

## Case of colonic intussusception secondary to mobile cecum syndrome repaired by laparoscopic cecopexy using a barbed wound suture device

Tetsu Yamamoto, Yoshitsugu Tajima, Ryoji Hyakudomi, Takanori Hirayama, Takahito Taniura, Kazunari Ishitobi, Noriyuki Hirahara

Tetsu Yamamoto, Yoshitsugu Tajima, Ryoji Hyakudomi, Takanori Hirayama, Takahito Taniura, Kazunari Ishitobi, Noriyuki Hirahara, Department of Digestive and General Surgery, Shimane University Faculty of Medicine, Izumo, Shimane 693-8501, Japan

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**Correspondence to:** Tetsu Yamamoto, MD, PhD, Department of Digestive and General Surgery, Shimane University Faculty of Medicine, 89-1 Enya, Izumo, Shimane 693-8501, Japan. [t2t2@med.shimane-u.ac.jp](mailto:t2t2@med.shimane-u.ac.jp)  
Telephone: +81-853-202232  
Fax: +81-853-202229

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### Abstract

A 27-year-old man with recurrent right lower quadrant pain was admitted to our hospital. Ultrasonography and computed tomography examination of the abdomen revealed a target sign in the ascending colon, which was compatible with the diagnosis of cecal intussusception. The intussusception was spontaneously resolved at that time, but it relapsed 6 mo later. The patient underwent a successful colonoscopic disinvagination; there was no evidence of neoplastic or inflammatory lesions in the colon and terminal ileum. The patient underwent laparoscopic surgery for recurring cecal intussusception. During laparoscopy, we observed an unfixed cecum on the posterior peritoneum (*i.e.* a mobile cecum). Thus, we performed laparoscopic appendectomy and cecopexy with a lateral peritoneal flap using a barbed wound suture device. The patient's post-operative course was uneventful, and he continued to do well without recurrence at 10 mo after surgery. Laparoscopic cecopexy using a barbed wound suture device is a simple and reliable procedure that can be the treatment of choice for recurrent cecal intussusception associated with a mobile cecum.

**Key words:** Colonic intussusception; Adult; Mobile cecum; Cecopexy; Barbed wound suture device

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**Core tip:** Colonic intussusception secondary to mobile cecum is uncommon, and the surgical procedure is controversial. As the main cause of intussusception comprises neoplasms, most patients with colonic intussusception undergo intestinal resection. In our case, the cause of colonic intussusception was only the mobile cecum. Thus, we performed laparoscopic cecopexy using a barbed wound suture device, after which the patient made steady progress. This surgical procedure benefits from its good cosmetic outcomes and reduced invasiveness. In addition, a barbed wound suture device is useful for laparoscopic cecopexy, as it is easy to handle and results in a shorter operation time.

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## INTRODUCTION

Mobile cecum syndrome is characterized by chronic right lower quadrant pain without evidence of appendicitis or other etiological factors. Although abnormal mobility of the cecum and ascending colon has been estimated to occur in 10%-20% of the population, intussusception or volvulus of the cecum secondary to a mobile cecum is uncommon<sup>[1,2]</sup>. Approximately one-third of the intussusceptions of the intestinal tract occur as a result of surgery-induced changes, such as adhesion, submucosal edema, and intestinal motility disorders; colonic intussusceptions in adults are usually caused by malignant or benign tumors<sup>[3]</sup>. Therefore, surgical interventions, such as intestinal resection through either an open or laparoscopic approach, have been performed for the majority of adult patients with colonic intussusception<sup>[4]</sup>. We describe herein a rare case of colonic intussusception secondary to mobile cecum syndrome, which was successfully treated with laparoscopic cecopexy using a barbed wound suture device.

## CASE REPORT

A 27-year-old man with recurring abdominal pain in the right lower quadrant was re-admitted to our hospital. The patient had a 3-year history of mild ulcerative colitis, but he had been free from abdominal symptoms and continued to do well without medications. On admission, abdominal ultrasonography (Figure 1A) and contrast-enhanced computed tomography (CT) (Figure 1B) showed a target sign in the ascending colon with dilatation of the cecum and ileum, which was compatible

with the diagnosis of cecal intussusception. The patient had no previous surgical history, and there was no evidence of intraabdominal tumors or inflammatory conditions in these imaging evaluations. Thereafter, the intussusception spontaneously resolved.

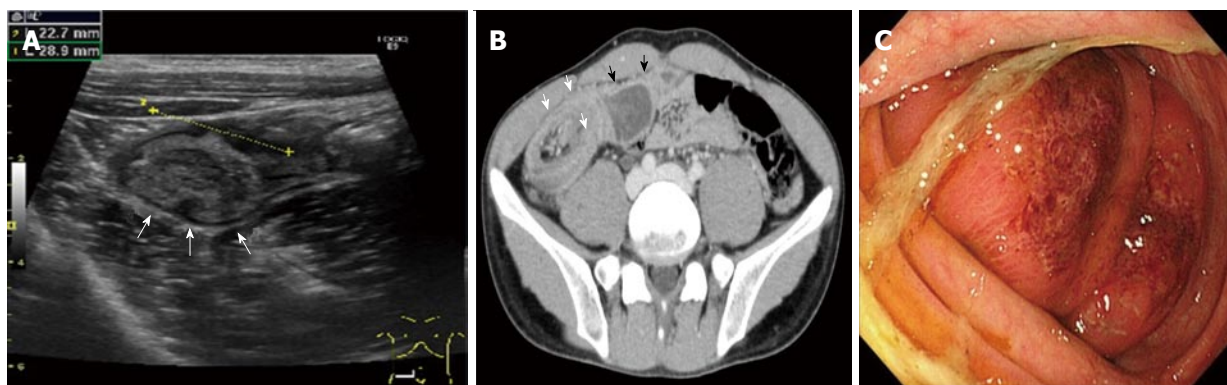
The patient was discharged a few days after admission, but the abdominal pain recurred 6 mo later. Abdominal CT scan again revealed cecal intussusception. An emergency colonoscopy was performed to reduce the intussusception, in which the cecum had advanced into the ascending colon. An edematous colonic mucosa restricted to the lead point of intussusception was identified (Figure 1C). No other inflammatory changes or neoplastic lesions were detected in the colon and terminal ileum, even after reduction of the intussusception. The patient was thus diagnosed with recurrent cecal intussusception that was likely due to a mobile cecum, and underwent an elective laparoscopic surgery.

The patient was placed in the supine position under general anesthesia. A 20-mm long skin incision was made on the umbilicus, and a 12-mm trocar was inserted. After creating a pneumoperitoneum with carbon dioxide at an intra-abdominal pressure of 10 mmHg, additional 5-mm and 12-mm trocars were placed at the left upper quadrant and the middle of the lower abdomen, respectively. Upon laparoscopy, no evidence of ischemia, inflammation, or caliber change in the gastrointestinal tract, including the cecum, appendix and terminal ileum, was found. A linear indentation running along the minor axis of the large bowel was identified in the middle portion of the ascending colon, which left a trace of intussusception (Figure 2A). The cecum was easily mobilized from the right lower quadrant to the upper abdominal cavity, as it was not fixed to the posterior parietal peritoneum (Figure 2B).

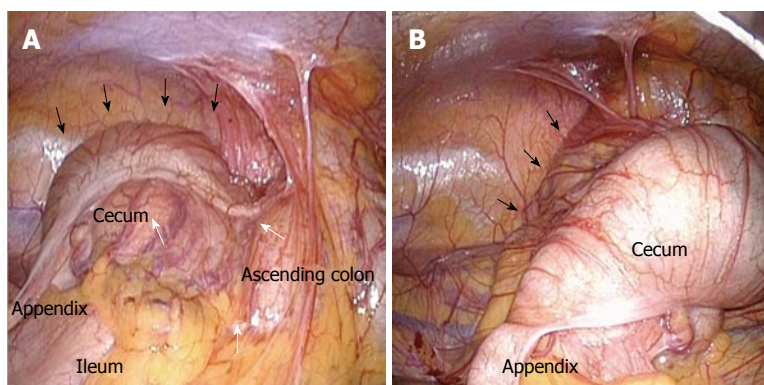
The findings confirmed that the recurrent cecal intussusception was associated with an abnormal fixation of the cecum and ascending colon to the parietal peritoneum (*i.e.* a mobile cecum). Laparoscopic appendectomy and cecopexy were performed. After the appendectomy, an approximately 10-cm long incision was made in the right parietal peritoneum along the ascending colon for the cecopexy (Figure 3A); then, the cecum and ascending colon were fixed to the incision line of the parietal peritoneum with a continuous suture technique, using an absorbable barbed wound suture device (V-Loc™ 180; Medtronic, Tokyo, Japan) (Figure 3B). The operation time was 87 min, with less than 10 g of blood loss. The patient's postoperative course was uneventful, and he was discharged 4 d after surgery. The patient continued to do well without recurrence at 10 mo after surgery.

## DISCUSSION

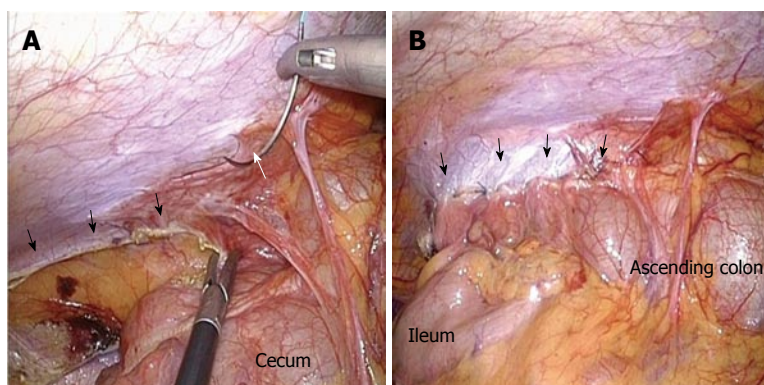
Intestinal intussusception is the leading cause of gastrointestinal obstruction in children. However, it is



**Figure 1** Target sign on abdominal ultrasonography (A) and contrast-enhanced computed tomography scan (B). The so-called bowel-within-bowel configuration, in which the layers of the bowel are duplicated, thereby forming concentric rings, is seen (white arrows). Dilatation of the terminal ileum is observed (black arrows). C: A colonoscopic view of the intussusception. Edematous colonic mucosa was identified on the lead point of intussusception. No neoplastic lesion was detected, even after reduction of intussusception.



**Figure 2** Laparoscopic view. A: A linear indentation leaving a trace of intussusception was found in the middle portion of the ascending colon (white arrows). The cecum was not attached to the retroperitoneum (black arrows); B: The cecum was easily moved to the upper abdomen. No fixation of the cecum was observed (black arrows).



**Figure 3** Laparoscopic cecopexy. A: An approximately 10-cm long incision (black arrows) was made on the right parietal peritoneum along the ascending colon; B: The cecum and ascending colon were stitched to the parietal peritoneum with continuous sutures using an absorbable barbed wound suture device (black arrows).

rarely encountered in adults, accounting for 1%-5% of all cases of intestinal obstruction<sup>[5]</sup>. Although the exact mechanism of bowel intussusception remains unclear, one leading theory is that intestinal motility disorder due to intraluminal lesions or inflammation induces invagination<sup>[6,7]</sup>. The common site of intussusception is the junction between the free intestine and the portion fixed to the retroperitoneum or at postoperative

adhesions<sup>[7,8]</sup>. Non-malignant lesions, such as benign or inflammatory neoplasms, Meckel's diverticulum and appendix, are the most common cause of intussusception in the small bowel, with only 30% of cases due to malignant neoplasms<sup>[6,9]</sup>. In contrast, malignant lesions are responsible for most cases of colonic intussusceptions<sup>[7,10]</sup>.

In the present case, neither malignant or benign

**Table 1 Colonic intussusception associated with mobile cecum in adults: reported cases from 2005 to 2016**

Ref.	Age	Sex	Clinical symptoms	Repeated symptoms	Episode duration	Diagnostic modalities	Characteristic finding	Etiology of intussusception / location	Operative procedure
Hamdi <i>et al</i> <sup>[16]</sup>	85	F	Abdominal pain, diarrhea	Yes	3 mo	Barium enema, CT	Target mass	Tumor /cecum	Resection
Drnovsek <i>et al</i> <sup>[15]</sup>	65	M	Abdominal pain, rectal bleeding	No	12 h	CT	Target sign	Tubulovillous adenoma /cecum	Right hemicolectomy
Kuzmich <i>et al</i> <sup>[14]</sup>	62	M	Abdominal pain, weight loss	Yes	2 mo	US	Target sign	Submucosal lipoma /ileocecal valve	Right hemicolectomy
Frydman <i>et al</i> <sup>[13]</sup>	22	F	Rectal prolapse	No	1 d	CT	Target sign	Villous adenoma /cecum	Right hemicolectomy
Present case	27	M	Right lower quadrant pain	Yes	7 mo	US, CT	Target sign	None	Laparoscopic cecopexy

CT: Computed tomography; US: Ultrasonography.

tumors nor inflammatory conditions were identified upon colonoscopic, ultrasonographic and CT examinations. Laparoscopically, other than the unfixed cecum and ascending colon on the posterior peritoneum, no notable finding (*e.g.*, abdominal adhesions or mesenteric lymph node swelling) was observed, thereby indicating that the cecal intussusception occurred secondary to the mobile cecum in our patient.

Mobile cecum is not uncommon, with up to 25% to 64% of cadavers exhibiting a mobile cecum. Nevertheless, colonic intussusception related to mobile cecum is rare in adults<sup>[11,12]</sup>. We performed a review of the literature from 1995 to 2016 using the PubMed database with the search terms "intussusception," "mobile cecum" and "adult," which yielded only 4 cases of colonic intussusception associated with mobile cecum<sup>[13-16]</sup>. Moreover, all of these cases had some lead lesions as a cause of intussusception, such as villous adenoma and submucosal lipoma in the cecum or ileocecal valve (Table 1).

Meanwhile, our case showed no evidence of neoplastic lesions or inflammatory conditions in the colon and terminal ileum, except edematous colonic mucosa identified at the lead point of intussusception. In terms of the cause of intussusception, our patient represented a rare case of colonic intussusception associated with a mobile cecum. The mucosal edema identified on the lead point of intussusception might be a cause or an effect of the intussusception in our patient. It is undeniable that the mucosal edema might have been induced by ulcerative colitis because the patient had a history of mild ulcerative colitis; however, he had been free from ulcerative colitis-related specific symptoms and required no medications for the treatment.

The presenting symptoms of colonic intussusception are nonspecific, such as abdominal pain, nausea and emesis, and a definitive diagnosis can be made only in 33% of patients prior to surgery<sup>[17]</sup>. The typical target sign or a sausage-shaped mass on a CT scan is used to confirm the diagnosis of intussusception<sup>[17, 18]</sup>. In our patient, cecal intussusception was diagnosed on the basis of the target sign on abdominal ultrasonography and CT examination. Ultrasonography is a noninvasive

and readily available imaging modality and easy to perform in routine clinical practice, thus, it was useful in the diagnostic workup of colonic intussusception in our patient.

In the treatment of colonic intussusception, colonoscopic reduction is worth considering because it is less invasive than surgery, although its efficacy remains controversial<sup>[9]</sup>. In adult patients, surgical resection is generally required because most cases have intraluminal neoplasms as a cause of intussusception<sup>[3,7,19]</sup>. In the present case, we performed an elective laparoscopic cecopexy after endoscopic reduction of cecal intussusception because the patient had neither intraluminal lesions nor mesenteric lymphadenopathy.

Cecopexy or right hemicolectomy can be performed to treat mobile cecum syndrome with abdominal symptoms. Some studies have recommended only colectomy because there is a possibility of recurrence of the abdominal pain due to volvulus or intussusception after performing a cecopexy<sup>[20,21]</sup>. Meanwhile, other reports have described cecopexy as a good treatment option for patients with a mobile cecum, which is associated with a low rate of disease and symptom recurrence<sup>[22,23]</sup>. Given the absence of any recurrence in our case, laparoscopic cecopexy seems to be a useful treatment of choice for cecal intussusception secondary to mobile cecum without neoplastic lesions.

Open and laparoscopic surgery can be performed for mobile cecum syndrome, and the benefits of laparoscopic surgery, in terms of cosmetic outcomes and less invasiveness, have been reported<sup>[24,25]</sup>. In the present case, we performed an elective laparoscopic cecopexy after colonoscopic reduction of cecal intussusception because the patient was generally stable and had no neoplastic lesions that could have possibly caused cecal intussusception. In addition, a barbed wound suture device was used to fix the cecum to the posterior peritoneum. Previous studies have reported various benefits of using barbed sutures, including knotless suturing, shorter stitching time and increased convenience for the surgeon<sup>[26,27]</sup>. In our case, a barbed suture device was useful for laparoscopic cecopexy, as it was easy to handle and resulted in a shorter operation

time.

Laparoscopic cecopexy is a useful strategy to treat colonic intussusception secondary to a mobile cecum without any other pathologic disorders. A barbed suture device is also useful in performing a laparoscopic cecopexy in terms of its ease in handling and shorter stitching time.

## COMMENTS

### Case characteristics

A 27-year-old man with recurring abdominal pain in the right lower quadrant.

### Clinical diagnosis

The patient's abdomen was slightly distended and hard. Tenderness of the right lower quadrant was detected with a palpable mass when intussusception occurred.

### Differential diagnosis

Cecal volvulus or intra-abdominal tumors.

### Laboratory diagnosis

Laboratory data were within normal limits.

### Imaging diagnosis

Abdominal ultrasonography and computed tomography scan showed a target sign in the ascending colon with dilatation of the cecum and ileum, which was compatible with the diagnosis of cecal intussusception.

### Pathological diagnosis

There was no evidence of malignancy or any other inflammatory disease.

### Treatment

Laparoscopic cecopexy using a barbed wound suture device.

### Related reports

Past studies have recommended only colectomy to treat the mobile cecum, given the high rate of recurrence after cecopexy. Recently, some case reports have described a cosmetic benefit and reduced invasiveness of cecopexy without recurrence of cecal intussusception.

### Term explanation

A mobile cecum, which is defined as the unfixed cecum and ascending colon on the posterior peritoneum, is not uncommon. However, colonic intussusception related to mobile cecum is rare in adults.

### Experiences and lessons

Colonic intussusception secondary to a mobile cecum is uncommon, and the surgical procedure for treatment is controversial. In this case, we performed laparoscopic cecopexy using a barbed wound suture device. This surgical procedure produces a good cosmetic outcome, while a barbed wound suture device is useful for laparoscopic cecopexy, as it is easy to handle and results in a shorter operation time.

### Peer-review

The paper is an interesting Case Report of colonic intussusception secondary to mobile cecum syndrome and is suitable for publication.

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