Int Surg 2019;**104:**16–20
DOI: 10.9738/INTSURG-D-17-00116.1

Case Report

Mesh Plug Migration Into the Ileum 11 Years After Open Inguinal Hernia Repair: A Rare Case Report and Literature Review

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Introduction: A mesh plug is used worldwide for tension-free repair of an inguinal hernia. This procedure is relatively quick, is easy to learn, has a low recurrence rate, has few complications, and offers rapid recovery; however, complications specific to the mesh plug are infrequently reported.

Case presentation: We present a rare case of a 70-year-old man admitted to our hospital with right lower abdominal pain and groin swelling 11 years after open inguinal hernia repair using a mesh plug. Abdominal computed tomography showed a subcutaneous abscess in the right inguinal region and a thickened ileum wall. We diagnosed that a mesh plug had penetrated into the ileum wall, resulting in an abscess. The emergency operation revealed the mesh plug migration into the ileum, and removal of the mesh plug and partial resection of the ileum were performed. At 9 months after operation, there has been no recurrence of the hernia.

Conclusion: Although rare, migration of the mesh plug should be considered in patients who have undergone inguinal hernia repair and have symptoms of acute abdominal pain, particularly when there is no previous history of abdominal surgery.

Key words: Inguinal hernia – Mesh plug – Migration

In 1958, Usher *et al* published the first report about a tension-free concept for an incisional hernia repair using polypropylene mesh.[1] The tension-free method for inguinal hernia was reported in 1986, and was a huge improvement over the current surgical technique.[2] The mesh plug hernia repair, which was reported by Rutkow in 1993, has spread rapidly due to its advantages, such as an

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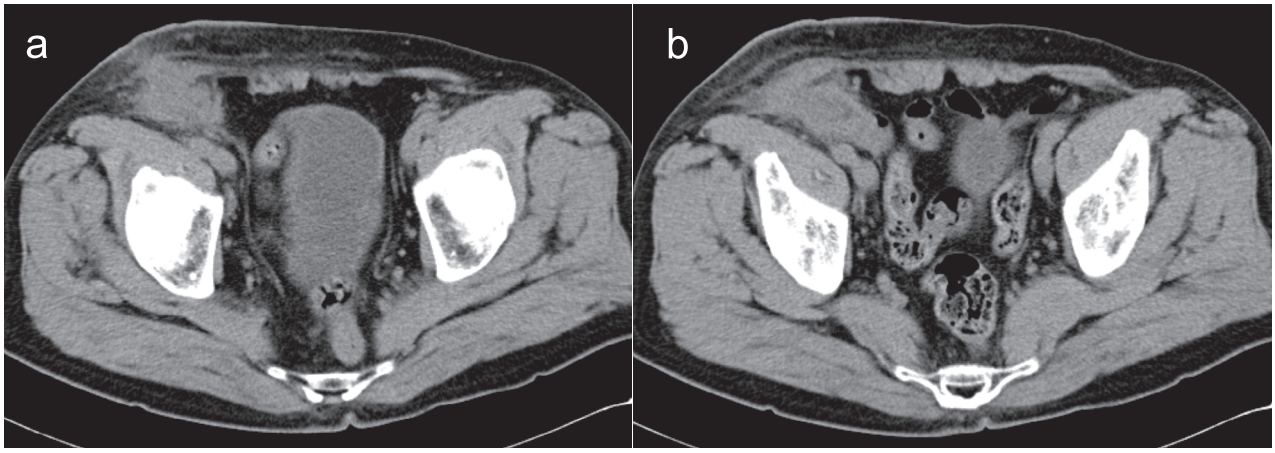

Fig. 1 Abdominal CT scan. (a) A subcutaneous abscess of the right inguinal region and (b) thickened wall of the ileum were observed.

easy-to-learn procedure, low recurrence rate, and less pain.[3]

However, postoperative complications also have been reported, such as mesh infection, hematoma, inguinal pain, intestinal injury, and seroma.[4] There are only a few reports of late-onset complications caused by mesh plug migration, and the frequency and pathology are still unclear. Here, we present a case of mesh plug migration into the ileum 11 years after open inguinal hernia repair.

Case Presentation

A 70-year-old male was admitted to our hospital with fever, right lower abdominal pain, and groin swelling. His medical history included a right inguinal hernia repair with a mesh plug 11 years earlier. He had received ambulant treatment for emphysema, prostatic hypertrophy, and angina. No diabetes mellitus or immunosuppressive diseases were present. The physical examination revealed a painful mass and redness on the surgical scar of the right inguinal hernia repair. No muscular defense was observed. The laboratory examination showed a slight elevation of white blood cells (WBCs; 10,510/mm^3) and C-reactive protein (CRP; 3.9 mg/dL), and there were no other abnormal findings. Abdominal computed tomography (CT) showed a subcutaneous and intraperitoneal abscess accompanied by high density surrounding adipose tissue in the right inguinal region. The small intestine in contact with the abscess also had a thickened wall, and a passage between the abscess and intestine was suspected because of a gas image in the abscess (Fig. 1). We diagnosed that a mesh plug had penetrated into the ileum's wall, resulting in an abscess. An emergency operation was performed laparoscopically. No pus contamination was observed in the peritoneal cavity. The ileum was clumped in the right inguinal region with strong adhesion, and the mesh plug was exposed during adhesiolysis. Removal of the mesh plug and partial resection of the ileum were performed (Fig. 2). Additional repair of the inguinal hernia was difficult due to surrounding inflamed tissues. Histopathologic examination revealed that severe inflammation existed at the serosa side of the ileum with fibrin deposition. The infiltrating inflammatory cells contained not only neutrophils but also lymphocytes and plasma cells, indicating chronic inflammatory changes. At the site of penetration, the intestinal wall structure was obscure with necrotic changes (Fig. 3). On postoperative day 14, he experienced similar symptoms in the right groin. The laboratory examination showed a slight elevation of WBCs (15,330/mm^3) and CRP (16.2 mg/dL). Abdominal CT revealed a subcutaneous abscess in the same region. Drainage surgery was performed using a forward approach. There was no passage between the abscess and intraperitoneal cavity. The abdominal wall around the inguinal canal was scarred and very hard and the onlay mesh could not be found. The nonabsorbing threads used for mesh fixation and the surrounding scarred tissues were removed as much as possible. After a second operation, the patient recovered uneventfully. There has been no recurrence of the hernia since the operation 9 months ago.

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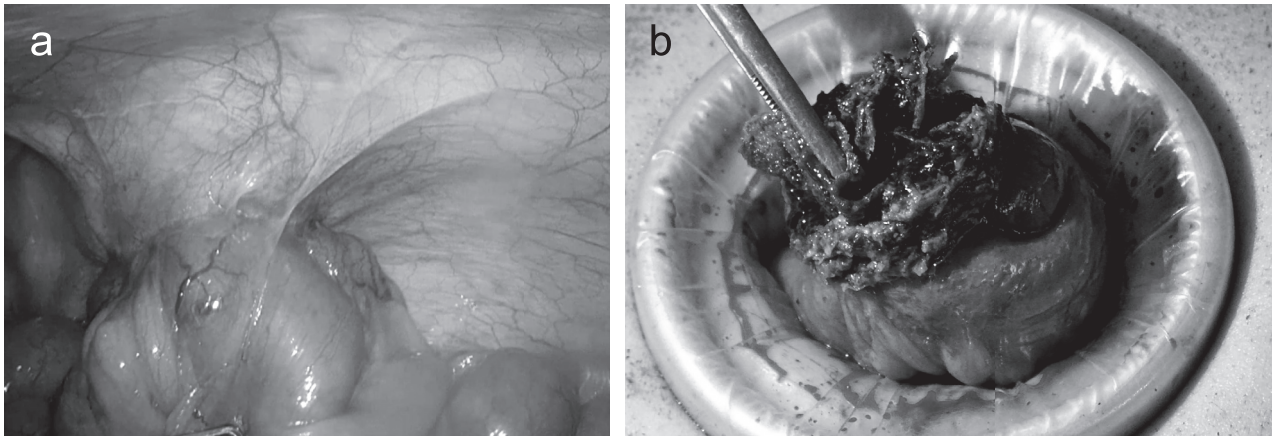

Fig. 2 Operative findings. (a) Tight adhesion of the ileum to the mesh plug through the peritoneum was observed. (b) The mesh plug was solidly adhered to the ileum.

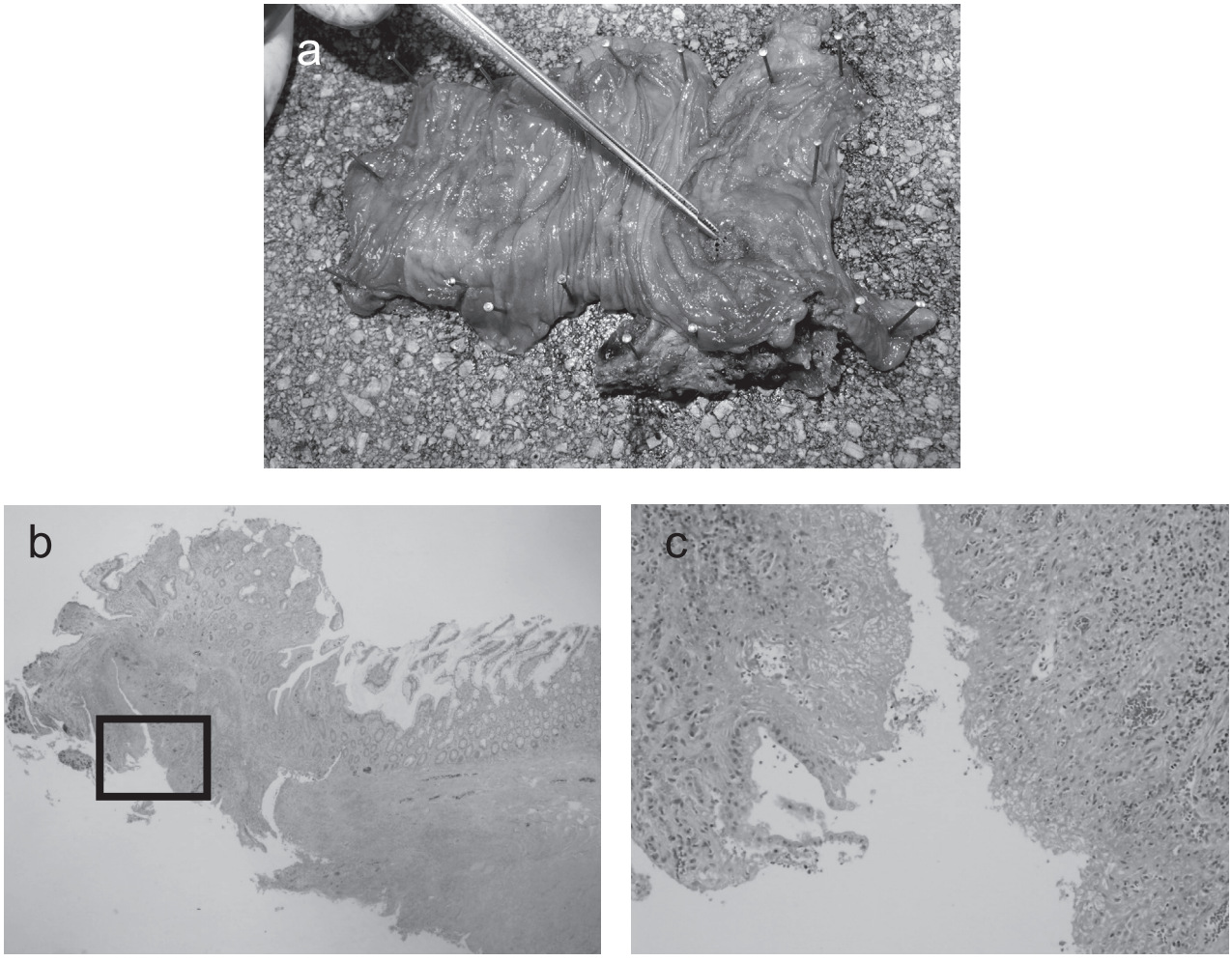

Fig. 3 Histopathologic findings. (a) The mesh plug penetrated into the ileum's lumen. (b) The severe inflammation was observed at the serosa side, ×10. The square is magnified in (c), × 200.

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Table 1 Literature review of reported cases with mesh plug migration

Year	Author	Age	Sex	Side	Duration (year)	Symptom	Migration site
2000	Chuback	69	M	R	2	Ileus	Ileum
2001	Tokunaga	83	M	L	7	Melena	Sigmoid colon
2005	Benedetti	67	M	L	2	Rectal bleeding	Sigmoid colon
2005	Nowak	30	M	R	N.D.	Ileus	small intestine
2007	Stout	76	M	L	N.D.	Abdominal pain, Ileus	small intestine
2008	Xiao	85	M	R	4	Abdominal pain, Ileus	Ileum
2010	Ming-Jenn	79	M	R	2	Abdominal pain, Ileus	Ileum
2013	Yilmaz	36	M	L	3	Abdominal pain, Ileus	Sigmoid colon
2015	Yamamoto	72	M	L	2	Ileus	Intraperitoneal cavity
2015	Ishikawa	80	F	R	5	Skin fistula	Bladder
2015	Scheuer	65	M	L	20	No symptom	Intraperitoneal cavity
2015	Sekiguchi	57	M	R	13	Groin pain	Cecum
This case	Ogino	70	M	R	11	Groin pain	Ileum

N.D., not described.

Discussion

Inguinal hernia repair using a mesh plug has a low recurrence rate; therefore, it has been a standard surgery worldwide.[3] However, the use of a protruding prosthesis adds the potential risk for intraperitoneal migration of a mesh plug that can cause erosion in the organ. The chronic persistent stimulation of the peritoneum by the mesh plug can cause chronic inflammation and penetration into the adjacent intestinal wall through the peritoneum due to severe inflammatory cell infiltration. There was no peritoneal intervention observed in this case.

From 2000 to 2016, complications after mesh plug hernia repair related to organ penetration were reported in 13 cases, including ours (Table 1).[4–15] The average patient age was 66.8 years (range: 30–85 years old), and there were 12 males. The average duration from hernia repair was 6.5 years (range: 2–20 years). The intestinal sites of penetration were mostly the ileum or sigmoid colon. The symptoms were mainly abdominal pain and ileus. However, the true incidence is likely unknown, since it can be assumed that many migrated plugs were unnoticed because there were no symptoms, and there was no detection by CT and magnetic resonance imaging. Several cases were treated conservatively with antibiotics and drainage, but surgical prosthesis removal was eventually necessary because the patients could not recover fully. The intestinal resection and prosthesis removal were performed in most cases. When there were defects after removal, no additional repair was performed in most cases due to fibrosis and scarring of the surrounding tissues. Even if there was no repair, the recurrences were extremely rare. It is presumed that adhesion and fibrosis occur around the inguinal canal because of the indwelling mesh plug, and the rear wall of the inguinal canal is reinforced as a result. In our case, it was also difficult to perform additional repair due to the large defect in the muscular layer. Thus, long-term follow-up is necessary.

The surgeons who perform mesh-plug hernia repair should be careful to peel off the preperitoneal layer enough, remove the peritoneal tension, avoid placing the mesh plug too deep, and avoid damaging the peritoneal sac, because the organ penetration of mesh plug is caused by (a) intraperitoneal exposure of the prosthesis, (b) long-term compression of the peritoneum, (c) deviation from the fixed position due to fixation failure, and (d) intra-abdominal migration.[5,6,9] In conclusion, although migration of the mesh plug into the intestinal lumen is quite rare, it is important for surgeons to recognize this late-onset complication.

Acknowledgments

Written informed consent was obtained from the patient for publication of this case report and accompanying images. The authors declare no conflict of interest. This case report received no specific support in any form.

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