Mediastinal herniation of the biliary tract leading to bile duct obstruction following oesophagectomy

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ABSTRACT

Surgical management of oesophageal and gastro-oesophageal junction malignancies is one of the most challenging situations confronting the surgeon. Attaining a complete circumferential resection margin of lower-third oesophageal and gastro-oesophageal junction locally advanced carcinomas requires en-bloc resection of the hiatus and all the peri-oesophageal tissue and pleura. This results in an increased risk of herniation of the abdominal organs through the enlarged hiatus, which carries significant risk of morbidity and mortality.

The incidence of this complication is higher than has been reported. Surgical management of symptomatic hernias is the standard treatment while criteria for managing asymptomatic hernias are less clear. We report a rare case of a late mediastinal herniation of the pancreas and bile duct, leading to obstructive jaundice following oesophagectomy which was treated successfully in our unit.

KEYWORDS

Oesophageal cancer – Hiatus hernia – Diaphragmatic hernia – Risk factors

Accepted 2 June 2018

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Case history

A 58-year-old man underwent an uneventful open left thoraco-abdominal oesophagectomy following neoadjuvant chemotherapy for a T3N2M0 poorly differentiated gastro-oesophageal junction adenocarcinoma. No anatomical abnormality was identified either during the preoperative staging process or intraoperatively. Six months post-oesophagectomy he presented to the emergency department with nausea, jaundice and general feeling of malaise. On examination, his abdomen was soft and non-tender, and he was profoundly jaundiced. Blood tests were unremarkable except the presence of increased bilirubin (192 µmol/l) and deranged liver function tests. Computed tomography (CT) followed by magnetic resonance cholangiopancreatography showed the presence of biliary tree dilatation with abrupt transition into collapsed distal common bile duct at the level of the cystic duct confluence (Fig 1). The second part of the duodenum was displaced at the level of the hiatus, with simultaneous distortion of the head of pancreas. CT positron emission tomography did not show any recurrence or metastasis. An emergency laparotomy was performed and a hiatal defect was identified, through which the second part of the duodenum and the head of the pancreas were displaced into the chest (Fig 2). This deformity led to acute angulation and extrinsic compression of the

common bile duct with subsequent biliary obstruction. Anatomical restoration was undertaken by approximating the hiatus and fixation of the gastric conduit to the right crus and to anterior abdominal wall. Duodenopexy was also performed on to the right Gerota's fascia. Postoperative recovery was uneventful, with rapid improvement of patient's icterus, which completely resolved by his discharge on the eighth postoperative day.

Discussion

Intrathoracic herniation of abdominal intraperitoneal fat, colon and small bowel has been described in the literature post-oesophagectomy.¹ To our knowledge, this is the first description of pancreas and common bile duct symptomatic late herniation post-oesophagectomy.

Post-oesophagectomy mediastinal herniation was considered a rather rare complication with associated morbidity, related mainly to trans-hiatal and minimally invasive approach. Evidence shows that the incidence of this complication is higher than it was previously appreciated, estimated as 10–15%.^{1,2}

Disruption of the anatomy and enlargement of the hiatus to facilitate oesophageal mobilisation and adequate diaphragmatic resection is a major predisposing factor for

Figure 1 Magnetic resonance cholangiopancreatography findings: biliary tree dilatation with abrupt transition into collapsed distal common bile duct.

Figure 2 Herniation of duodenum and pancreatic head into mediastinum.

herniation.⁵ Congenital maldevelopment of the pleuroperitoneal folds or improper migration of the diaphragmatic musculature may lead to posterolateral diaphragmatic deformities, including a Bochdalek hernia, and can predispose to herniation of retroperitoneal contents into the thorax. The conduit formation can put further tension on the duodenum, while the combination of increased

intra-abdominal and negative intrathoracic pressure during respiration further contributes to postoperative hiatal herniation.⁴ Many authors consider that minimal invasive oesophagectomy is related to a higher incidence of hiatal herniation as a result of decreased formation of adhesions, preventing anchoring of the abdominal organs intraperitoneally.^{3,5} Moreover, a pneumoperitoneum promotes hiatal dilatation, contributing to distortion of the hiatal anatomy.⁵ Interestingly, although increased intra-abdominal pressure has been identified as a significant factor for post-oesophagectomy mediastinal herniation, there are reports supporting that increased body mass index reduces the incidence of this complication. This may be explained by the increased volume of the organs in the upper abdomen, which obscure the oesophageal hiatus, in combination with the decreased motility of intra-abdominal organs.^{1,2}

Our patient had a locally advanced tumour requiring neoadjuvant chemotherapy. There is no evidence to support the increased incidence of hiatal herniation following the use of neoadjuvant chemotherapy or chemoradiotherapy. Mediastinal herniation in these patients is probably related to the extensive hiatal dissection required to achieve a R0 resection than to the neoadjuvant treatment.

Hiatal herniation can occur early or even years after oesophagectomy. Patients may present with a variety of symptoms, depending on the herniated organ, or may be asymptomatic and are identified on follow-up CT.^{1,5} It is worth noting that most studies did not use routine CT to identify post-oesophagectomy herniation, including mainly symptomatic patients.³ In a retrospective study where routine CT was reviewed for all patients, hiatal herniation was identified in only 16% of patients on routine follow-up. In this study, 8.5% (5/59) of patients who initially developed asymptomatic hernias gradually experienced enlargement of their hernias and became symptomatic, requiring surgical intervention.¹ This finding underlines the need for vigilance among radiologists, as the diagnosis of small asymptomatic hernias is often challenging.

Enlargement of the hiatus is recognised as a significant predisposing factor for post-oesophagectomy hiatal herniation.⁵ The importance of this anatomical weakness led some authors to suggest reapproximation of the hiatus and fixation of the conduit to the crus as a preventive measure.^{1,4,5} In our unit, we do not fix the conduit to the crus or to diaphragm, although we regularly perform reapproximation of the hiatus. Further studies with a larger number of patients are needed to investigate the importance of conduit fixation and its safety for the blood supply and tension of the conduit before this procedure is adopted systematically.

There is a wide agreement that hiatal hernia repair should be offered to all symptomatic patients fit for surgery who have a reasonable prognosis.^{1–5} The criteria to offer treatment in asymptomatic patients are less clear. Identifying the subpopulation of patients that will eventually experience enlargement of an asymptomatic hernia and develop potentially life-threatening complications is extremely difficult. In an attempt to prevent this, some authors have suggested that all asymptomatic patients

should be offered a hiatal hernia repair.^{3,5} In contrast to this approach, it has been suggested that asymptomatic patients should be treated conservatively unless they develop symptoms.² The recurrence rate has been a further concern.⁵ Other authors suggest a more selective approach, offering a repair to patients with large or progressively enlarging hernias taking under consideration that these hernias are more often presenting with symptoms.¹ Despite the differing views, there is a consensus that a decision to operate on a patient with an asymptomatic hernia should balance carefully the potential risks of a hernia in relation to the possible complications and the reduced life expectancy of this group of patients.^{1–5}

Conclusion

To our knowledge, this is the first reported case of biliary obstruction secondary to hiatal hernia following left thoracoabdominal oesophagectomy. The incidence of hiatal hernia post-oesophagectomy seems to be higher than was previously thought. The role of imaging in identifying this

underreported complication is substantial. Surgical management of symptomatic hernias is the standard treatment while criteria for managing asymptomatic hernias are less clear. Decisions regarding operating on asymptomatic patients should be personalised, considering carefully the potential risks of a hernia in relation to morbidity, long-term outcomes of the procedure and cancer prognosis.

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