Int Surg 2013;**98:**412–415
DOI: 10.9738/INTSURG-D-13-00002.1

Case Report

Incisional Intercostal Hernia With Prolapse of the Colon After Right Partial Nephrectomy

Takatsugu Yamamoto, Yukiko Kurashima, Chie Watanabe, Kazunori Ohata, Ryoya Hashiba, Shogo Tanaka, Takahiro Uenishi, Koichi Ohno

Department of Surgery, Ishikiri Seiki Hospital, Osaka City, Japan

A 75-year-old woman with a history of myocardial infarction, gallstones, and right renal cancer was referred to our department because of right flank pain. She had a surgical scar on the right abdomen between the 10th and 11th ribs; computed tomography demonstrated intercostal herniation of the colon. Recognizing the possibility of adhesions of the hernia and colon, we used a median skin incision and patched a polyester mesh coated with absorbent collagen. The patient had an uneventful postoperative course, with no pain for 6 months postoperatively. Transdiaphragmatic intercostal hernias with abdominal contents commonly develop after trauma or thoracic surgery. Incisional intercostal hernias seldom develop after nephrectomy; the present case is only the fourth report. We conjecture that a costochondral incision can induce subluxation of the costotransverse joint, intercostal nerve injury, and atrophy of the intercostal and abdominal oblique muscles. Surgeons must therefore recognize the potential, albeit rare, for intercostal hernia after nephrectomy.

Key words: Incisional hernia – Intercostal hernia – Postoperative complication after nephrectomy

Transdiaphragmatic intercostal hernias containing abdominal contents commonly develop after trauma or thoracic surgery. Incisional intercostal hernia after nephrectomy has rarely been reported. We present a case of incisional intercostal hernia with prolapse of the colon after right partial nephrectomy, and we discuss the etiology and treatment.

Case Report

A 75-year-old woman was referred to our department because of continuous dull pain in the right flank for the past 4 years. She had a medical history of left ventricular repair for wall rupture caused by myocardial infarction at age 56 years, cholecystectomy for gallstones at age 70 years, right partial

Reprint requests: Takatsugu Yamamoto, Department of Surgery, Ishikiri Seiki Hospital, 18–28 Yayoi-cho, Higashi Osaka City, Osaka 579-8026, Japan.
Tel.: +81 72 988 3121; Fax: +81 72 986 3860; E-mail: takatsugu@msic.med.osaka-cu.ac.jp

nephrectomy for renal cell carcinoma at age 71 years, repair by direct approach for incisional hernia of right partial nephrectomy at age 72 years, and coronary bypass for myocardial infarction at age 73 years. The incisional hernia that was caused by previous right partial nephrectomy and filled with colon was repaired by a mesh sheet overlay with lateral costal space. The patient weighed 63 kg, with a height of 157 cm and a body mass index of 25.5. Physical examination revealed operative scars of a median thoracoabdominal incision and a skin bulge with the right oblique incisional scar between the 10th and 11th ribs. Blood and serologic examination revealed white blood cell count, 6740/μL; C-reactive protein, 0.39 mg/dL; and creatine kinase, 76 IU/L. Several dynamic abdominal computed tomography (CT) scans during the previous 4 years persistently showed an incisional intercostal hernia consisting of a porta between the 10th and 11th ribs, and a peritoneal sac, with part of the transverse colon as the hernia contents. The CT images suggested that the surgical repair for the incisional hernia 3 years ago failed, but they showed the diaphragm as having its normal shape and the transverse colon as maintaining its vasculature, with no fractures of the ribs or costal cartilage (Figs. 1 and 2). Further examination suggested that only the hernia, not any disease, induced the right flank pain.

We performed radical surgery, not via a direct skin incision, but using a median skin incision

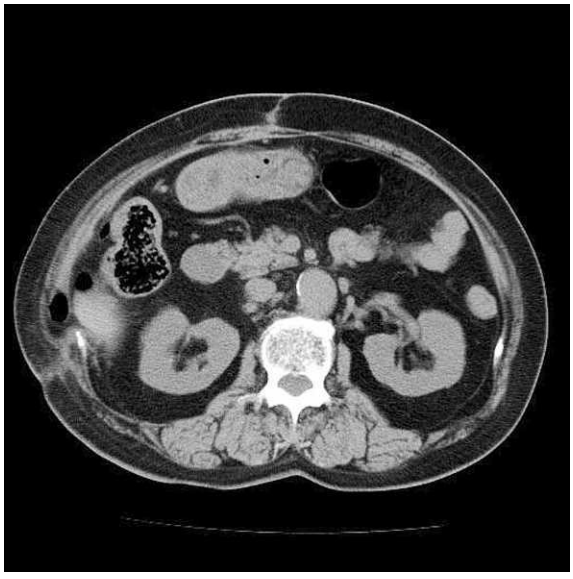

Fig. 1 Abdominal CT conducted 3 years ago shows incisional intercostal hernia between the right 10th and 11th ribs persistent after direct repair of the hernia.

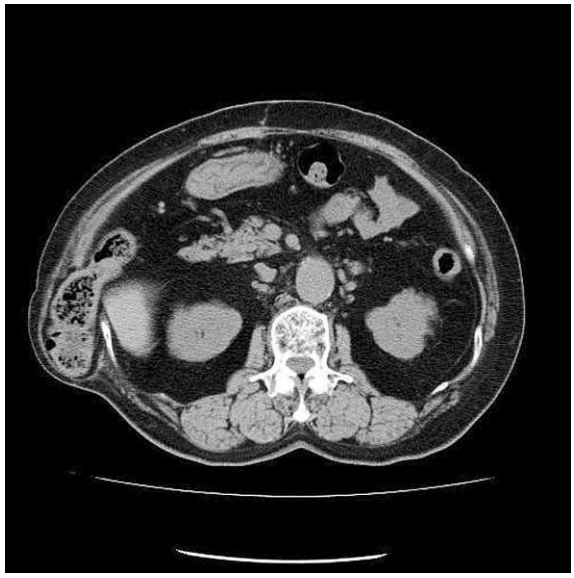

Fig. 2 Abdominal CT at this admission shows the transverse colon prolapsing extra-abdominally through the intercostal space.

because of the possibility that the porta and sac of the hernia might be adhering to such intra-abdominal contents as the intestine and/or the liver. In the intercostal defect space, we detected that the abdominal oblique muscles were atrophying between the 10th and 11th ribs, and that the transverse colon was adhering to the space of the hernia. We recognized the impossibility of closure and performed décollement of the colon, and we then repaired the hernia using polyester mesh coated with absorbent collagen. We sutured the mesh and peritoneum on the 10th and 11th ribs using absorbable suture (Fig. 3). The patient's postoperative course was uneventful, and the patient has been well without pain or recurrence at 6 months after surgery (Fig. 4).

Discussion

Intercostal herniation of abdominal contents sometimes develops after blunt thoracic trauma, and it can also accompany rib fractures and thoracic surgery.[1–3] In rare cases, hard physical exercise and violent coughing with rib fracture can also cause herniation.[4–8] Commonly, an intercostal hernia consists of prolapse of the abdominal/thoracic contents, sacs containing atrophied intercostal/oblique/diaphragm muscle, and defects of the intercostal space and diaphragm. These various causes can lead to intercostal/diaphragmatic muscle defects, intercostal/diaphragmatic nerve injuries,

Fig. 3 Approaching through the abdominal median incision, we patched polyester mesh coated with absorbent collagen to the hernia space intra-abdominally.

fractures of the ribs or costal cartilage, and/or costotransverse joint dislocations.[3,4] These derangements ultimately disrupt the integrity of the thoracic cage, and the resulting negative thoracic pressure draws the abdominal content out of the damaged thoracic cage. Development of herniation tends to the left flank, and the hernia content is commonly the small or large intestine. Meanwhile, hernia of the right side is rare; the hernia content is seldom the liver because of the large, solid liver covering the area of muscle atrophy.[9]

Fig. 4 Abdominal CT after the hernioplasty via the visceral side shows no abdominal organ prolapse or hernia.

Diagnosis of intercostal hernia can be made by taking a thorough history and performing careful clinical examination. The patient may present with a palpable mass in the thoracic wall or flank, which is reducible. Definitive diagnosis of intercostal hernia is made by CT.

Intercostal hernia without diaphragmatic atrophy is rare because there is little damage to the thoracic cage and no negative thoracic pressure to draw out the abdominal contents. On rare occasions, intercostal hernia develops after an intercostal incision, such as with lower thoracic surgery, nephrectomy, or lower costal fracture/dislocation. Incisional intercostal hernia after nephrectomy is rare. Including the present case, only 4 cases of incisional intercostal hernia after nephrectomy have been reported.[9–11] The 4 cases consisted of 2 men and 2 women; 1 herniation was noted on the left side and 3 were on the right side. The patient body mass indexes documented in 2 of the 3 reports were 32 and 44. All cases were repaired using nonabsorbable mesh. One patient later died from myocardial infarction.

The etiology of incisional intercostal hernia after nephrectomy is unknown. In reviewing the 4 known cases, we conjecture some of the following to be factors of lower incisional intercostal hernia: cicatrization of intercostal muscle, paralysis of thoracic muscle caused by intercostal nerve injury, costal cartilage not repaired after the operation, dislocation of the costotransverse joint, and additional abdominal pressure caused by obesity.[3,4] We believe that the surgical procedure of nephrectomy easily tends to provoke the aforesaid triggers that can lead to intercostal hernia, although incisional intercostal hernia after nephrectomy indeed seldom develops. Surgeons and urologists must therefore take great care in the performance of nephrectomy, being aware of the potential for intercostal hernia to occur from anatomic derangements created during nephrectomy.

The best treatment of intercostal hernia after nephrectomy is surgical repair of the thoracic wall. Repair using with the original internal organ has never been reported because there is no original tissue to fill up the large intercostal space.[4,6,8–10] In the 4 known cases, the intercostal hernia repairs were performed using an artificial mesh sheet.[9–11] In

3 of the cases, the mesh was sutured to the thoracic/abdominal wall via a direct skin incision. In the present case, we sutured the mesh to the thoracic/abdominal wall via the visceral side through a median skin incision. The mesh we used is coated with absorbent collagen tissue. The collagen is gradually assimilated for several months after the operation, with mesothelium simultaneously growing to cover the mesh. This process prevents the mesh from adhering to the visceral organs, and the mesh is amenable to laparoscopic surgery.[12] When a surgeon encounters a patient with intercostal hernia after nephrectomy without a history of an intra-abdominal surgical approach, the mesh repair may be performed laparoscopically.

Acknowledgments

We owe a very important debt to the other surgeons of Ishikiri Seiki Hospital for supporting us.

References

1. Losanoff JE, Richman BW, Jones JW. Transdiaphragmatic intercostal hernia: review of the world literature. *J Trauma* 2001;**51**(6):1218–1219
2. Sharma OP, Duffy B. Transdiaphragmatic intercostal hernia: review of the world literature and presentation of a case. *J Trauma* 2001;**50**(6):1140–1143
3. Timmermans L, Klitsie PJ, Maat AP, de Goede B, Kleinrensink GJ, Lange JF. Abdominal wall bulging after thoracic surgery, an underdiagnosed wound complication. *Hernia* 2013;**17**(1): 89–94
4. Aggarwal G, Khandelwal G, Shukla S, Maheshwari A, Mathur R, Acharya D. Spontaneous transdiaphragmatic intercostal hernia: a rare clinical entity. *Hernia* 2012;**16**(1):113–115
5. Kallay N, Crim L, Dunagan DP, Kavanagh PV, Meredith W, Haponik EF. Massive left diaphragmatic separation and rupture due to coughing during an asthma exacerbation. *South Med J* 2000;**93**(7):729–731
6. Losanoff JE, Richman BW, Jones JW. Recurrent intercostal herniation of the liver. *Ann Thorac Surg* 2004;**77**(2):699–701
7. Kurer MA, Bradford IM. Laparoscopic repair of abdominal intercostal hernia: a case report and review of the literature. *Surg Laparosc Endosc Percutan Tech* 2006;**16**(4):270–271
8. Thomasson J, Maxwell R. Intercostal hernias. *Am Surg* 2010; **76**(8):E125–E127
9. Ohlow MA, Hocke M. Incisional intercostal hernia with prolapse of the liver. *Ann Hepatol* 2011;**10**(1):80
10. Rosch R, Junge K, Conze J, Krones CJ, Klinge U, Schumpelick V. Incisional intercostal hernia after a nephrectomy. *Hernia* 2006;**10**(1):97–99
11. Rompen JC, Zeebregts CJ, Prevo RL, Klaase JM. Incarcerated transdiaphragmatic intercostal hernia preceded by Chilaiditi's syndrome. *Hernia* 2005;**9**(2):198–200
12. Bobbio A, Ampollini L, Prinzi G, Sarli L. Endoscopic repair of an abdominal intercostal hernia. *Surg Laparosc Endosc Percutan Tech* 2008;**18**(5):523–525