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CASE REPORT

Curative endoscopic treatment of intussusception due to a giant colonic lipoma using a wedged balloon and ligation with detachable snares

Masahiro Okada[1] · Hirotsugu Sakamoto[1] · Yoshikazu Hayashi[1] · Tomonori Yano[1] · Satoshi Shinozaki[1,2] · Keijiro Sunada[1] · Alan Kawarai Lefor[3] · Hironori Yamamoto[1]

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Abstract
A 67-year-old woman presented with symptoms of bowel obstruction. Radiographic and ultrasonographic findings suggested colo-colonic intussusception caused by a colonic lipoma. Colonoscopy with an endoscope tip balloon was performed for reduction. The intussusception was partially reduced by injecting dilute contrast media with a wedged inflated balloon at the endoscope tip. For definitive treatment of the polyp, ischemia was induced using a detachable snare. The abdominal pain well improved after endoscopic treatment. However, ultrasonography suggested a residual lesion. Another detachable snare was applied to the stalk on day 6. A large amount of dark-red necrotic tissue was passed *per anus* the following day. One month later, complete scarring of the site was confirmed colonoscopically. This is the first report of curative endoscopic treatment of an intussusception due to a giant colonic lipoma with detachable snares after the reduction with a wedged balloon of colonoscope tip.

Keywords Colonic lipoma · Intussusception · Detachable snare · Balloon-assisted colonoscopy

Introduction

Colonic lipomas are the most common benign submucosal lesions of the colon [1]. Although they are usually asymptomatic, large lesions may cause symptoms such as abdominal pain due to intermittent intussusception. In recent years, the usefulness of endoscopic treatment to ligate colonic lipomas with a detachable snare, the so-called "Ligate and Let Go" technique has been reported [2, 3]. However, in patients with a symptomatic intussusception due to a giant colonic lipoma, surgical intervention is usually required [4–8]. We describe successful endoscopic reduction of a colo-colonic intussusception with a wedged balloon and injection pressure followed by endoscopic ligation of the responsible giant lipoma.

Case report

A 67-year-old previously healthy female presented with the sudden onset of intermittent left lower quadrant abdominal pain and nausea. She visited her local physician and after colonic intussusception was suspected based on ultrasonographic findings, and then, she was referred to our institution. Vital signs showed a temperature of 36.8 °C, pulse 82 bpm, and blood pressure 141/111 mmHg. Physical examination revealed mild tenderness and a mobile, palpable mass in the left lower quadrant without peritoneal signs. Laboratory data were almost normal. Only CRP was slight elevating up to 0.44 mg/dl. Abdominal computed tomography (CT) scan showed a 55 mm well-defined intraluminal mass of fat density of the descending colon and a small amount of ascites in the pouch of Douglas. The mass obstructed the colon and the base of the stalk was located in the transverse colon (Fig. 1a–c). Contrast-enhanced CT images revealed that the blood flow in the mucous around the lipoma and

✉ Hironori Yamamoto
ireef@jichi.ac.jp

1 Division of Gastroenterology, Department of Medicine, Jichi Medical University, 3311-1 Yakushiji, Shimotsuke 329-0498, Tochigi, Japan

2 Shinozaki Medical Clinic, Utsunomiya, Japan

3 Department of Surgery, Jichi Medical University, Shimotsuke, Japan

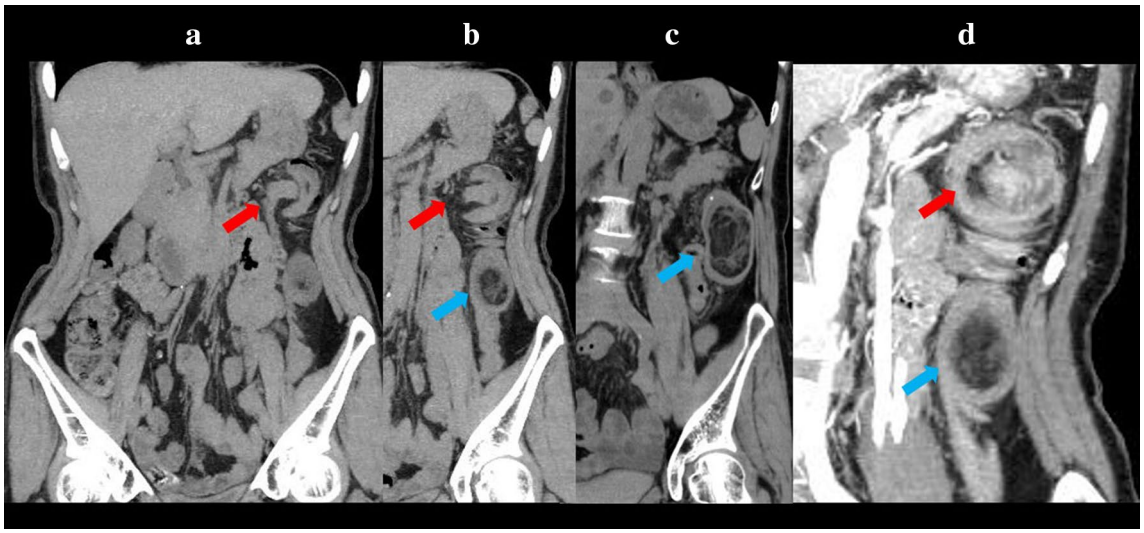

Fig. 1 Coronal views of an abdominal computed tomography (CT) scan. **a**–**c** Plain images, showing a colo-colonic intussusception (red arrows) low-density mass as the lead point (blue arrows). The base of the stalk is in the transverse colon. **d** Contrast-enhanced CT image revealed that blood flow to the mucous around the mass and the stalk was maintained

stalk was intact (Fig. 1d). Abdominal ultrasonography (US) visualized the mass as a high echoic lesion. These findings were consistent with colo-colonic intussusception caused by a colonic lipoma.

Endoscopic reduction was scheduled without emergency laparotomy, because there were no findings suggesting intestinal ischemia. Colonoscopy with a balloon at the tip (EC-450BI5, Fujifilm, Tokyo, Japan) was performed without bowel preparation to evaluate and reduce the intussusception. Written informed consent was obtained before the procedure. A discolored slightly dark-red submucosal mass was found in the lumen of the descending colon (Fig. 2a). Dilute contrast media were injected distal to the affected region through the working channel of the colonoscope while

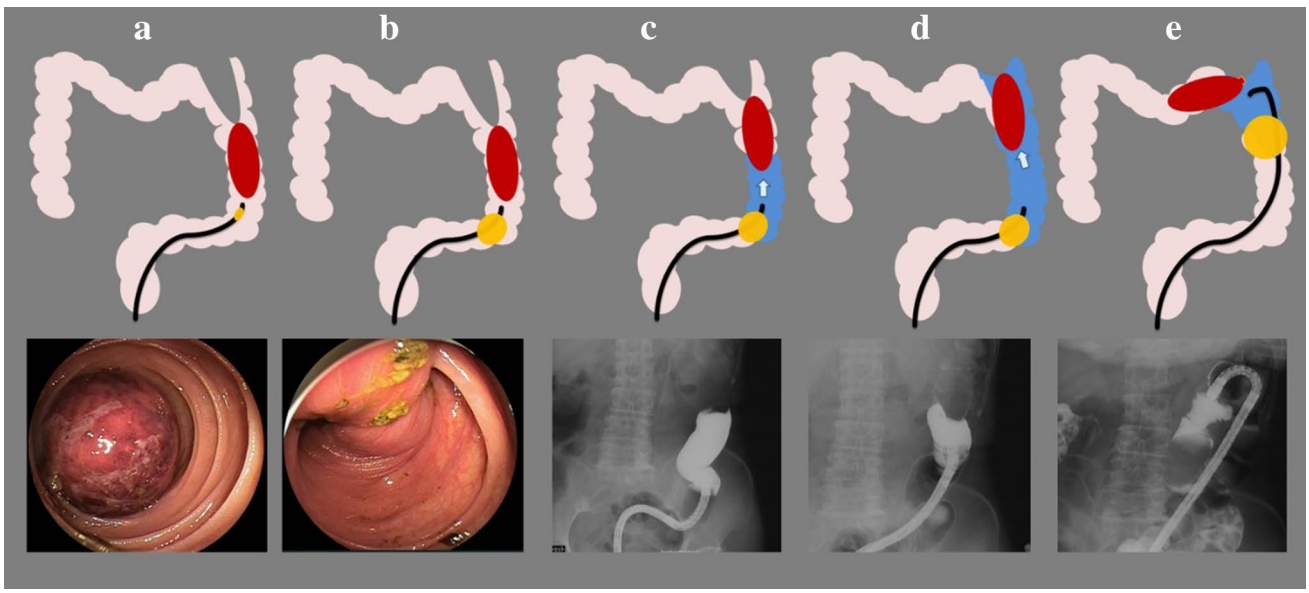

Fig. 2 Illustrations and images demonstrating the sequence of the procedure used for reduction. **a** Colonoscopy shows a giant submucosal mass with slight dark-red discoloration in the descending colon. **b** Dilute contrast media were introduced into the distal part of the affected region through the accessory channel of the colonoscope while inflating the attached balloon. **c** Radiographic image shows a filling defect suggesting a colo-colonic intussusception. **d** Mass appeared as a typical crab claw-like filling defect after injecting more dilute contrast medium to reduce the intussusception. **e** It was possible to reduce the intussusception by injecting dilute contrast media

wedging the lumen with the attached balloon (Fig. 2b). The contrast clearly delineated a crab claw-like filling defect suggesting a colo-colonic intussusception (Fig. 2c, d). The intussusception was reduced with gentle pressure by injecting the dilute contrast media (Fig. 2d, e). After reduction of the intussusception to the transverse colon, the surface of the lipoma rapidly recovered to a normal color, similar to the surrounding mucosa. As definitive treatment, the stalk of the mass was ligated with an endoloop (HX-400U-30, Olympus, Tokyo, Japan) until the mass discolored sufficiently consistent with ischemia (Fig. 3a, b).

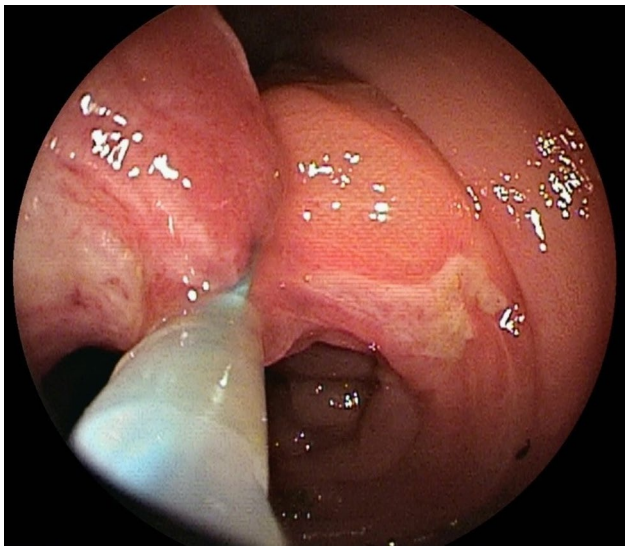

Fig. 3 Endoscopic view of the stalk of the lipoma ligated with an endoloop

The abdominal pain improved remarkably after the endoscopic reduction, but mild abdominal pain persisted. Therefore, we observed the patient carefully and withheld oral intake. Abdominal US was performed on the fifth day after the first endoscopic treatment, which suggested a residual lesion (Fig. 4). Blood flow was observed in the stalk of the mass. Therefore, a second colonoscopy without bowel preparation was performed on the next day. The lipoma was not intussuscepted and the top of the lesion had turned dark red. However, the base of it was a lighter red, suggesting that blood flow was intact. For this reason, another detachable snare was applied to the stalk. Although the top of the lipoma was excised for pathological evaluation, only necrotic tissue was obtained because of prior endoscopic treatment causing ischemia. On the seventh day, a large amount of dark-red necrotic tissue passed *per anus*. On the eighth day, the abdominal pain resolved, and the mass could no longer be detected by abdominal US. Follow-up colonoscopy 45 days after the first endotherapy revealed that the treatment site was completely scarred without any residual mass (Fig. 5).

Discussion

In patients with an intussusception due to a malignant lesion, surgical intervention is usually required. However, it is desirable to perform less invasive treatment when possible, especially for benign lesions. In the present patient, reduction of the intussusception followed by endoscopic curative treatment of the lipoma was performed using an endoscope tip balloon. We have previously reported cases of reduction of intussusception using double-balloon endoscopy

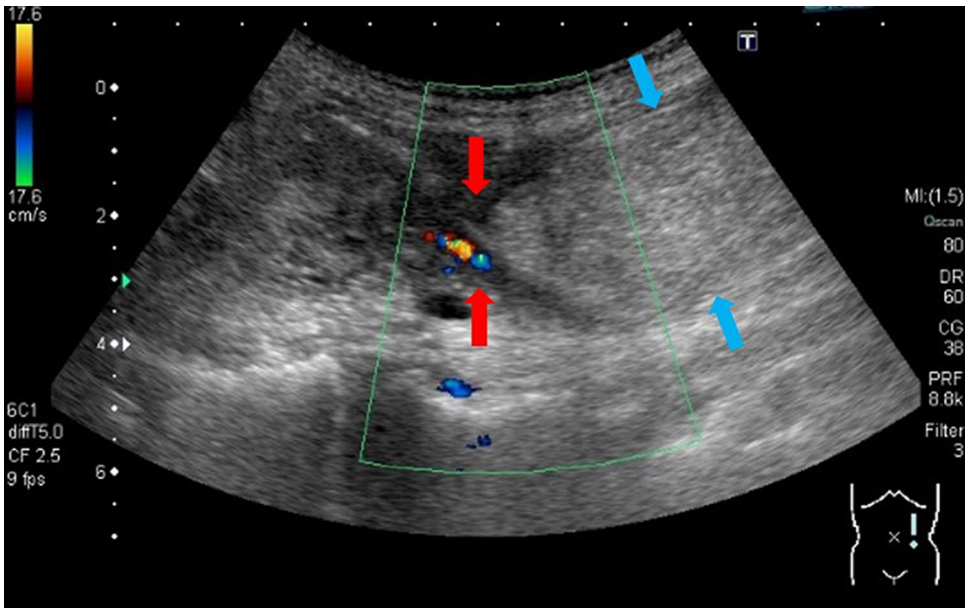

Fig. 4 Abdominal ultrasound 5 days after the first endoscopy showed the mass was present (blue arrow) and blood flow to the stalk was maintained (red arrow)

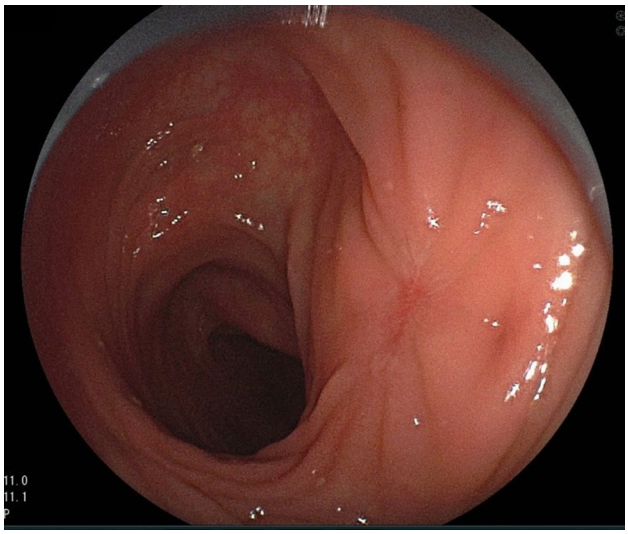

Fig. 5 Colonoscopy performed 45 days after the first endoscopy. The treatment site was completely scarred without any residual mass

bidirectionally [9, 10]. In the present patient, the wedged balloon of the tip of endoscope prevented reverse flow of contrast media enabling reduction of the intussusception more effectively. This procedure would not be possible with a conventional colonoscope.

It is desirable to obtain a definitive pathological diagnosis. The present patient was symptomatic at the time of the first colonoscopy and required urgent treatment. Therefore, we did not prioritize to obtain tissue samples. Although a tissue sample was obtained at the second colonoscopy, only necrotic tissue remained, and pathological evaluation could not be performed. The CT and US findings of the present patient showed no components other than fat in the mass, which did not suggest malignancy. Therefore, treatment without pathological evaluation is considered acceptable. The incidence of colonic liposarcoma is extremely rare worldwide [11]. Liposarcomas are classified into five histological subtypes and there are some differences in the CT scan and US appearance [12]. In general, liposarcomas are irregular masses with a nodular component, appear heterogeneous after intravenous contrast medium injection, protrude into the mucosal wall [13], and sometimes have necrosis and hemorrhage [12, 14]. If there are features suspicious for liposarcoma present, we should avoid endoscopic treatment. The "Ligate and Let Go" technique is a safe and useful treatment for symptomatic lipomas [2, 3]. However, as in the present patient, the lesion may not pass spontaneously even if a detachable snare is applied. The reason is presumed that the detachable snare has become loose allowing resumption of blood flow. Giant colonic lipomas are easily visualized as a high echoic lesion with abdominal US, and evaluation of blood flow is also possible even after ligation. We were able to determine the need for additional treatment using non-invasive US examination in this patient. There are reports of endoscopic techniques for resecting a large lipoma. The "endoscopic unroofing" technique is useful [15–18]. However, it is somewhat unreliable and pathological evaluation is sometimes insufficient for partial resection. The "conventional polypectomy" is also useful and easy to perform, but this method carries a relatively high risk of perforation or bleeding. As previously mentioned, the "Ligate and Let Go" technique does not allow evaluation of the lipoma pathologically. In an emergency setting, this technique is safer with a very low risk of perforation or bleeding.

In conclusion, to the best of our knowledge, this is the first report of successful reduction of an intussusception caused by a giant colonic lipoma and curative treatment with a detachable snare after endoscopic reduction with a wedged balloon of the colonoscope tip. With this new technique, even if intussusception is present, surgery may be avoided using a less invasive treatment. However, it is important to rule out a malignancy which requires surgery for cure. This procedure should be done carefully by well-trained endoscopists at high volume centers which can perform emergency laparotomy if needed.

Compliance with ethical standards

Conflict of interest Hironori Yamamoto received a research grant from Fujifilm, serves as a consultant to the company, received lecture fees from the company and holds patents on the double-balloon endoscope described in this article. Masahiro Okada, Hirotsugu Sakamoto, Yoshikazu Hayashi, Tomonori Yano, Satoshi Shinozaki, Keijiro Sunada, and Alan Kawarai Lefor declare that they have no conflict of interest.

Human/animal rights All procedures followed have been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

Informed consent Informed consent was obtained from all patients for being included in the study.

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