or familial adenomatous polyposis.[8] Different types of ileal pouches have been developed,[44] with the J pouch more frequently performed than the S pouch. The anatomic landmarks are stoma closure site, afferent limb (ie, the pre-pouch ileum), inlet, tip of the J (present in J pouch and absent in S pouch), pouch body (1 "U" turn in the J pouch and 2 "U" turns in the S pouch), cuff (absent in those with mucosectomy), and anal transition zone[45] (**Fig. 9**A, B).

Pouchitis is the most prevalent long-term complication in patients undergoing restorative proctocolectomy and IPAA. Other inflammatory disorders of the pouch, such as CD of the pouch, cuffitis, and inflammatory polyps, can be found as well.

Pouchitis is the inflammation of the pouch body that represents a spectrum of diseases with various etiology, pathogeneric pathways, disease phenotype, response to therapy, and prognosis. Diagnosis based solely on clinical symptoms is inadequate; objective evidence of inflammation through endoscopy and histology is often necessary[46] (**Fig. 10**A, B). Detailed documentation of endoscopic features is essential for a proper diagnosis and treatment, specifying the location: pre-pouch afferent limb, pouch inlet, pouch body, cuff/anal transition zone; distribution pattern: normal, focal/diffuse inflammation; and presence of stenosis or fistulas. Several composite indices have been used to measure pouch disease activity, including the Pouchitis Disease Activity Index (PDAI), modified PDAI, and Pouchitis Activity Score. However, none of these indices has been fully validated.[47] The presence of ulcers or ulcerated

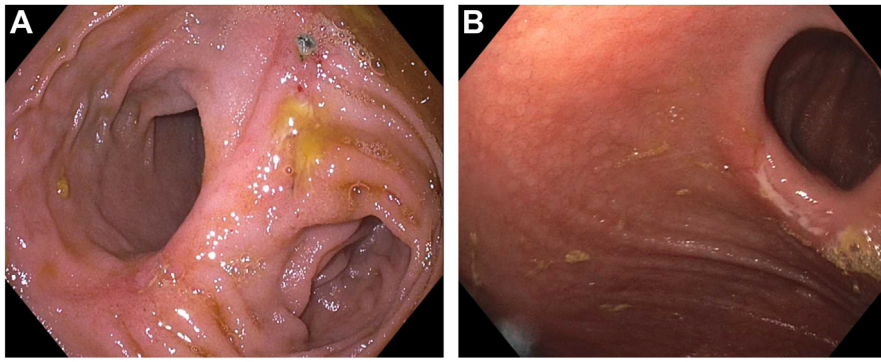

Fig. 9. Ileal pouch-anal anastomosis. (*A*) J pouch characterized by an owl's eye configuration, with the tip of the "J" at one side and pouch inlet at the other side; (*B*) S pouch featured with a larger pouch volume with absent tip of the "J."

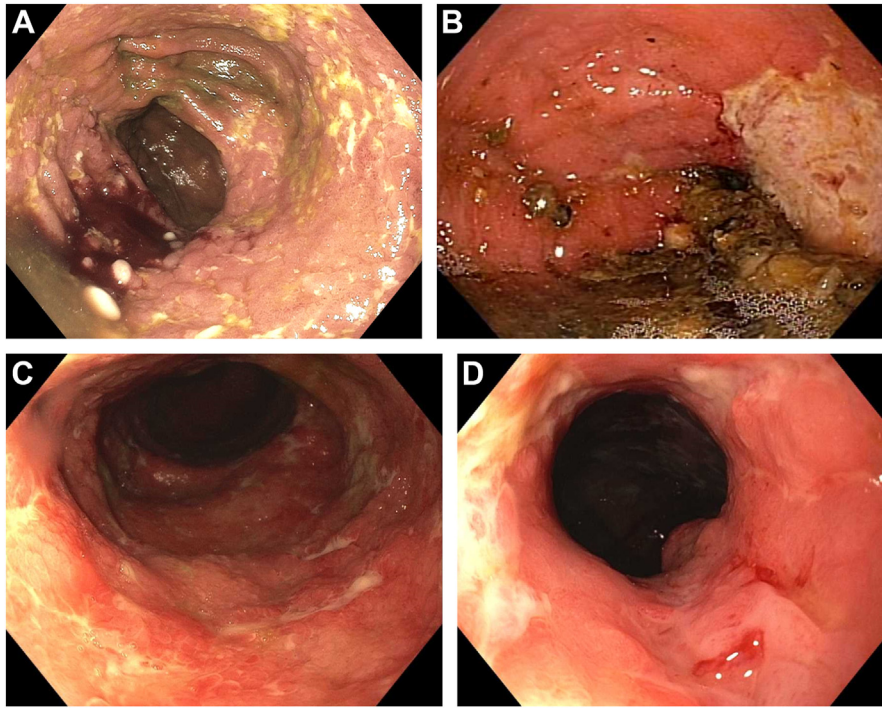

Fig. 10. Pattern of pouchitis. (*A*) Diffuse pouchitis from dysbiosis; (*B*) Ischemic pouchitis with asymmetric distribution of inflammation; (*C*) Prepouch ileitis; (*D*) Cuffitis.

surfaces in the pouch body serves as the most reliable endoscopic indicator of pouch inflammation.[48]

Pre-pouch ileitis or inflammation in the proximal small bowel can occur on its own or be associated with pouchitis, and it is not synonymous with CD (**Fig. 10**C). It may result from other causes including backwash from diffuse pouchitis (distal ileitis within 10 cm of pouch inlet), inlet stricture-associated fecal stasis, the use of nonsteroidal anti-inflammatory drugs (NSAIDs), or surgical ischemia. CD of the pouch or Crohn's-like pouchitis is a debated entity, referring frequently to the extra-pouch manifestation. It can occur in patients with a preoperative diagnosis of ulcerative colitis or indeterminate colitis. In the past, there was a tendency to over-diagnose CD of the pouch,[49] resulting in adverse effects on both the physical and psychological spheres of the patients. Consequently, more stringent criteria have been proposed: the presence of non-caseating, non-crypt-rupture-associated granulomas on intestinal biopsy of the pre-pouch afferent limb, pouch body, or cuff; segmental or skip lesions (such as longitudinal ulcers) or strictures in the pouch or small bowel; late development of fistulas or abscess; and pre-pouch ileitis.[44] In addition, biopsy should avoid the suture-line or staples where the foreign body-associated granuloma may be confused with CD.

Cuffitis is the inflammation of the remnant part of the distal rectum, which is typically 2 to 2.5 cm long (**Fig. 10**D). While it commonly arises as a recurrence of ulcerative colitis, it can also occur due to cuff prolapse in a floppy pouch complex or CD of the pouch. The mucosectomy is frequently performed in patients with a history of colorectal neoplasia to reduce the risk of neoplasia, although it does not eradicate it

completely. The anal transition zone should be carefully evaluated in these cases. Inflammatory polyps are associated with chronic mucosal inflammation and carry a low risk for neoplasia.[50] Removal should be considered in cases of significant size that to obstruction or when associated with anemia.

Patients who undergo restorative proctocolectomy with IPAA or continent ileostomy can be complicated by anastomotic, staple-line, or suture line leaks and strictures.

Leaks at the anastomosis, staple line, or suture line typically manifest within 6 to 12 months following pouch construction, although late-onset may happen as well.[51] Moreover, if left uncontrolled, it could precipitate the development of abscesses, para-pouch or perianal fistulas, or sinuses (**Fig. 11**A). Other causes of pouch fistula are ischemia, sepsis, CD, or CD-like condition, cryptoglandular abscesses, and neoplasia.[52] The tip of the J site is particularly susceptible to surgical ischemia, which can result in ulcers, leaks, abscesses, or sinuses. It is crucial to distinguish these manifestations from Crohn's-like condition of the pouch.[44]

Bowel obstruction is common in patients with the ileal pouch. The obstruction can result from intraluminal (such as mucosal prolapse), intramural (such as anastomotic strictures), or extraluminal factors (such as adhesion and afferent limb syndrome). A stricture is defined in previous consensus as difficulty in the passage of a gastroscope or pediatric colonoscope, or luminal narrowing of more than 50%, with or without pre-stenotic luminal dilation[44] (**Fig. 11**B). Various factors can contribute to their development, including the use of NSAIDs, surgery-associated ischemia, and CD. Proper identification of the location of the strictures is the key for the management. Common strictures locations are the anastomosis, pouch inlet, and stoma closure site. Strictures located at the anastomosis or stoma closure site are likely to be surgically induced, whereas narrowing in the pouch body and pre-pouch ileum are more commonly associated with Crohn's disease and Crohn's disease-like conditions.[44] Similarly to CD-associated strictures, distinguishing between an inflammatory stricture and a fibrostenotic one can be challenging, as the majority often present a mixed component. However, the presence of pre-stenotic luminal dilation is suggestive of the predominance of fibrotic nature. Extrinsic strictures comprise the afferent limb syndrome, an acute angulation of the afferent limb; the efferent syndrome, a sharp angulation between the pouch body and the efferent limb, typical of S pouch; and the pouch prolapse, commonly occurred at the anterior wall of the distal pouch body and the cuff.[53] The existence of non-healing ulcers or persistent strictures or fistula of the pouch should raise suspicion of a malignant process.

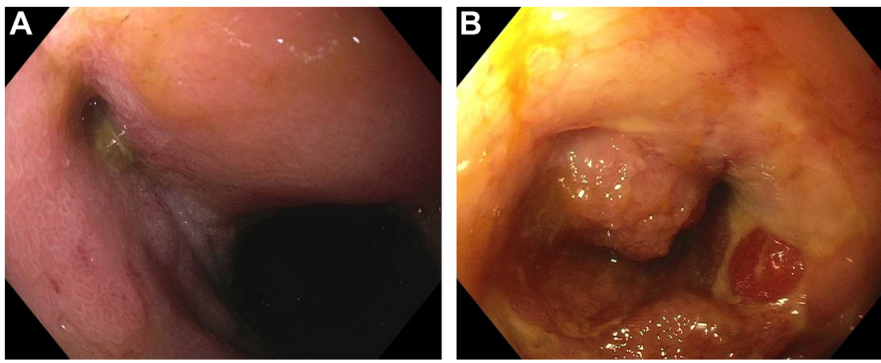

Fig. 11. Structural complication of the ileal pouch. (*A*) Presacral sinus; (*B*) Pouch inlet stricture with an inflammatory polyp in the lumen.

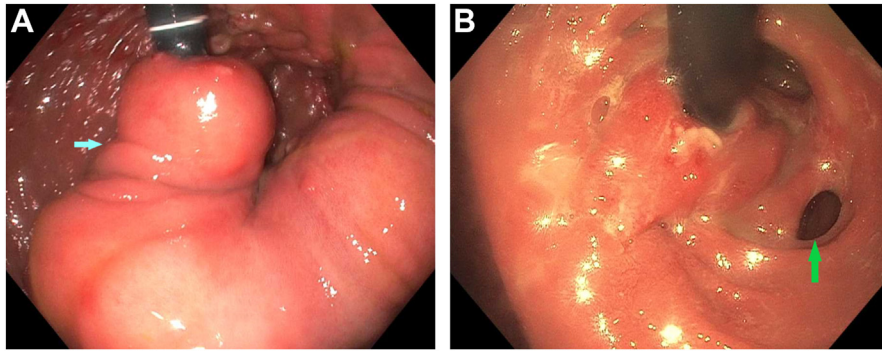

Fig. 12. Continent ileostomy. (*A*) K pouch characterized by a nipple valve (*Blue arrow*); (*B*) Barnett pouch featured with a bowel loop acting as a collar (*Green arrow*).

Continent Ileostomy

The Kock pouch is a continent ileostomy created from the terminal ileum with an intussusception of a bowel segment forming an antiperistaltic valve (Fig. 12A) that is held by surgical staples. On pouchoscopy, it appears like a single lumen following entering through a tight ileostomy. Retroflexion is required to visualize the valve at the entry.[45] The Kock pouch is associated with a high complication rate of valve slippage.

The Barnett continent intestinal reservoir (BCIR) is characterized by the construction of a collar from a loop of the small bowel to reduce valve slippage[54] (Fig. 12B). This intestinal segment is then wrapped around the exit conduit to manage valve slippage. The "living intestinal collar" reinforces the mesenteric side of the valve, where slippage typically begins. In contrast to the Kock pouch, the BCIR employs a side-to-side orientation to eliminate the trifurcated suture line[55]

SUMMARY

A significant proportion of patients with Crohn's disease or ulcerative colitis will eventually require surgical interventions despite advances in diagnosis, medical therapy, and endoscopic interventions. These surgical procedures lead to substantial alterations in bowel anatomy, consequently impacting endoscopic features. Inflammatory responses, ulcers, stenosis, or fistulas related to surgical complications or ischemic phenomenon should be carefully distinguished from those caused by underlying recurrence of Crohn's disease or ulcerative colitis. A meticulous and comprehensive description, along with photo documentation, of anatomic landmarks and endoscopic changes is crucial for clinical interpretation, thereby influencing decisions on medical or endoscopic treatments. It is strongly recommended that gastroenterologists and IBD specialist to acquaint themselves with these alterations to ensure optimal patient care.

CLINICS CARE POINTS

- The landmarks for postoperative colonoscopy include neo-terminal ileum, configuration of anastomosis, anastomosis- related anatomical structures (eg. inlet of the neo-terminal ileum and the ileal segment facing the colon in end-to-end anastomosis) and proximal colon.
- Despite controversies, providing a detailed description of endoscopic changes, whether confined to the anastomosis or not, and monitoring the evolution over time is crucial for the management of the recurrence of postoperative CD.

- The landmarks for pouchouscopy include the prior stoma site if applicable, afferent limb, inlet, tipo of the J-pouch, pouch body, ileal-pouch anastomosis, cuff and anal transition zone.
- In addition to the inflammatory disorders of the pouch, other complications of the IPAA should be considered such as surgical-related complications, ischemic changes drug-induced lesions, CD- like conditions, and the floppy pouch complex.

DISCLOSURES

None.

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