

CASE REPORT

An Analysis of the Literature and a Case Study on the Successful Surgical Treatment of a Crohn's Patient Using a Kono-S Anastomosis

Mirza Saeed¹, Ahmed Taymour Algahiny², Omar Samir Mohamed Megahed Saleh Elmitwalli³, Mirit Mohamed Mohamed Refaat Mohamed Ahmed⁴, Isam Mazin Juma⁵

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ABSTRACT

Background: Crohn's disease (CD) is a chronic inflammatory bowel disease affecting the gastrointestinal tract. Treatment involves immunosuppression, and surgical intervention is sometimes necessary for patients who do not respond to medical treatment. However, recurrence of the disease is a common complication after surgery.

Aim: This case report focuses on a patient with CD who underwent ileocecal resection with Kono-S anastomosis, a surgical technique aimed at reducing recurrence rates.

Case description: A 43-year-old male with a known history of CD for 13 years presented with recurring moderate-to-severe lower abdominal pain associated with belching, nausea, subjective fever, and sweats. The patient was on infliximab and azathioprine. Investigations confirmed irregular skip mural thickening of ileal loops with significant luminal narrowing along with stenotic fibrostrictures of the ileum, and mild bilateral sacroiliitis. The patient was treated surgically with an ileocecal resection and a Kono-S anastomosis operation. This case report highlights the advantages and disadvantages of the Kono-S anastomosis technique in treating patients with recurrent CD.

Clinical significance: Kono-S anastomosis demonstrates a relative safety profile and carries several potential benefits. However, its wider adoption is limited due to insufficient familiarity among surgeons and the possibility of complications. Nevertheless, embracing Kono-S as the standard anastomosis method holds the promise of significant advantages for individuals with CD.

Conclusion: This case report highlights the potential benefits of Kono-S anastomosis in reducing CD recurrence and provides valuable insights for further research and clinical practice.

Keywords: Anastomosis, Case report, Crohn's disease, Inflammatory bowel disease, Intestinal obstruction, Stricture.

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BACKGROUND

Crohn's disease (CD) is a chronic inflammatory disease of the bowel, affecting the entire Gastrointestinal tract. Treatment is typically through immunosuppression to control the inflammation and relieve the symptoms. Sometimes, Crohn's patients are treated surgically due to failure of medical treatment or disease complications. However, difficulties may continue postoperatively, with recurrence being the most common complication.¹ Recurrence typically occurs post an ileocecal resection at the site of the anastomosis, which raises the question of whether a different surgical technique of an anastomosis could reduce recurrence rates.¹ Kono-S anastomosis is a surgical technique in which an antimesenteric end-to-end functional anastomosis is created with the expectation of reducing the recurrence of the disease.^{1,2} In this case report, we follow a patient with CD who was surgically treated by Kono-S anastomosis. The patient suffered from CD for 13 years, with an endoscopy showing fibrostenotic small bowel strictures. After performing the Kono-S anastomosis, the patient showed no sign of recurrence.

CASE DESCRIPTION

The patient was a 43-year-old man with CD for 13 years and was administered infliximab and azathioprine. The patient presented with recurring moderate-to-severe lower abdominal pain associated with belching, nausea, subjective fever, and sweats.

^{1,5}Department of General Surgery, King Hamad University Hospital, Muharraq, Bahrain

²⁻⁴School of Medicine, Royal College of Surgeons in Ireland – Medical University of Bahrain, Busaiteen, Muharraq, Bahrain

Corresponding Author: Ahmed Taymour Algahiny, School of Medicine, Royal College of Surgeons in Ireland – Medical University of Bahrain, Busaiteen, Muharraq, Bahrain, Phone: +97339269314, e-mail: 19201282@rcsi.com

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Computed tomography (CT) as depicted in [Figure 1 to 3](#) showed irregular skip mural thickening of ileal loops with remarkable narrowing but no evidence of complete intestinal obstruction. They have also noted mild smudging of related fat planes and vascular engorgement. Furthermore, while there was no evidence

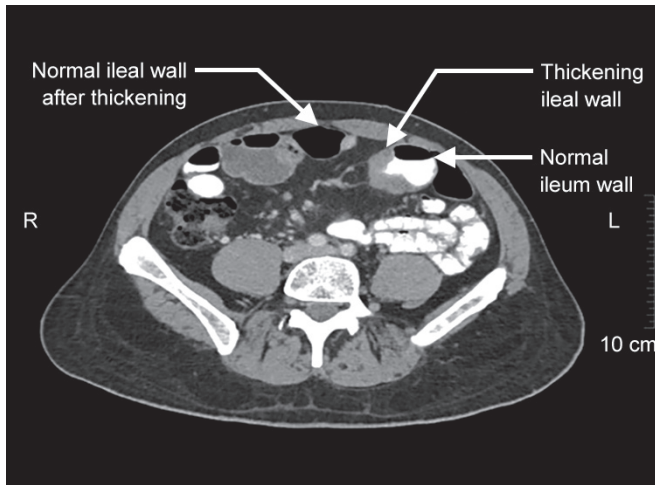


Fig. 1: Computed tomography showing thickened ileal wall

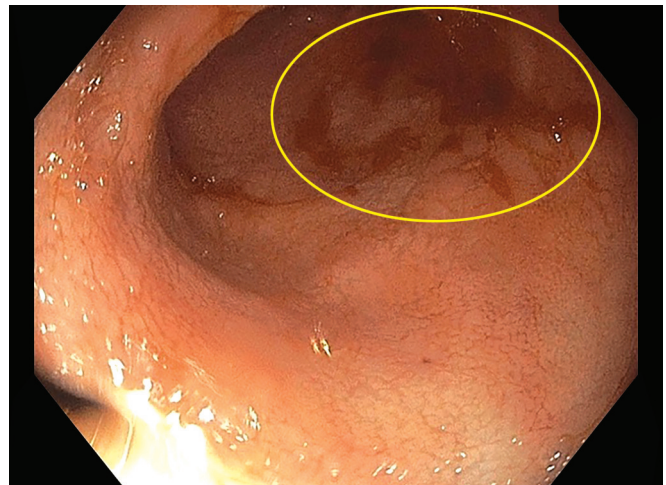


Fig. 4: Colonoscopy showing ileal ulcer (circled in yellow)

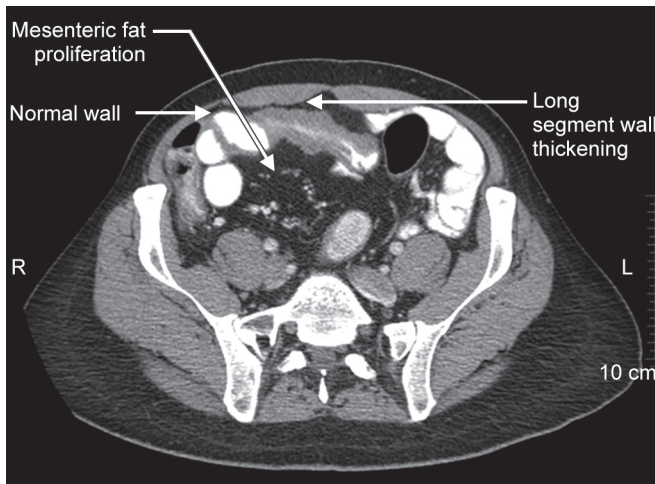


Fig. 2: Computed tomography showing mesenteric fat proliferation and long-segment wall thickening

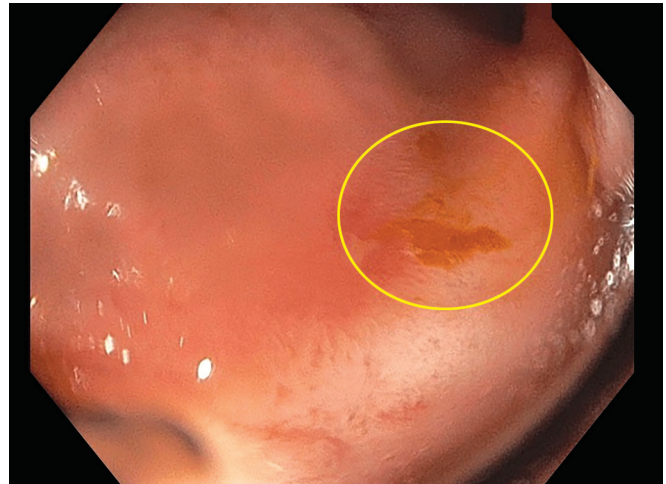


Fig. 5: Colonoscopy showing ileal ulcer (circled in yellow)

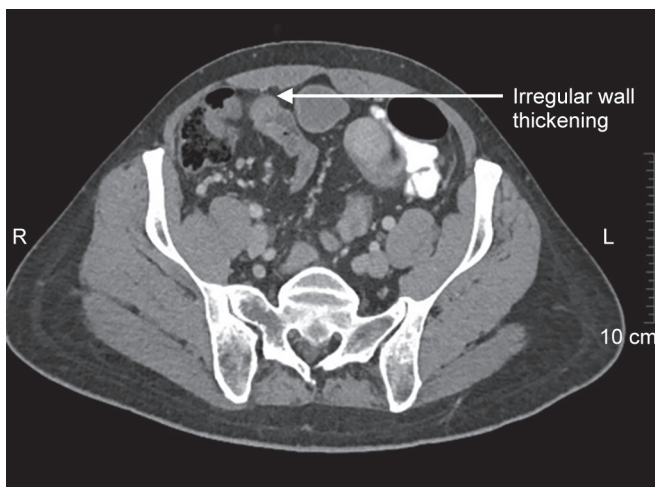
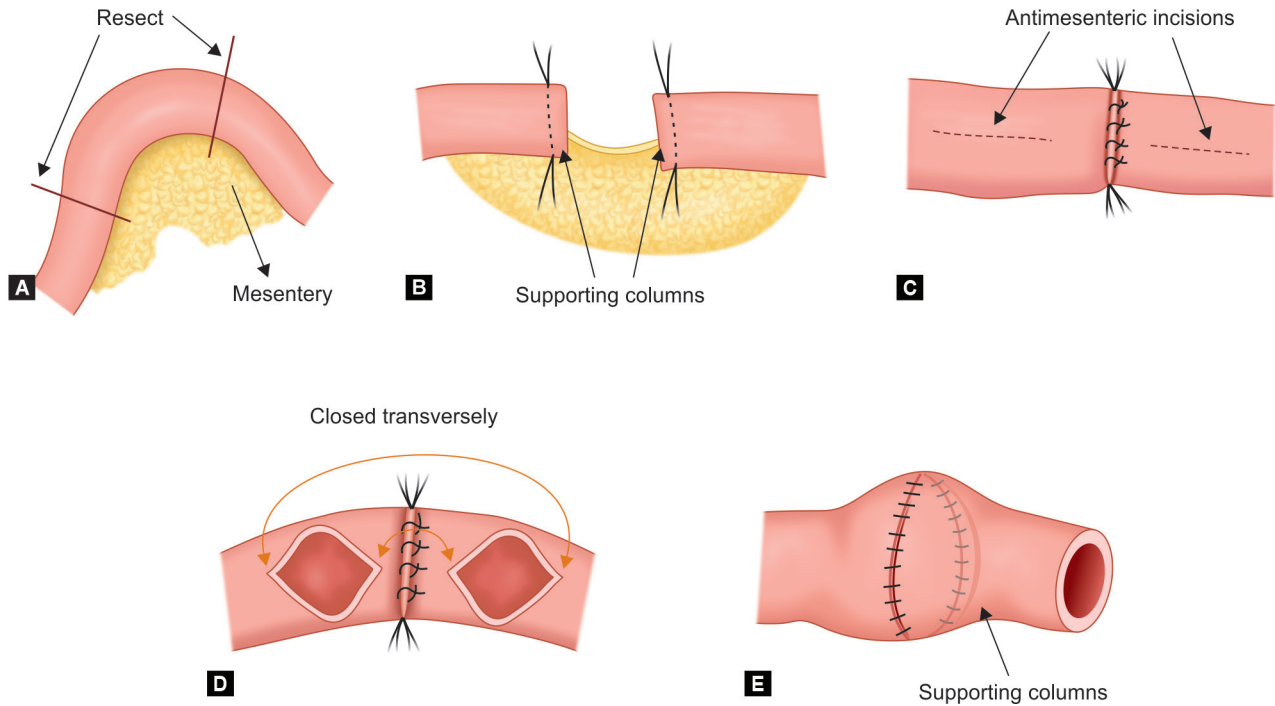


Fig. 3: Computed tomography showing irregular skip mural thickening of ileal loops with remarkable narrowing

On colonoscopy, as shown in [Figures 4 and 5](#), there was mild inflammation of the ascending colon and the cecum. Also noted were stenotic fibrostrictures of the ileum. Laboratory tests were performed, and significant results were as follows: Leukocyte count, $17.14 \times 10^9/L$; neutrophil count, $15.07 \times 10^9/L$; hemoglobin, 13.4 g/dL; C-reactive protein (CRP) 44.36 mg/L; albumin 31.8 g/L; total bilirubin, 7.1 mmol/L; aspartate aminotransferase, 24.9 U/L; activated partial thromboplastin time (APTT)-ratio, 0.95%; international normalized ratio (INR), 1.13; APTT 25.1 seconds; prothrombin time (PT), 13.3 seconds.

of intraperitoneal free fluid, abscess, or fistula formation, there was mild bilateral sacroiliitis.

Due to the patient's history and holistic clinical picture, it was decided to perform an ileocecal resection and Kono-S anastomosis. A midline incision was created to start the procedure. The bowel was run with the diseased segments and ileal strictures identified. The stricture was found 7.5 cm from the diseased segment. With margins of resection identified, the mesentery was divided using a tissue-sealing device. Division was done as close to the intestinal wall as possible, to preserve neovascularization of the mesentery. The resection points and the antimesenteric walls were marked before dividing the bowel transversely. A gastrointestinal anastomosis (GIA) stapler was placed perpendicular to the mesentery, 90° opposite to a conventional anastomosis. The bowel stumps were sewn together using absorbable sutures to create a



Figs 6A to E: The steps of Kono-S-anastomosis technique. (A) Proximal and distal margin for resection; (B) Mesentery is divided; (C) Supporting column; (D) Longitudinal enterotomies at the antimesenteric border; (E) Completed anastomosis

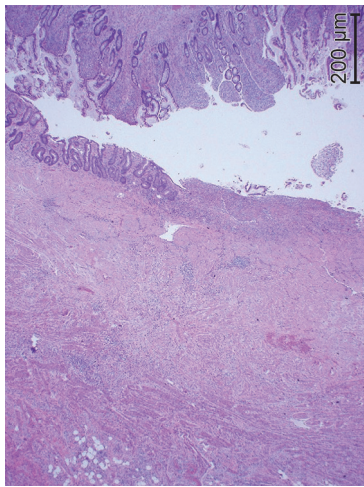


Fig. 7: Histopathological sample showing a 35 mm × 25 mm × 5 mm ulcer

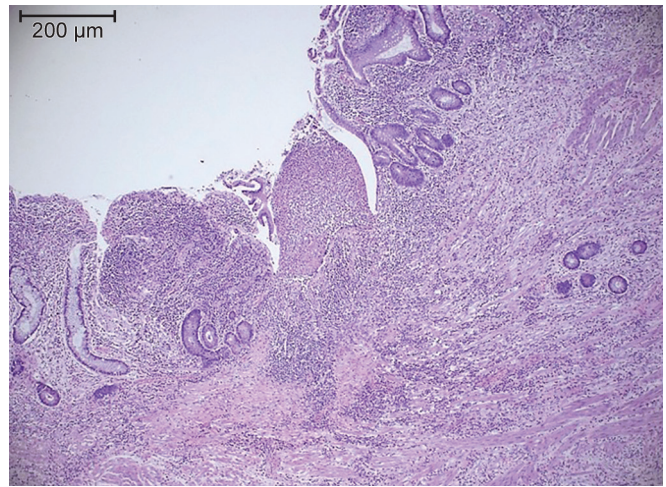


Fig. 8: Histopathological sample showing another ulcer measuring at 25 mm × 20 mm × 4 mm

“supporting column.” Next both sides of the supporting column were cut longitudinally on the antimesenteric wall, 1 cm from the support column. The longitudinal incisions were then sutured transversely using absorbable sutures completing the anastomosis. The steps of Kono-S-anastomosis is simplified in [Figures 6A to E](#).

The operative time was approximately 4 hours. Postoperative pathologic examination as shown in [Figures 7 and 8](#) revealed two ulcers, the larger ulcer measured 35 mm × 25 mm × 5 mm and the smaller one measured at 25 mm × 20 mm × 4 mm. The mucosa was edematous, with multiple ulcers, underlying fibrosis, and patchy chronic active inflammation. Six mesenteric lymph nodes were noted and there was no evidence of dysplasia or malignancy. The postoperative course was uneventful, and he was discharged on day 6 and prescribed infliximab and azathioprine. Colonoscopy

was done 12 months post-Kono-S anastomosis and showed no evidence of stenosis.

DISCUSSION

In an advanced and severe CD, medical treatment is often inadequate, and surgery is the only option to achieve remission.³ Recurrence occurs at the anastomotic site in 90% of cases.⁴ Since the length of the resected segment does not affect the recurrence rate, attention is centered around the anastomosis formation technique to reduce reoccurrence.⁴⁻⁵

Generally, endoscopic recurrences are far more common than symptomatic recurrences, and medical treatment is usually adequate.⁶ However, fixed stenosis that are caused by anastomotic

recurrence cannot be treated medically and require further endoscopic intervention or surgery.⁷ The Kono-S anastomosis helps endoscopists by allowing a more straightforward access and removal due to the functional end-to-end configuration of the anastomosis.⁸ The initial interventional therapy for anastomotic stenosis may be endoscopic dilatation. Although its application is restricted in angulated bowel, and the information about the angulation of anastomotic stenosis is limited, interventional therapy may have an important role in efficacy.¹ Therefore, it is crucial to ensure that a dilatation is both feasible and accessible. Additionally, the endoscopic dilation is easier to perform after handsewn than stapled anastomosis.¹

Kono-S anastomosis may prevent restenosis because the supporting column preserves the diameter and dimensions of the anastomosis.⁹ The mesenteric side of the intestine is where the anastomotic recurrence usually occurs.⁹ With the Kono-S anastomosis, the mesenteric side is placed in the center of the supporting column.⁹ So, even if recurrence occurs on the mesenteric side, the supporting column prevents the distortion from occurring.⁹

According to the debate that was held in the American Society of Colon and Rectal Surgeons,¹⁰ it was noted that Kono-S anastomosis was similar to the conventional anastomosis in the operative and early postoperative time in terms of surgery duration, postoperative stay, days to pass stool, days to pass flatus, anastomotic fistulas, anastomotic bleeding, abdominal abscess, postoperative ileum, and rate of infections. However, endoscopic and clinical recurrence was lower in the Kono-S anastomosis compared conventional anastomosis.¹¹

In a recent systematic review, Alshantti et al. reported that the endoscopic and surgical recurrence rates with Kono-S anastomosis were significantly lower than those with conventional anastomosis (0–3.4% vs 15–24.4%), respectively,¹² Also, it was found safer as the incidence of complications was lower. Mainly, anastomotic leak incidence rate was significantly lower (1.8% vs 9.3%), respectively.¹² Recent literature also supported the use of Kono-S anastomosis, reporting its safety and suitability for both small and large bowel with a reduction in postoperative recurrence, deeming it a potential standard surgical technique for CD in the future.^{13,14} In this case report, the patient was followed up for 12 months and did not have any recurrence. More randomized control trials are needed to determine the efficacy of Kono-S anastomosis technique.

Clinical Significance

Kono-S anastomosis is relatively safe and potentially holds several benefits. While it may not necessarily be superior to conventional anastomosis, it certainly does not present any significant drawbacks. Considering this, it begs the question as to why it shouldn't be adopted more widely. It is worth noting, though, that not all surgeons are currently acquainted with this technique, and it is not without its own set of potential complications. However, implementing Kono-S anastomosis as the new standard anastomosis could potentially bring about substantial advantages for all Crohn's patients.

CONCLUSION

In conclusion, surgical intervention is often necessary to achieve remission in advanced and severe CD, and anastomotic recurrence is a common issue. The Kono-S anastomosis technique has emerged as a promising solution to prevent anastomotic recurrence and reduce postoperative complications, especially with its advantages of preserving the diameter and dimensions of the anastomosis

and reducing the incidence of anastomotic leak. The initial results from recent literature suggest that Kono-S anastomosis could be a standard surgical technique for CD. However, further randomized controlled trials are necessary to confirm the efficacy of this technique in preventing anastomotic recurrence and reducing postoperative complications.

ORCID

Omar Samir Mohamed Megahed Saleh Elmitwalli  <https://orcid.org/0000-0003-1356-4473>

Isam Mazin Juma  <https://orcid.org/0000-0003-4470-677X>

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