Mesh migration into the sigmoid colon after inguinal hernia repair presenting as a colonic polyp: A case report and review of literature

Sha Liu, Xin-Xin Zhou, Lin Li, Mo-Sang Yu, Hong Zhang, Wei-Xiang Zhong, Feng Ji

Sha Liu, Xin-Xin Zhou, Lin Li, Mo-Sang Yu, Hong Zhang, Feng Ji, Department of Gastroenterology, the First Affiliated Hospital, College of Medicine, Zhejiang University, Hangzhou 310003, Zhejiang Province, China

Wei-Xiang Zhong, Department of Pathology, the First Affiliated Hospital, College of Medicine, Zhejiang University, Hangzhou 310003, Zhejiang Province, China

ORCID number: Sha Liu (0000-0001-5682-180X); Xin-Xin Zhou (0000-0003-0183-6400); Lin Li (0000-0002-2175-1052); Mo-Sang Yu (0000-0002-5614-0227); Hong Zhang (0000-0003-0485-6044); Wei-Xiang Zhong (0000-0002-5493-893X); Feng Ji (0000-0003-4252-8850).

Author contributions: Ji F designed the study; Liu S collected the patient’s clinical data and studied the relevant literature; Zhou XX, Zhong WX and Li L reviewed the data; Liu S analyzed the data and wrote the manuscript; Yu MS and Zhang H edited the manuscript and figures.

Supported by Zhejiang Provincial Natural Science Foundation of China, No. LQ16H030001.

Informed consent statement: The patient’s informed written consent was obtained, and approval was granted by the ethics committee of the First Affiliated Hospital, College of Medicine, Zhejiang University.

Conflict-of-interest statement: The authors declare no conflicts of interest related to the publication of this case report.

CARE Checklist (2013) statement: This manuscript has completed the CARE Checklist (2013).

Open-Access: This article is an open-access article which was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: http://creativecommons.org/licenses/by-nc/4.0/.

Manuscript source: Unsolicited manuscript

Correspondence to: Feng Ji, MD, PhD, Chief Doctor, Professor, Department of Gastroenterology, the First Affiliated Hospital, College of Medicine, Zhejiang University, No. 79 Qingchun Road, Hangzhou 310003, Zhejiang Province, China. jifeng@zju.edu.cn

Telephone: +86-571-87236862

Received: June 28, 2018
Peer-review started: July 2, 2018
First decision: July 24, 2018
Revised: August 9, 2018
Accepted: August 30, 2018
Article in press: August 31, 2018
Published online: October 26, 2018

Abstract

Mesh migration and penetration into abdominal viscera rarely occur after laparoscopic inguinal hernia repair. We present the first case of mesh migration into the sigmoid colon identified as a colonic polyp at initial colonoscopic examination. The patient complained of mild abdominal distention in the lower abdomen over the previous year without changes in bowel habits or stool appearance and without weight loss. By complementary endoscopic ultrasonography, a cavity-like structure beneath the suspected polyp was further confirmed. Enhanced abdominal computed tomography merely revealed local bowel wall thickening and inflammation of the colosigmoid junction. The migrating mesh, which was lodged in the sigmoid colon and caused intra-abdominal adhesion in the lower abdominal cavity, was finally identified via exploratory surgery. The components of inflammatory granulation tissue around the mesh material were diagnosed based on histological examination.
of the surgical specimen after sigmoidectomy. In this patient, nonspecific endoscopic and imaging outcomes during clinical work-up led to the diagnostic dilemma of mesh migration. Therefore, the clinical, radiological and endoscopic challenges specific to this case as well as the underlying reasons for mesh migration are discussed in detail.

**Key words:** Colonoscopy; Surgical mesh; Hernia repair; Sigmoid colon; Colonic polyps; Computed tomography; Foreign bodies

© The Author(s) 2018. Published by Baishideng Publishing Group Inc. All rights reserved.

**Core tip:** Mesh migration and penetration into abdominal viscera are rarely reported as a long-term complication after inguinal hernia repair. In this case, a migrating prosthetic mesh penetrated the sigmoid colon in a 59-year-old male patient after bilateral inguinal hernioplasty. The migrating mesh mimicked a "colonic polyp" under endoscopy, while it was almost absent on radiological imaging and caused no obvious symptoms. This has never been reported in the previous literature, and it enhanced preoperative diagnostic difficulty. Therefore, clinical, radiological and endoscopic aspects of the case and, more importantly, the possible factors accounting for mesh migration and erosion are analyzed and summarized.

Liu S, Zhou XX, Li L, Yu MS, Zhang H, Zhong WX, Ji F. Mesh migration into the sigmoid colon after inguinal hernia repair presenting as a colonic polyp: A case report and review of literature. *World J Clin Cases* 2018; 6(12): 564-569 Available from: URL: http://www.wjgnet.com/2307-8960/full/v6/i12/564.htm DOI: http://dx.doi.org/10.12998/wjcc.v6.i12.564

**INTRODUCTION**

The tension-free method with mesh as a muscle reinforcement technique is regarded as an important part of inguinal hernia repair since it reduces the hernia recurrence rate and recovery period. Superficial wound infection and chronic pain associated with prosthetic mesh are well-known complications, which mainly occur in the early postoperative period. However, serious complications, such as mesh migration and perforation of adjacent organs, are rarely reported and may present symptoms at different time intervals after inguinal hernia repair. Colon penetration by inguinal hernia repair mesh can possibly cause formation of inflammatory granulation tissue within the injured bowel wall leading to misdiagnosis or missed diagnosis. We report the first case of chronic mesh penetration into the sigmoid colon, where the migrating mesh appeared to be a colon polyp under endoscopy, while it was almost asymptomatic and invisible in enhanced computed tomography (CT).

**CASE REPORT**

The patient was a 59-year-old man with a history of Stoppa-repair for bilateral inguinal hernia 7 years previously. Shortly thereafter, he developed a mild superficial wound infection in the right groin region. However, the infection improved without any medical treatments and did not recur. One year ago, he underwent general examinations in a local hospital due to mild lower abdominal distention. Colonoscopy revealed a "polyp" (2.5 cm × 2.0 cm in size), which was hyperemic and erosive on mucosa and was situated on the upper segment of the sigmoid colon. The colonic lesion was suspected to be an inflammatory protuberance or malignant neoplasm, hence it was biopsied but left untreated. The "polyp" was defined as mucosal inflammation based on histological characteristics. Therefore, the patient was referred to our hospital for further examinations and treatment.

On admission to our gastroenterology department, the patient did not appear to be sick. Neither tenderness on palpation nor rebound tenderness was positive on physical examination. The stool test showed occult blood of 1+. The abdominal CT revealed local bowel wall thickening and inflammatory stranding involving the colosigmoid junction, accompanied by bowel gas accumulation and extension of the proximal sigmoid colon segment (Figure 1). Hyperemic polypoid mucosal changes in the sigmoid colon (approximately 28 cm from the anal verge) were observed via colonoscopic re-examination, which occupied 1/4 of the bowel wall circumference (Figure 2A). The lesion was oozing a pus-like substance and was covered with mucus. Complimentary endoscopic ultrasonography confirmed the mucosal lesion to be heterogeneously isoechoic or hypoechoic, with a cavity-like structure below (Figure 2B). It bled easily when biopsied. Pathological examination showed chronic mucosal inflammation with components of necrotizing inflammation. We presumed the colonic lesion to be atypical colonic diverticulitis or a localized abscess. However, there were no positive laboratory test results (white blood cell, erythrocyte sedimentation rate, peripheral blood culture) supportive of our suspicion; hence, we determined that the patient would not benefit greatly from antibiotic therapy, and therefore, no antibiotics were used. An exploratory surgery was undertaken, and endoscopic carbon nanoparticle tattooing was utilized to position the colonic lesion prior to surgery. Screening for enlarged intra-abdominal lymph nodes was negative during laparoscopic intraperitoneal observation. However, the sigmoid colon was found firmly adhered to the abdominal wall. The mesh material was not exposed in the abdominal cavity until adhesiolysis was performed. We identified the presence of left-sided hernia repair mesh penetrating the sigmoid colon from the preperitoneal space (Figure 3). No obvious sinus or fistulas were found between the mesh and colon lumen. Sigmoidectomy with removal
val of the mesh was performed. Simultaneously, mild adhesion between the right-sided abdominal wall and colon was also observed and separated. The patient received flurbiprofen for postoperative analgesia and prophylactic antibiotics (omnidazole combined with lactamoxef intravenously for 3 d) perioperatively. Pathological analysis of surgical specimen confirmed the substance of the foreign body within the bowel wall along with adjacent inflammatory granulation tissue formation (Figure 4). He was discharged on postoperative day 6 without major complications and recovered uneventfully.

DISCUSSION

Over the past four decades, increasingly wide utilization of hernia-repair mesh during laparoscopic inguinal hernioplasty has significantly reduced the recurrence rate of inguinal hernia. With the introduction of trocars, mesh implantation is carried out distally from the trocar incision[20], and the superficial infection rate has decreased dramatically (less than 2%)[3]. In comparison, other complications induced by mesh, such as foreign body reaction, deep-seated infection, consequent mesh migration and perforation into viscera, have been reported sporadically. Incidence rates for such complications remain unknown[11]. The intestine and urinary bladder were involved in most cases of mesh migration reported from 2003 to 2017[1-4,10]. A relatively rare case of a migrated mesh in the retroperitoneal region mimicking a cystic adnexal mass was also documented previously[11].

Depending on the different positional relationship of migrating mesh with visceral organs, clinical manifestations vary significantly and may present from 1 to 20 years after inguinal hernia repair[12]. Lower abdominal pain and mild tenderness were described in the majority of cases[4,13], while weight loss, anorexia, symptoms of bowel obstruction, palpable abdominal mass were merely referred to by a few reports[9,14]. In our case, the male patient complained of mild abdominal discomfort, without other symptoms or positive physical signs, which led to diagnosis delay. Furthermore, the colon-embedded mesh was chronically mildly infected and surrounded by inflammatory granulation tissue, which limited the diagnostic value of colonoscopy and enhanced abdominal CT. Typical signs caused by gastrointestinal perforation or peritonitis were almost absent on the radiograph. In previously reported cases, migrating mesh plugs were neglected or misdiagnosed as a poorly defined mass[4], an intra-abdominal neoplasm[9] or sigmoid diverticulosis[13] based on radiological investigations.

Incomplete peritoneal repair, inadequate fixation or inappropriate amount of implantation space are possible reasons accounting for mesh migrating into intra-abdominal viscera, occasionally followed by fistulas formation or mechanical bowel obstruction[10]. In addition, the sharp edges of prosthetic mesh or tackers could injure the visceral serosal layer[16,17], initiating the intra-abdominal inflammatory process and subsequent mesh erosion. The bowel injury incidence rate ranged between 0.4% and 5.6% in previous studies[18]. Considering that the patient in our case was almost asymptomatic, the factors responsible for painless mesh migration are as follows: (1) The foreign body reaction to mesh enables gradual movement of the mesh through the anatomic planes in the abdominal cavity, particularly along the paths of low resistance[17]; (2) In some occasions, the mesh can be encapsulated by the omentum during its migration and create a channel into hollow organs along with inflammatory reaction and peristaltic bowel movement[5]; (3) Gram-positive cocci are generally responsible for superficial wound infection and can further trigger the deeper infection. Bacterial biofilm can develop over the mesh due to chronic contamination by staphylococcus species, which results in painless mesh migration through the tissue[18] and (4) Prosthetic mesh material decreases the formation of the mesothelial cell layer in peritoneal repaired defects, predisposing the irregular surface of mesh to be surrounded by scar tissue, thus the inflammation is localized.

To prevent further erosion of migrating mesh and preserve the function of affected viscera, total removal of the mesh via laparoscopy or laparotomy is advised in clinical practice, along with either partial or entire resection of the organ[1]. Meanwhile, the possible wound sinus or enteric fistulas linked to the mesh should be completely eradicated by excision in combination with medication therapy (antibiotics, somatostatin and parenteral nutrition). Tailoring the mesh, appropriate suture placement and adherence to principles of antisepsis during hernia repair surgery are crucial in avoiding long-term mesh-related complications.

ARTICLE HIGHLIGHTS

Case characteristics

A 59-year-old male patient developed mild lower abdominal distention 7 years after repair surgery of a bilateral inguinal hernia. A colonic lesion was found under his endoscopic examination and was suspected to be a polyp. However, the complementary radiological imaging and subsequent endoscopic ultrasonography (EUS) failed to provide enough clues for exact diagnosis. The patient was referred for explorative surgery, during which a prosthetic mesh was confirmed as migrating into the sigmoid colon from its original position.
Sigmoidectomy with removal of the mesh was performed. Histological investigations also demonstrated the existence of a foreign body within the bowel wall. Histological findings revealed by Hematoxylin and Eosin staining of paraffin-embedded sections from the surgical specimen. A: The presence of a foreign body in the bowel wall, which caused inflammatory infiltrate and granulation tissue formation in the surrounding tissue (magnification × 10); B: Infiltration of massive inflammatory cells and formation of granulation tissue (magnification × 100); C: Foreign-body giant cells were observed (magnification × 200); D: Prosthetic mesh material (magnification × 100).
Mesh migration into the sigmoid colon after inguinal hernia repair. Abdominal pain and mild tenderness, and pain occasionally increased with food intake. An abdominal mass could be palpable when migrating mesh initiates due to severe adhesions between viscera. Meanwhile, symptoms including weight loss, anorexia, and fatigue could develop. Bowel obstruction could occur due to intraluminal penetration of migrating mesh. Metal clips or tackers used to fasten mesh are radiopaque but still occasionally missed by internists. In addition, inflammatory tissue formation caused by foreign body can prevent an accurate preoperative diagnosis. Therefore, the case-based learning as well as detailed collection of patients’ medical history provides clinicians with more clues to analyze CT scan with orientation. Overreliance on ultrasonic or radiological investigations occasionally leads to misdiagnosis and missed diagnosis of specific foreign bodies.

**REFERENCES**

1. Lauwers P, Bracke B, Hubens G, Vaneeerdegeweg W. Unusual complications of preperitoneal mesh implantation in the treatment of inguinal hernia. Acta Chir Belg 2003; 103: 513-516 [PMID: 14653040]
2. Foschi D, Corsi F, Cellerino P, Trubucchini A, Trubucchini E. Late rejection of the mesh after laparoscopic hernia repair. Surg Endosc 1998; 12: 455-457 [PMID: 9569371 DOI: 10.1007/s004649900704]
3. Lammers BJ, Meyer HJ, Huber HG, Groß-Weege W, Röther HD. Entwicklungen bei der Leistenhernie vor dem Hintergrund neu eingeführter Eingriffstechniken im Kammerbereich Nordrhein. Der Chirurg 2001; 72: 448-452 [DOI: 10.1007/s001000400530]
4. Asano H, Yajima S, Hoso Y, Takagi M, Fukano H, Ohara Y, Shinozuka N, Ichimura T. Mesh penetrating the cecum and bladder following inguinal hernia surgery: a case report. J Med Case Rep 2011; 11: 260 [PMID: 28903762 DOI: 10.1186/s13256-017-1435-8]
5. Falk GA, Means JR, Pryor AD. A case of ventral hernia mesh migration with splenosis mimicking a gastric mass. BMJ Case Rep 2009; 11: pii: bcr06.2009.2033 [PMID: 21954401 DOI: 10.1136/ bcr.06.2009.2033]
6. Hamouda A, Kennedy J, Grant N, Nigam A, Karanja N. Mesh erosion into the urinary bladder following laparoscopic inguinal hernia repair; is this the tip of the iceberg? Hernia 2010; 14: 317-319 [PMID: 19657592 DOI: 10.1007/s10109-009-0539-5]
7. Aggarwal S, Praneeth V, Rathore Y, Waran V, Singh P. Laparoscopic management of mesh erosion into small bowel and urinary bladder following total extra-peritoneal repair of inguinal hernia. J Minim Access Surg 2016; 12: 79-82 [PMID: 26917927 DOI: 10.4103/0972-9941.169956]
8. Goswami R, Babor M, Ojo A. Mesh erosion into caecum following laparoscopic repair of inguinal hernia (TAPP): a case report and literature review. J Laparoendosc Adv Surg Tech A 2007; 17: 669-672 [PMID: 17907986 DOI: 10.1089/lap.2006.0135]
9. Ojo P, Abenhofram A, Friedler P, Yavorek G. Migrating mesh mimicking colonic malignancy. Am Surg 2006; 72: 1210-1211 [PMID: 17216820]
10. Celik A, Kutsun S, Kockar C, Mengi N, Ulucanlar H, Cetin A. Colonic erosion of inguinal hernia mesh: report of a case and literature review. J Laparoendosc Adv Surg Tech A 2005; 15: 408-410 [PMID: 16108747 DOI: 10.1089/lap.2005.15.408]
11. Ronnenmaier MA, Heinemann S, Truong H, Micha JP, Brown JV 3rd, Goldstein BH. Marlex mesh mimicking an adnexal malignancy. Hernia 2009; 13: 221-223 [PMID: 18795414 DOI: 10.1007/s10109-008-0426-5]
12. Novaretti JP, Silva RD, Cotrim CA, Souto LR. Migration mesh mimicking bladder malignancy after open inguinal hernia repair. Hernia 2012; 16: 467-470 [PMID: 21140183 DOI: 10.1007/s10109-010-0760-2]
13. El Hakam MZ, Sharara AI, Chedid V. Persistent left lower abdominal pain. Gastroenterology 2010; 138: e5-e6 [PMID: 19932661 DOI: 10.1053/j.gastro.2009.04.064]
14. Chuback JA, Singh RS, Sills C, Dick LS. Small bowel obstruction resulting from mesh plug migration after open inguinal hernia repair. Surgery 2000; 127: 475-476 [PMID: 10776441 DOI: 10.1067/mys.2000.104122]
15. Demir U, Mihmanli M, Coskun H, Dilege E, Kalyoncu A, Altinti E, Gunduz B, Yilmaz B. Comparison of prosthetic materials in incisional hernia repair. Surg Today 2005; 35: 223-227 [PMID: 15772793 DOI: 10.1007/s00595-004-2907-1]
Mesh migration into the bladder after TEP repair: a rare case report. Surg Laparosc Endosc Percutan Tech 2006; 16: 52-53 [PMID: 16552383 DOI: 10.1097/01.sle.0000202185.34666.f1]

Mesh migration following repair of inguinal hernia: a case report and review of literature. Hernia 2006; 10: 79-82 [PMID: 16258705 DOI: 10.1007/s10029-005-0024-8]

Intravesical migration of a polypropylene mesh implant 3 years after laparoscopic transperitoneal hernioplasty. Urologe A 2002; 41: 366-368 [PMID: 12214456 DOI: 10.1007/s00120-001-0148-0]

Diagnosis, treatment and prevention of penile prosthesis infection. Int J Impot Res 2003; 15 Suppl 5: S139-S146 [PMID: 14551594 DOI: 10.1038/sj.ijir.3901091]
