

Submucosal Tunnel Formation as a Complication Caused by Long Intestinal Tube Insertion: A Case Report

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Abstract

We present a case of a 76-year-old man with submucosal tunnel formation caused by long intestinal tube (LIT) insertion. The patient had undergone an LIT insertion to treat bowel obstruction caused by ascending colon cancer. Although intestinal decompression was achieved successfully, a procedural pre-scheduled endoscopy incidentally revealed that the LIT had penetrated the abdominal esophageal mucosa and re-entered the gastric lumen, passing through the submucosal layer at the gastroesophageal junction. Therefore, the LIT was removed under endoscopic observation during ileocecal resection surgery and the patient was treated conservatively. The current case suggests that this unfamiliar complication can occur without any signs or symptoms.

Key words: Long intestinal tube insertion, Complication, Submucosal tunnel formation, Bowel obstruction (Interventional Radiology 2020; 5: 141-144)

Introduction

Long intestinal tube (LIT) decompression is a useful treatment for patients with bowel obstruction, achieved by draining the intestinal contents [1, 2]. While gastrointestinal bleeding, perforation, laryngeal injury, and aspiration pneumonia are well-known complications of LIT insertion, submucosal tunnel formation is a very rare complication [3-7]. We report a case of asymptomatic submucosal tunnel formation attributed to LIT insertion that was incidentally detected through an endoscopy.

Case Report

A 76-year-old man was admitted to our hospital for colon cancer treatment owing to multiple liver metastases. He complained of anorexia and abdominal pain. An abdominal

radiograph revealed air-fluid levels in the dilated small bowel, and contrast-enhanced computed tomography (CT) showed bowel obstruction due to the ascending colon cancer. Surgeons planned gastrointestinal decompression before ileocecal resection, and an LIT was then inserted by interventional radiologists.

A 16 F LIT with a length of 300 cm (Sumitomo Bakelite Co., Ltd., Tokyo, Japan) was inserted via the left nasal cavity with fluoroscopic guidance. Although a mild vomiting reflex was triggered when the LIT passed through the gastroesophageal junction, the LIT was eventually placed in the dilated ileum. There was no resistance during insertion and no hemorrhage was observed during the procedure. Additionally, the patient did not experience any pain during or after the insertion of the tube. An abdominal radiograph taken immediately after the procedure confirmed that the LIT was in place immediately (**Fig. 1A**). Tubal drainage was satisfactory, and effective gastrointestinal decompression was

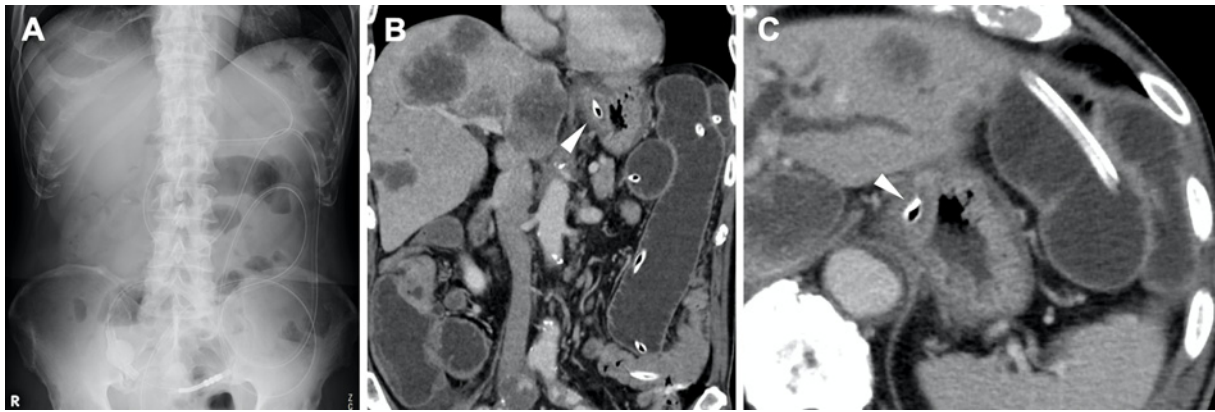


Fig. 1. A The position of the long intestinal tube (LIT) seemed to be appropriate based on the radiographic evaluation conducted after the procedure. B, C Contrast-enhanced CT revealed the LIT partially located in the gastric wall with a subtle edematous change (white arrowhead) (B: reconstructed coronal image, C: enlarged axial image).

achieved. However, four days after the LIT insertion, a preoperatively scheduled upper gastrointestinal endoscopy revealed LIT penetration and traversal of the submucosal layer between the abdominal esophagus and gastric cardia (Fig. 2 A, 2B). Contrast-enhanced CT also showed the LIT partially transverse the submucosal layer at the gastroesophageal junction with submucosal edema. There were no signs of leakage of digestive juices, free air, or abscess formation (Fig. 1B, 1C). Despite the fact that the patient did not complain of abdominal symptoms, ileocecal resection was performed in advance of the scheduled date and the LIT was removed without any resistance during the operation. Endoscopy performed during the removal of the LIT showed a detached mucosa hole and exposed a proper muscle layer at the abdominal esophagus and the gastric cardia (Fig. 2C, 2D).

A proton pump inhibitor was administered intravenously immediately after the surgery, and orally at subsequent periods. Follow-up endoscopy performed one week after the surgery showed the submucosal tunnel formation with signs of improvement (Fig. 2E, 2F). One month after the surgery, postoperative chemotherapy was started and is still ongoing.

Discussion

Submucosal tunnel formation (or dissection or bridge formation) is a very rare complication of LIT insertion, and its frequency is unknown [3-7]. In our hospital, where more than 800 cases of LIT insertion have been performed during the past 20 years, this was the first case in which the formation of a submucosal tunnel due to the insertion of the LIT was confirmed. According to previous reports, risk factors for submucosal tunnel formation include esophageal strictures, esophageal diverticula, persistent retching, presence of artificial airways, comatose status, esophageal tumors, traumatic injury, and use of rigid stylets [3, 4]. Returning blood within the tube or inability to advance the tube can also be observed as a clinical manifestation of the procedure [3].

In this patient, the mild vomiting reflex might have induced submucosal tunnel formation, because the patient's status did not match the other risk factors. During vomiting, the intra-abdominal pressure to the thorax increases considerably as the force applied to advance the tube increases. This can generate shear stress between the esophageal wall and the LIT, and may result in the migration of the LIT to the submucosal layer [8]. We suspect that in our case, this series of events occurred so drastically that we could not feel any insertion resistance. Although it is very difficult to prevent this rare complication, physicians must be careful not to apply excessive force, especially when the tube is advanced through the gastroesophageal junction.

There were several reasons for why we could not observe the LIT migration. First, the patient did not complain of any symptoms except for vomiting that occurred frequently during the LIT insertion. Moreover, neither insertion resistance nor hemorrhage could be detected. Second, the LIT position on the radiograph seemed to be appropriate. Even on the CT, it was difficult to identify the penetrated area unless a significant change such as the formation of an abscess had occurred. Third, gastrointestinal decompression was achieved without any problems because the migrated tip of the LIT was returned to the gastric lumen and placed in the dilated small bowel. All these factors made the diagnosis of the LIT migration difficult, and we could not detect it without the preoperative upper gastrointestinal endoscopy.

In earlier reports, most patients with submucosal tunnel formation were treated successfully with conservative management [4-7]. In our case, we confirmed that there were no perforations or abscess formations on the contrast-enhanced CT before the removal of the LIT. Accordingly, after the removal of the LIT, the patient was treated with a proton pump inhibitor. Once the diagnosis of submucosal tunnel formation is confirmed, further diagnostic and therapeutic steps should be considered because of the associated life-threatening risks like esophageal perforation and mediastinal abscess formation.

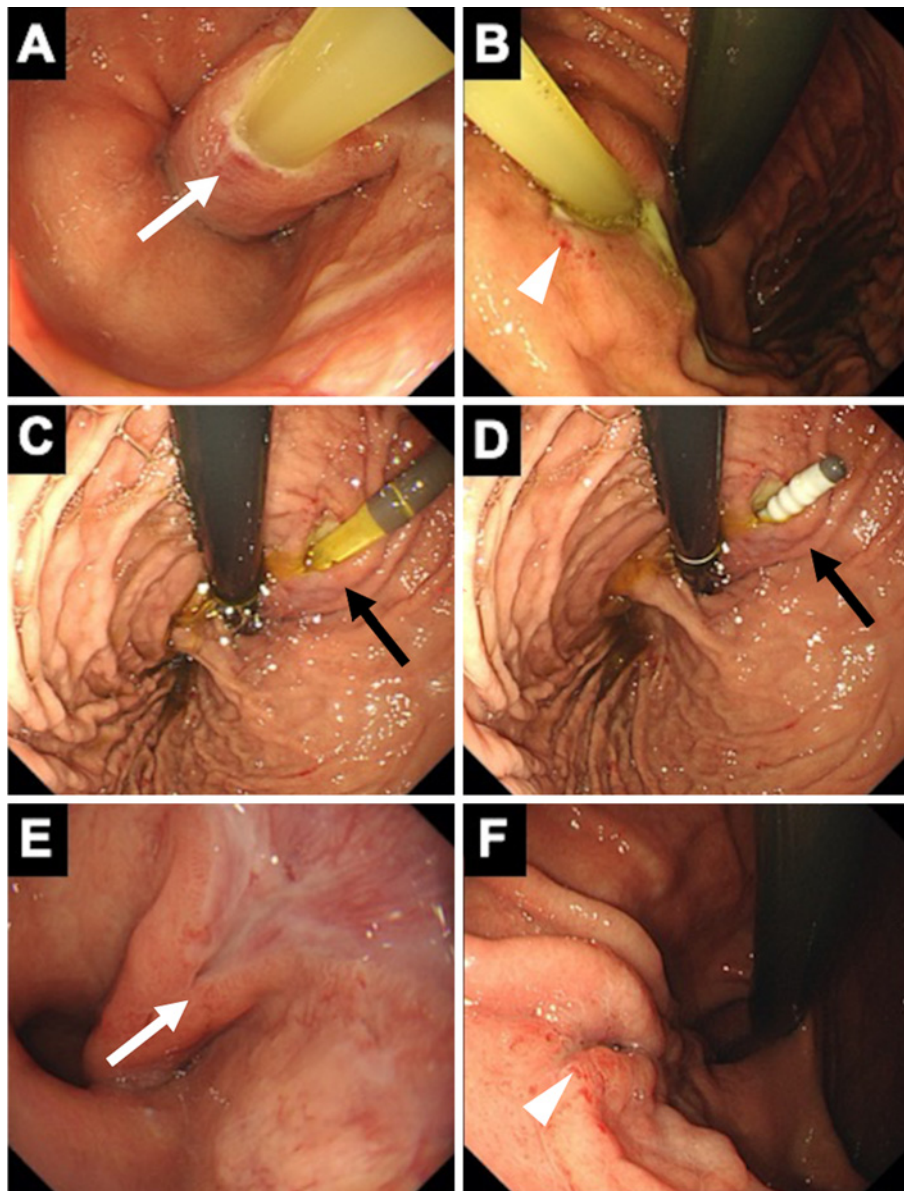


Fig. 2. A, B Endoscopy revealed LIT penetration and traversal of the gastroesophageal wall (white arrow: entry, white arrowhead: exit). C, D LIT (black arrow) removal during the operation. E, F Follow-up endoscopy showed the submucosal tunnel formation between the abdominal esophagus and gastric cardia (white arrow: entry, white arrowhead: exit, comparison with A and B).

Based on the current case, it can be concluded that due to LIT insertion, unfamiliar complications like submucosal tunnel formation may arise without any associated signs or symptoms.

Conflict of interest: The authors declare that they have no conflict of interest.

Disclaimer: Yoshitaka Inaba and Takaaki Hasegawa are the Editorial Board members of *Interventional Radiology*. They were not involved in the peer-review or decision-making process for this paper.

Abbreviations: LIT: long intestinal tube.

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