

# Morbidly Obese Patients with Ileocolic Crohn's Disease May Benefit from Robotic Surgery

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## ABSTRACT

**Background and Objectives:** Obesity is increasing as a comorbid condition for patients requiring surgery for Crohn's disease. Minimally invasive colectomy is ideal for a patient with combined obesity and Crohn's disease. However laparoscopic colon resection is associated with high operative conversion rates in these cases. Data examining the use of robotic surgery in the obese patient with Crohn's disease is sparse.

**Methods:** We examined the feasibility and outcomes of performing a minimally invasive colectomy using the Da Vinci robot in a prospective case series of morbidly obese patients with ileal Crohn's disease.

**Results:** A robotic ileocectomy was performed in four morbidly obese patients with Crohn's disease. There were no operative conversions or complications with a median length of stay of 3 days.

**Conclusion:** A robotic approach is a promising minimally invasive surgical alternative to laparoscopic surgery for these complex patients.

**Key Words:** Robotic ileocectomy, Crohn's disease, obesity.

Crohn's disease (CD).<sup>1,2</sup> Laparoscopic surgery for ileal CD has also recently been established as a reasonable alternative to biologics for nonstricturing ileal CD, with similar quality of life for patients.<sup>3</sup> Although CD patients may benefit from a minimally invasive surgical approach, laparoscopic surgery is often technically challenging. CD patients may have inflammation, fistulas, abscess, adhesions, and obesity that limit completion of the surgery laparoscopically. Consequently, laparoscopic resection of CD is associated with high rates (up to 40%) of operative conversion (OC) and increased complications, prolonged hospitalization, and increased mortality.<sup>4,5</sup>

Of all patients undergoing surgery for inflammatory bowel disease, those with CD or obesity have the highest risk of OC.<sup>6</sup> Despite evidence that obese patients benefit from minimally invasive intestinal surgery,<sup>7</sup> a recent nationwide study of NSQIP hospitals revealed that this approach is underutilized for surgical treatment in CD.<sup>8</sup> Of 1917 ileocolic resections for CD, only 644 (34%) were performed laparoscopically. In this study, 16% of patients undergoing surgery for CD were obese (BMI > 30) with only 30% of these cases performed laparoscopically compared to 70% performed via an open approach.<sup>8</sup>

This present case series describes the surgical outcomes of four morbidly obese patients (BMI  $\geq$  35) with ileocolic CD. We hypothesized that a low operative conversion rate could be achieved using a robotic approach since robotic colon surgery has a lower OC compared to laparoscopic colon surgery in general.<sup>9</sup>

## OPERATIVE TECHNIQUE

The Da Vinci Si robot (Intuitive Surgical, Sunnyvale, CA) was used in three cases and the Da Vinci Xi robot used in one case. Four robotic ports and two assistant ports were placed on the left side of the abdomen in all cases. The monopolar scissors was used for lysis of adhesions and the vessel sealer used to divide the mesentery of the ileum and right colon. The robotic stapler (3.5 mm staple loads) was used to divide the ileum (5 centimeters proximal to the ileocecal valve) and the ascending colon just distal to the cecum. The proximal ileum was then anastomosed to the distal ascending colon as previously described with

## INTRODUCTION

Laparoscopic ileocolic resection is considered the preferred approach for surgical treatment of select patients with ileal

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a completely stapled side–side anastomosis.<sup>10</sup> After completing the anastomosis, the common channel is closed initially with sutures and then with staples to ensure full thickness closure.<sup>10</sup> The blood supply of the anastomosis was examined by injecting 3 milliliters of indocyanine green (ICG) intravenously and by inspecting the anastomosis under firefly luminescence. The specimen was removed with an Alexis wound protector (Applied Medical, Santa Margarita, CA).

### Case 1

35-Year–old female presented with a 1-year history of ileal Crohn's disease with persistent upper abdominal post-prandial pain despite treatment with 5-ASA medications and Humira. She had been hospitalized for small bowel obstruction (SBO) several months prior that was partially resolved with steroid treatments. Her BMI was 41.3 and the right lower quadrant of her abdomen was tender to palpation without rebound. C-reactive protein (CRP) was 5.4 mg/liter, an adalimumab level of 4.8 µg/ml, and an erythrocyte sedimentation rate (ESR) of 3 mm/hour. Colonoscopy revealed inflammation of the rectum and ileocecal valve. A magnetic resonance enterography (MRE) revealed terminal ileal inflammation but no evidence of stricture. She underwent a robotic ileocectomy with ICA for failure to respond to biologic therapy. The operative time (OT) was 291 minutes and estimated blood loss (EBL) of 50 ml. She was discharged on postoperative day 3 with complete return of gastrointestinal function and tolerating a solid diet. Pathology revealed a 12-cm segment of ileum with transmural inflammation and a 6-cm fibrotic stricture. She had no 30-day postoperative complications and four months following surgery, she was well but having diarrhea that responded to fiber and Imodium.

### Case 2

37-Year–old female presented with abdominal pain, hematochezia, and diarrhea with a family history of a first degree relative with colorectal cancer. On physical examination, she was obese with a BMI of 41.9 and abdominal tenderness with a palpable mass. The hemoglobin was 13.2 g/dl, CRP 11.2 mg/liter, and ESR of 31 mm/hour. Colonoscopy showed an inflammatory mass at the ileocecal valve. Biopsies revealed nonspecific inflammation. CT-enterography showed inflammation of a long segment of terminal ileum. A robotic ileocectomy was performed for definitive diagnosis. OT was 389 minutes and EBL of 200 ml. She was discharged on the third postoperative day

with complete return of gastrointestinal function consuming solid food. Pathology revealed a 10-cm segment of ileum with ulcers and transmural inflammation with a benign stricture. She had no perioperative complications but developed abdominal pain and diarrhea three months later. Colonoscopy revealed recurrent Crohn's disease with ulceration of the ileum and colon with no strictures and was treated with Humira.

### Case 3

48-Year–old female with a 20-year history of ileal Crohn's disease presented with recurrent upper abdominal pain, vomiting, and explosive diarrhea for three years despite being treated with sulfasalazine. Colonoscopy showed stenosis of the ileocecal valve and ileal inflammation. One month post-colonoscopy, she was hospitalized for an SBO treated with intravenous (I.V.) steroids. Subsequently, Humira was begun and steroids tapered. Her symptoms persisted for over 6 months and she was readmitted with recurrent SBO. This exacerbation was treated with I.V. steroids. Repeat colonoscopy was performed with balloon dilation of the ileocecal valve stenosis but her symptoms persisted, and she was referred for robotic surgery for medical failure. She had a BMI of 40.1 with abdominal tenderness in the right lower abdomen and a reducible umbilical hernia. MRE showed a long segment of diseased terminal ileum with associated inflammation and stricture. A robotic ileocectomy with ICA with open umbilical hernia repair was performed with OT of 370 minutes and EBL of 100 ml. Her hospitalization was three days with complete return of GI function and consuming solids. Pathology showed a 36-cm segment of ileum with inflammation and a 1.3 cm fibrotic stricture. She had no complications at two months following surgery.

### Case 4

62-Year–old female with a 26-year history of Crohn's disease of the terminal ileum presented with a 1-year history of recurrent small bowel obstructions. The patient was treated with prednisone with partial resolution of symptoms. Her physical examination revealed a BMI of 35 and abdominal distention. The patient underwent a CT scan that showed a persistent small bowel obstruction with a 4-cm ileal stricture (**Figure 1**). Prednisone was weaned to a daily dosage of 10 mg. She underwent a robotic ileocectomy with an OT of 280 minutes and EBL of 100 ml. At surgery, the patient had a fibrotic stricture of the terminal ileum and a persistent small bowel obstruction. The specimen revealed an ileal stricture secondary to Crohn's disease confirmed on final pathology



**Figure 1.** CT-enterography shows isolated Crohn's ileal stricture with persistent small bowel obstruction.

(**Figure 2**). The patient was discharged two days postoperatively with no complications at 30 days.

**DISCUSSION**

The incidence of obesity is increasing worldwide. Similarly, the incidence of Crohn's disease is increasing worldwide. A causal relationship between obesity and CD has been postulated.<sup>11</sup> Although further work on the causal relationship

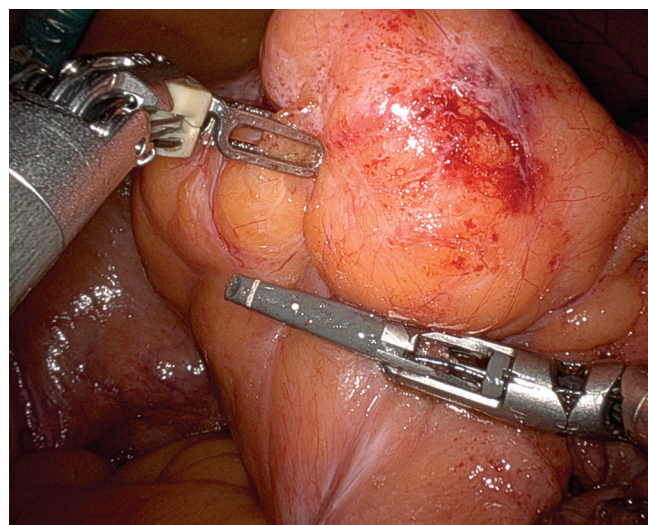


**Figure 2.** Ileocecal specimen with ileal stricture and creeping fat characteristic of Crohn's disease.

remains to be defined, studies have clearly demonstrated an increase in proportion of Crohn's patients with obesity.<sup>12</sup> The rise in obesity among Crohn's patients is of great clinical significance to surgeons as roughly 75% of Crohn's patients require surgery during their lifetimes and increasing BMI has been shown to increase the risk of operative conversion during a minimally invasive laparoscopic operation.<sup>6</sup> Unfortunately, patients with combined morbid obesity and CD are often excluded from minimally invasive surgery even though this subgroup of patients may benefit the greatest from a minimally invasive approach.<sup>7, 8</sup>

Although obesity is a risk factor for operative conversion in laparoscopic colon surgery, studies have indicated that BMI is not a predictor for OC in robotic colon surgery.<sup>9</sup> The role of robotic surgery for morbidly obese patients with CD has not been previously examined. Our series describes four morbidly obese patients with ileocolic CD who underwent successful minimally invasive operations using a robotic approach. All four patients did well with a short hospitalization of 2–3 days and no 30-day postoperative complications. Our series suggests that the robotic platform can be used consistently to achieve a successful minimally invasive operation compared to laparoscopic resection of obese patients with ileal CD.

The robotic approach has multiple advantages compared to laparoscopic surgery that enabled consistent success in this series. Adhesions that are common with CD are much more easily dissected with the robotic platform with stereoscopic 3-D vision and sharp dissection using the monopolar scissors. The thickened mesentery adjacent to



**Figure 3.** Division of the ileal mesentery close to the bowel wall with the vessel sealer. The mesentery is markedly thickened.

the bowel can be divided with high fidelity using the vessel sealer (**Figure 3**) with cauterization of the distal ileocolic pedicle multiple times prior to division. Additionally, the enhanced optics, ability for intracorporeal suturing, fidelity of the “smart” stapler platform, and use of firefly luminescence likely contribute to our ability in performing consistent successful intracorporeal anastomosis with no leaks.<sup>10</sup> The results achieved also seem to be generalizable to both Si and Xi robotic platforms with the main difference being port placement in an arc fashion versus a linear fashion, respectively, with a minimal spread of 8 cm between ports. The lack of any venous thromboembolism events is likely attributed to a 28-day regimen of postoperative low molecular weight heparin.

The potential limitations of this series include its retrospective design, small sample size, and the significant robotic experience of the surgeon prior to performing this case series. This present case series examining robotic surgery in a select cohort of morbidly obese patients with ileocolic CD, who are often denied a minimally invasive operation, extends previous observations of other investigators that have shown great promise for the robotic platform for nonobese patients with CD.<sup>13–15</sup> Future larger series and formal clinical trials evaluating the role of robotic surgery in morbidly obese patients with ileocolic Crohn's disease are warranted to determine the best surgical approach for these challenging patients.

## References:

- Milsom JW, Hammerhofer KA, Böhm B, Marcello P, Elson P, Fazio VW. Prospective, randomized trial comparing laparoscopic vs. conventional surgery for refractory ileocolic Crohn's disease. *Dis Colon Rectum*. 2001;44(1):1–8.
- Maartense S, Dunker MS, Slors JF, et al. Laparoscopic-assisted versus open ileocolic resection for Crohn's disease: a randomized trial. *Ann Surg*. 2006;243(2):143–149.
- Ponsioen CY, de Groof EJ, Eshuis EJ, et al. LIRIC study group. Laparoscopic ileocaecal resection versus infliximab for terminal ileitis in Crohn's disease: a randomised controlled, open-label, multicentre trial. *Lancet Gastroenterol Hepatol*. 2017;2(11):785–792.
- Schmidt CM, Talamini MA, Kaufman HS, Lilliemoe KD, Learn P, Bayless T. Laparoscopic surgery for Crohn's disease: reasons for conversion. *Ann Surg*. 2001;233(6):733–739.
- Masoomi H, Moghadamyeghaneh Z, Mills S, et al. Risk factors for conversion of laparoscopic colorectal surgery to open surgery. *World J Surg*. 2015;39(5):1240–1247.
- Krane MK, Allaix ME, Zoccali M, et al. Does morbid obesity change outcomes after laparoscopic surgery for inflammatory bowel disease? Review of 626 consecutive cases. *J Am Coll Surg*. 2013;216(5):986–996.
- Blumberg D. Laparoscopic colectomy performed using a completely intracorporeal technique is associated with similar outcome in obese and thin patients. *Surg Laparosc Endosc Percutan Tech*. 2009;19(1):57–61.
- Lee Y, Fleming FJ, Deeb AP, Gunzler D, Messing S, Monson JR. A laparoscopic approach reduces short-term complications and length of stay following ileocolic resection in Crohn's disease: an analysis of outcomes from the NSQIP database. *Colorectal Dis*. 2012;14(5):572–577.
- Bhama AR, Wafa AM, Ferraro J, Collins SD, et al. Comparison of risk factors for unplanned conversion from laparoscopic and robotic to open colorectal surgery using the Michigan Surgical Quality Collaborative (MSQC) database. *J Gastrointest Surg*. 2016;20(6):1223–1230.
- Blumberg D. Robotic colectomy with intracorporeal anastomosis is feasible with no operative conversions during the learning curve for an experienced laparoscopic surgeon developing a robotics program. *J Robotic Surg*. 2019;13(4):545–555.
- Mendall MA, Gunasekera AV, John BJ, Kumar D. Is obesity a risk factor for Crohn's disease? *Dig Dis Sci*. 2011;56(3):837–844.
- Moran GW, Dubeau MF, Kaplan GG, Panaccione R, Ghosh S. The increasing weight of Crohn's disease subjects in clinical trials: a hypothesis-generating time-trend analysis. *Inflamm Bowel Dis*. 2013;19(13):2949–2956.
- Aydinli HH, Anderson M, Hambrecht A, Bernstein MA, Grucela AL. Robotic ileocolic resection with intracorporeal anastomosis for Crohn's disease. *J Robot Surg*. 2020 Epub ahead of print.
- Hota S, Parascandola S, Smith S, Tampo MM, Amdur R, Obias V. Robotic and laparoscopic techniques in patients with Crohn's disease. *Surg Endosc*. 2020 Epub ahead of print.
- Raskin ER, Gorrepati ML, Mehendale S, Gaertner WB. Robotic-assisted ileocolic resection for Crohn's disease: outcomes from an early national experience. *J Robotic Surg*. 2019;13(3):429–434.