

HOW I DO IT

## Laparoscopic surgery for idiopathic adult intussusception successfully reduced by colonoscopy

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### Abstract:

Most cases of adult intussusception are caused by neoplastic lesions, and idiopathic adult intussusception is very rare. We present a case in which laparoscopic surgery was performed for idiopathic adult intussusception initially reduced by colonoscopy. A 53-year-old woman presented to the emergency department of our hospital with intermittent lower abdominal pain. Contrast-enhanced computed tomography and ultrasonography of the abdomen showed a concentric structure in the ascending colon. We diagnosed intussusception. Colonoscopy achieved successful reduction before surgery. Twelve days after this reduction, laparoscopic surgery was performed. Histopathological examination did not reveal any causative pathology; therefore, idiopathic adult intussusception was diagnosed. The postoperative course was uneventful, and the patient was discharged on postoperative day 14. Preoperative colonoscopy should be utilized to diagnose the main lesion and may be useful for reducing adult intussusception. Laparoscopic surgery is both minimally invasive and safe and can be performed following endoscopic reduction.

### Keywords:

idiopathic adult intussusception, endoscopic reduction, laparoscopic surgery

J Anus Rectum Colon 2019; 3(1): 49-52

### Introduction

Intussusception is the telescoping of a segment of the bowel into an adjacent segment. Intussusception is relatively common among children, and most cases of childhood intussusception are idiopathic with no structural lead points. In contrast, adult intussusception is rare, representing only 5% of all cases of intussusceptions<sup>1)</sup>, and most cases involve identifiable etiologies such as benign or malignant tumors. Moreover, colonic intussusception is less frequent than small intestinal intussusception and is mostly caused by malignant tumors<sup>1,2)</sup>. Intussusception shows a characteristic appearance on computed tomography (CT) and ultrasonography and comprises edematous bowel wall and luminal mesentery. Although childhood intussusception is treated by barium re-

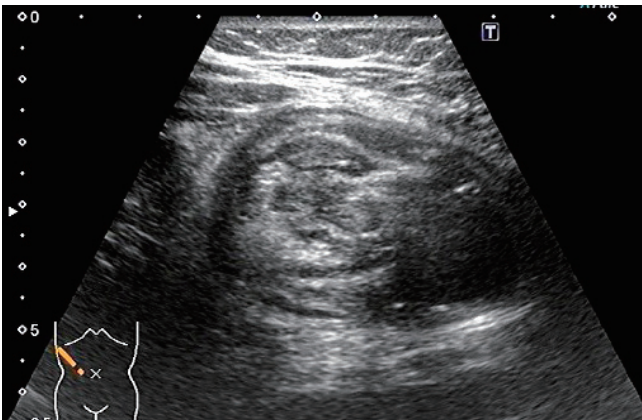
duction, adult intussusception usually requires surgical resection because of the existence of pathologic lead points<sup>2,3)</sup>. However, the extent of resection and need for the intussusception to be reduced remain controversial. Idiopathic intussusception is extremely rare in adults and very difficult to diagnose, and optimal treatment methods have yet to be established. This paper reports a case in which laparoscopic surgery was performed for idiopathic adult intussusception after reduction by colonoscopy.

### Case Report

A 53-year-old woman presented to the emergency department of our hospital with an 8-h history of intermittent lower abdominal pain and vomiting. Medical history in-

cluded an appendectomy at the age of 5 years. She had no previous history of intermittent abdominal pain with or without vomiting. Her body weight was 49 kg, and her height was 162 cm. Vital signs showed no abnormalities, and her temperature was 36.3°C at the time of the initial visit. The lower abdomen was tender, but no mass was palpable. Initial laboratory testing revealed mild inflammation, with a white blood cell count of 13,860/ $\mu$ L (neutrophils, 88.6%) and a C-reactive protein concentration of 0.4 mg/dL. Serum carcinoembryonic antigen was mildly high (6.4 ng/mL; normal, <5.0 ng/mL), but other laboratory findings were within the normal limits.

Ultrasonography of the right upper quadrant of the abdomen revealed a stratified structure representing invagination and a pattern of multiple concentric rings (Figure 1). Abdominal CT showed a bowel-within-bowel appearance of mesenteric fat and vessels with wall thickening in the ascending colon (Figure 2A). No distinct tumor lesion was seen as a lead point (Figure 2B). Based on these findings, adult intussusception in the ascending colon was diagnosed.

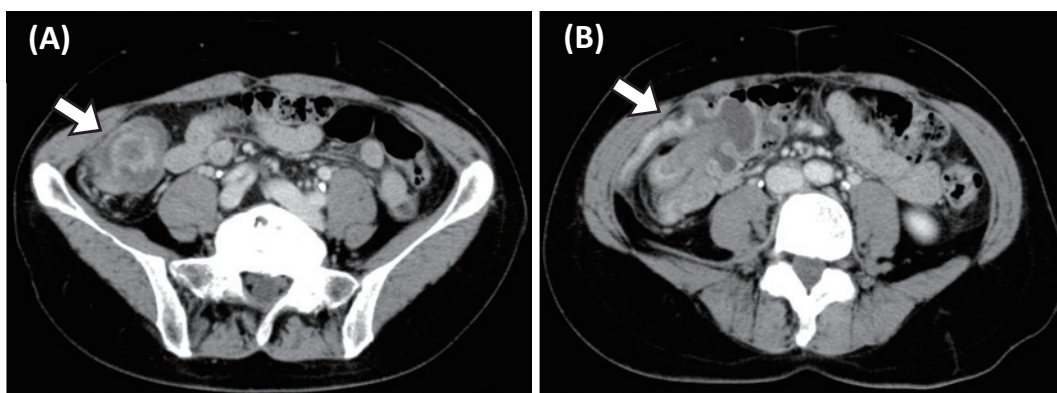


**Figure 1.** Abdominal ultrasonography showing a stratified structure as a pattern of multiple concentric rings.

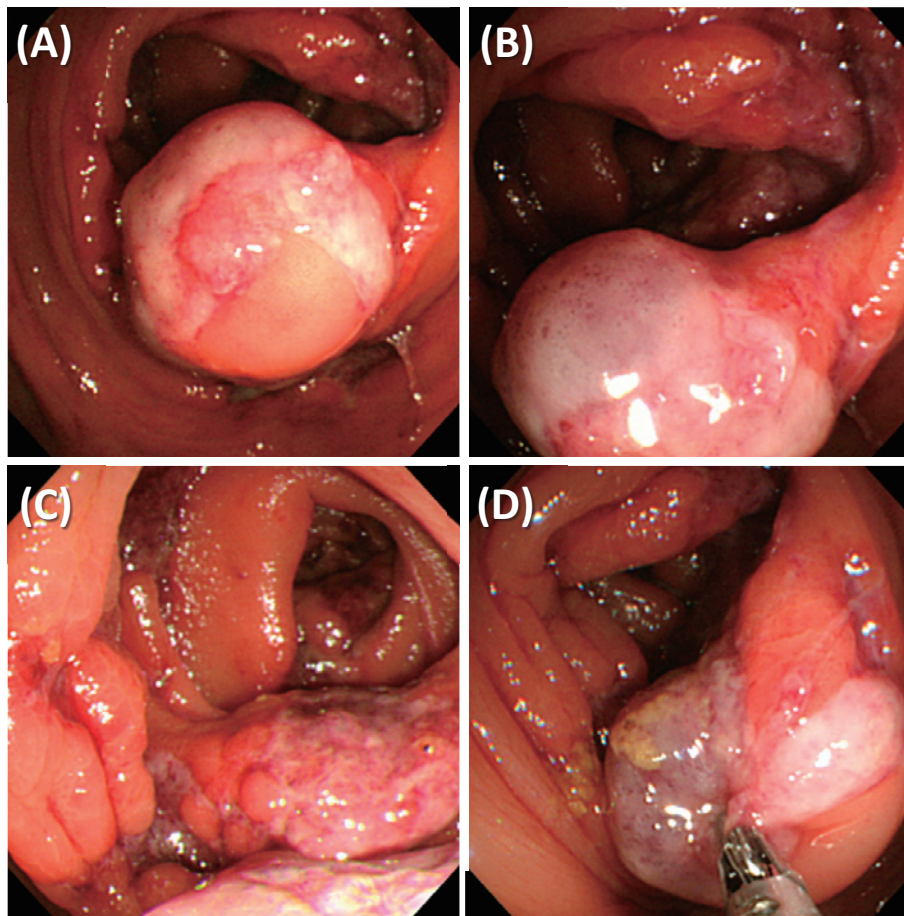
First, colonoscopy was performed for the pathological diagnosis of lead points and reduction. The intussusception was successfully colonoscopically reduced under CO<sub>2</sub> pressure. Colonoscopy revealed reduction of the intussusception and identified a submucosal tumor-like lesion in the ascending colon (Figure 3A). The mucosa around the lesion showed erosion and edema (Figure 3B, C). The tumor-like lesion showed a positive cushion sign (Figure 3D). Biopsy results from these sites were glandular epithelial tissues with inflammatory changes. Surgical treatment was considered because of a suspected submucosal tumor causing intussusception. We therefore, performed laparoscopic ileocecal resection 12 days after endoscopic reduction. Histopathological examination revealed mucosal erosion and mild ulceration in the ascending colon. No tumor was found, and malignant findings were not observed (Figure 4). We therefore, diagnosed idiopathic adult intussusception in the ascending colon. The postoperative course was uneventful, and the patient was discharged on postoperative day 14. Total colonoscopy performed 8 months after the operation showed no abnormalities. The patient has remained well with no evidence of disease recurrence 4 years after surgery.

## Discussion

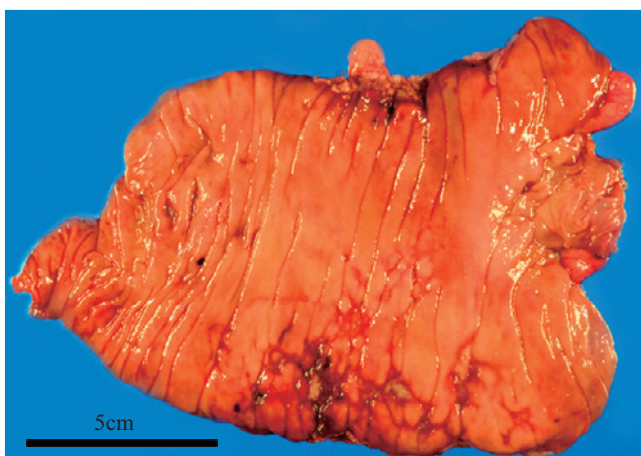
Intussusception occurs when a proximal segment of the bowel telescopes into the lumen of the adjacent distal segment of the bowel. Adult intussusception is rare and is mostly caused by pathologic lead points<sup>4</sup>. Intussusceptions have been classified according to their locations and the involvement of malignancy as ileo-colic, ileo-ileocolic, colocolic, and small bowel intussusception<sup>5</sup>. Most lead points in the small intestine are benign tumors, such as lipomas, adenoma polyps, Meckel diverticulum, and appendix. The most common malignant tumors in the colon are adenocarcinomas. Idiopathic intussusception is frequent in children but



**Figure 2.** Abdominal CT showing ascending colon wall thickening and invagination on the oral side of the intestine. (A) The target sign is evident in the intussusception (arrows). (B) No distinct tumor lesions are present at the lead point (arrowhead).



**Figure 3.** The intussusception is successfully reduced by colonoscopy with CO<sub>2</sub> pressure. (A) Endoscopic examination showing the presence of a submucosal tumor-like lesion in the ascending colon. (B, C) The mucosa on the oral side of that lesion showing severe erosion and edema. (D) Positive cushion sign of the tumor-like lesion.



**Figure 4.** Resected specimen showing only mucosal erosion and mild ulcer. No tumor or malignant findings are apparent.

rare in adults. The exact mechanisms underlying idiopathic intussusception are unknown, but the annular muscle of the bowel wall is believed to spasmodically contract, allowing

deep involvement into the adjacent relaxed bowel. Anatomical abnormalities, such as a moving cecum and abnormal intestinal rotation, are considered as alternative causes of idiopathic intussusception<sup>6</sup>. Idiopathic adult intussusception is more likely to occur in the small intestine than in the colon<sup>7</sup>.

Symptoms such as cramping abdominal pain, bloody diarrhea, and palpable tender mass are typical presentations with pediatric intussusception but are rare in adults. CT and ultrasonography are very useful for the diagnosis of intussusception. The characteristic features of CT show the target sign, and ultrasonography shows a multiple concentric ring sign. The intussusception appears as a complex soft-tissue mass, comprising edematous bowel wall and luminal mesentery. The diagnosis of adult intussusception is relatively easy, but the qualitative diagnosis of a lead point in adult intussusception is often difficult in CT images.

Colonoscopy is a useful tool not only for endoscopic reduction but also for pathological diagnosis of the lead point and such conditions as the bleeding of lesions<sup>1,8</sup>. There is no

reference to concrete methods for endoscope reduction. In this case, endoscopic reduction was possible under CO<sub>2</sub> pressure. The utility of endoscopic reduction in adult intussusception is controversial. Intraoperative endoscopy carries a risk of perforation, and if the cause of intussusception is a malignant tumor, then intraperitoneal dissemination and hematogenous metastasis represent key concerns<sup>3</sup>. However, the diagnosis of the cause of adult intussusception by endoscopy is considered important for determining treatment policies. If endoscopic reduction of adult intussusception is possible, then emergency surgery can be avoided and appropriate surgery can be performed. In situations where emergency surgery is possible, we consider intraoperative colonoscopy as useful for adult intussusception. In addition, adult intussusception often involves intestinal edema and blood flow obstruction; therefore, performing surgery after improvement of the intestinal condition by endoscopic reduction appears reasonable. No reports have detailed the appropriate period from endoscopic reduction to surgery. Considering improvements, such as edema and ischemia of the intestinal tract, performing surgery approximately 1-2 weeks after endoscopic reduction appears reasonable. In this case, surgery was performed 12 days after endoscopic reduction, and the condition of the intestinal tract was improved, and anastomosis was successfully performed. When endoscopic reduction of intussusception is possible, a period of several days to improve the condition of the intestinal tract appears to be warranted.

Because most cases of pediatric intussusception are idiopathic, reduction is generally performed by high-pressure enema. However, treatment for adult intussusception is almost always surgical because of the involvement of neoplastic lesions. If adult intussusception cannot be reduced before surgery, then emergency resection surgery is needed in most cases. Even if reduction is possible, several reports have described intestinal resection surgery due to the possibility of neoplastic lesions. Surgery for adult intussusception is typically laparoscopic, which is considered useful because it is not only diagnostic but also less invasive than laparotomy, and reduction of the intussusception can be performed relatively safely using forceps. Treatment for adult idiopathic intussusception has not been established, with reports describing fixation of the mobile cecum to the retroperitoneum<sup>9</sup> and endoscopic reduction alone<sup>10</sup>, in addition to intestinal resection surgery. Intestinal resection surgery may be overly invasive when idiopathic intussusception does not involve neoplastic lesions. However, the diagnosis of whether the cause of intussusception is neoplastic or idiopathic is difficult.

Although intussusception was diagnosed by CT and ultrasonography in this case, endoscopy was performed for the purpose of reduction and diagnosing the lead point of intussusception. As intussusception was reduced using endoscopy alone, the mucosa at the lead point appeared as a mass-like submucosal tumor. We considered laparoscopic surgery as appropriate because the possibility of malignant lesions cannot be denied. Adult intussusception is mostly caused by tumors, but the possibility of idiopathic intussusception needs to be considered. Even when idiopathic intussusception is considered, resection surgery is indicated if the possibility of neoplastic lesions cannot be eliminated, as was in this case. However, resection surgery may be overly invasive if the intussusception can be reduced before surgery and no tumor lesions are obvious.

#### Conflicts of Interest

There are no conflicts of interest.

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