Case report - Pulmonary

Hernia of the diaphragm with gastric ulcer and volvulus: an unusual complication after diaphragmatic resection by VATS

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Abstract

We present a 45-year-old female patient who developed diaphragmatic rupture and secondary hernia following a diaphragmatic resection for a diaphragmatic abnormality with spontaneous pneumothorax performed by endoscopic stapling in video-assisted thoracoscopic surgery (VATS). This complication can be avoided by careful direct repair of the diaphragmatic incision in addition to endoscopic stapling.

Keywords: Diaphragmatic hernia; Complication; Endoscopic stapling

1. Introduction

Diaphragmatic herniation is a rare complication of thoracic and abdominal surgery [1–3]. We describe herein a rare complication of diaphragmatic hernia that occurred in a woman after a diaphragmatic abnormality had been resected by endoscopic stapling in video-assisted thoracoscopic surgery (VATS) in spontaneous pneumothorax.

2. Case report

A 45-year-old woman was admitted to our hospital complaining of sudden chest pain and dyspnea coinciding with menses. Chest roentgenograms revealed bilateral pneumothorax, and a computed tomography scan of the chest additionally revealed some bullae at the bilateral lung apexes. VATS was performed with a diagnosis of bilateral spontaneous pneumothorax and a suspicion of the possibility of catamenial pneumothorax. At the right apex, two thumb-head-sized bullae were found and these were resected by VATS. Next, we operated on the left side by VATS, and a thumb-head-sized bulla was found on the adhesion at the left apex. The bulla was removed from the apex, when bleeding was found from the chest wall near the phrenic nerve and the bleeding vessel was clipped. A darkly-pigmented spot, ranging 1×0.5 cm, was found in the membranous part of the left hemidiaphragm, which was suspected to be ectopic endometriosis on the diaphragma. The darkly-pigmented spot was resected with a 2×1-cm area in the membranous part. All of these resections were performed by endoscopic stapling with an ETS-Flex45 Articulating Endoscopic Linear Cutter (Ethicon Endosurgery Inc., Cincinnati, OH, USA). Later, the resected diaphragm was diagnosed with mesothelial cyst of the diaphragm. Soon after the operation was finished, a chest film showed good re-expansion of both lungs and no specific abnormality, and the tracheal tube was removed.

Fourteen hours later she complained of severe epigastric pain and vomiting, and nasogastric tube was commenced. A chest film showed a massively dilated stomach in the left hemithorax, and it prompted a diagnosis of left diaphragmatic eventration caused by accidental damage of the left diaphragmatic nerve branch. Upper gastrointestinal endoscopy revealed a peptic ulcer in the fundus of the stomach. A barium swallow administered the following day revealed a slight trace of barium beyond the pylorus indicating gastric outlet obstruction. And the barium swallow radiograph...
showed an incarcerated barium-filled stomach in the chest, complicated by volvulus (Fig. 1). Magnetic resonance imaging (MRI) revealed that the diaphragm was ruptured and that the stomach was in the thorax (Fig. 2). At this time she was diagnosed with a diaphragmatic rupture and secondary hernia of the diaphragm, with gastric ulcer and volvulus.

On the 14th day after the first operation the patient underwent a second surgery. Performing thoracoscopy through the anterior VATS port proved difficult, and thus the VATS surgical ports were converted into a posterolateral thoracotomy. The herniated stomach wall had adhered to the diaphragm, the chest wall and the left lower lobe. The location site of the ulcer itself had adhered directly to the chest wall without penetration. Most of the staples placed in the diaphragm in the first operation had split along the suture line, and the diameter of the hernia was now about 5 cm. The diaphragm was closed with interrupted silk sutures. Postoperative recovery was uneventful, and she did not experience any pain or feeding disorder.

3. Discussion

Iatrogenic diaphragmatic hernia is a rare complication of thoracic and abdominal surgery [1–3]. To our knowledge there are no reports of diaphragmatic herniation occurring following endoscopic stapling by the VATS procedure. The patient had pneumothorax with menses and her diaphragm had darkly-pigmented spots and a possible catamenial pneumothorax was suspected, so we resected the pigmented spots in the membranous part of the left diaphragm. The incision and subsequent suturing of the diaphragm by endoscopic stapling may have later allowed the diaphragmatic laceration to pull the stomach into the thorax by abdominal pressure. Diaphragmatic hernias are especially prone to ulceration and may cause retention of gastric contents and ulcerogenic medications [4]. Moreover, diaphragmatic hernia ulcers may occur from pressure by strangulation of the diaphragmatic hernia against gastric blood vessels. Also, there is a report of diaphragmatic hernia complicated by gastric ulcer and volvulus [5]. A nasogastric tube and an X-ray of the chest of a lateral view may have shown the diagnosis of the diaphragmatic hernia, but we thought that the stomach was elevated with the evagination of the diaphragm and misdiagnosed that the dilated stomach was present under the diaphragm. For a long time after the first operation we misdiagnosed the evagination of the diaphragm, which led to a delay in this patient’s referral as well as that of the patient in the previous report [3]. On the basis of a standard chest X-ray and barium swallowing examination, the diagnosis of diaphragmatic hernia with intrathoracic gastric volvulus could be made. MRI showed the diaphragmatic

![Fig. 1. Barium swallow revealing an intrathoracic stomach complicated by a volvulus and gastric outlet obstruction.](image1)

![Fig. 2. Lateral view of magnetic resonance imaging, revealing a rupture of the diaphragm and intrathoracic stomach (arrow shows a rupture of the diaphragm).](image2)
abnormality, and the relation between the stomach and the diaphragm. MRI also contributed the exact diagnosis of diaphragmatic hernia. Considering this, we cannot overemphasize the importance of an MRI examination in checking the diaphragmatic abnormality following diaphragmatic surgery. Moreover, careful thought should always be given to potential complications following a diaphragmatic incision with endoscopic stapling in VATS. Or, if we are unable to safely resect the diaphragm by endoscopic stapling in VATS, and if we resect the diaphragm by VATS, diaphragmatic herniation can be avoided by carefully repairing the diaphragm directly in addition to the endoscopic stapling. It is important to use a strong absorbable or non-absorbable suture material for the repair of the diaphragm.

References