

A late visceral hernia after diaphragmatic flap coverage of the bronchial stump

Kemal Ayalp¹, Erkan Kaba², Özkan Demirhan², Mehmet Oğuzhan Özyurtkan², Alper Toker²

¹Department of General Surgery, Istanbul Group Florence Nightingale Hospital, Istanbul, Turkey; ²Department of Thoracic Surgery, Istanbul Bilim University and Group Florence Nightingale Hospital, Istanbul, Turkey

Correspondence to: Kemal Ayalp, MD. Department of General Surgery, Istanbul Florence Nightingale Hospital, Abide-i Hürriyet Cad. No: 166, Şişli-Istanbul, Istanbul, Turkey. Email: kemalayalp@yahoo.com.

Abstract: A 54-year-old man presented with sudden and severe abdominal pain, and vomiting. He had undergone a right pneumonectomy with bronchial stump reinforcement using diaphragmatic muscle flap 9 years ago, due to non-small cell lung cancer after neoadjuvant chemotherapy. A right partial visceral herniation had been detected 5 years ago during the follow-up which was not present at previous visits. He had refused any surgical intervention since he had been asymptomatic. The chest computed tomography demonstrated visceral herniation. The patient underwent an urgent operation via thoracoabdominal incision to repair the herniation. This type of late catastrophic complication of diaphragmatic muscle flap reinforcement is extremely rare.

Keywords: Diaphragmatic hernia; emergency management; outcomes; pneumonectomy

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Background

The bronchial stump support has been recommended to reduce the risk of a bronchopleural fistula in patients undergoing pneumonectomy, especially in those with neoadjuvant treatment (1). For this purpose, the bronchial stump is usually covered by tissue flaps, such as pericardium, pleura, omentum, and muscle flaps including intercostal, latissimus dorsi, serratus anterior, and diaphragm muscles (2,3). Therefore, the use of the diaphragmatic muscle flaps has not been popular in thoracic surgery, and several visceral herniations in the early follow-up period have been reported (4). Here in this report, we presented a patient with visceral herniation, detected 5 years after a pneumonectomy for non-small cell lung cancer operation with a diaphragmatic muscle flap support on the bronchial stump. He underwent an emergency thoraco-laparotomy 9 years after the first surgery due to acute abdomen symptoms. To our knowledge, this is the first reported case with visceral herniation in the late period undergoing repair.

Case report

A 54-year-old man presented to the thoracic surgery clinic complaining with sudden and severe abdominal pain, accompanied by right chest pain, vomiting, and nausea. He had undergone a right pneumonectomy due to non-small cell lung cancer (squamous cell carcinoma) after a neoadjuvant chemotherapy, 9 years ago in our clinic (*Figure 1*). A diaphragmatic muscle pedicle flap had been used to reinforce the bronchial stump following pneumonectomy. A chest roentgenogram showed a total opacity in the right hemithorax. The computed tomography of the chest demonstrated abdominal visceral organ herniation into the right side of the thorax (*Figure 2*). Although a small visceral organ herniation had already been detected 5 years after pneumonectomy during a follow-up consultation which was not present in the previous visits, and the patient had been offered to undergo repair, he had refused any surgical intervention since he had been asymptomatic. Then, he was lost to follow-up. The patient had no history of an abdominal

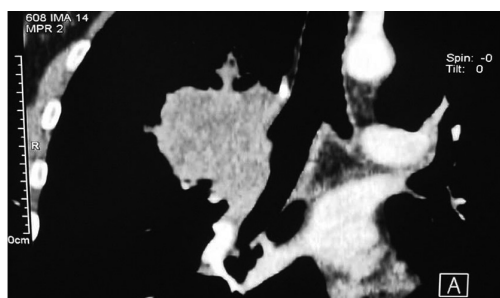


Figure 1 The chest computed tomography before pneumonectomy operation, demonstrating a central tumoral mass lesion.

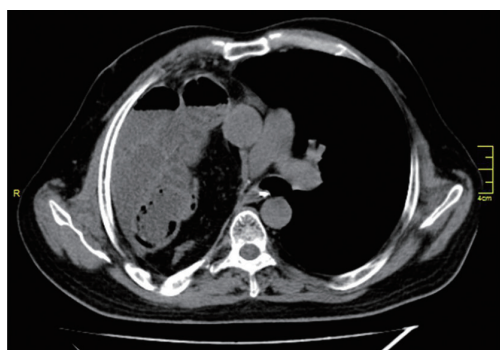


Figure 2 Preoperative computed tomography of the chest demonstrating abdominal visceral organ herniation into the right hemithorax.

or chest trauma, or any disease after the pneumonectomy operation.

The patient was operated on through a right thoracoabdominal incision at the supine position. The right hemithorax was filled with transverse colon, small bowel, and omentum through a diaphragmatic defect. Some parts of the small bowel were aperistaltic, and showing signs of ischemia, but after warm compressing these parts of the bowel became normal, and thus there was no need for an intestinal resection. Following the reduction of the visceral organs into the abdomen, the diaphragmatic defect was repaired using a mesh.

The patient had an uneventful recovery. The chest drain was removed 3 days after the surgery. The patient was started on a clear liquid diet on the first postoperative day. Diet was advanced to puree on postoperative day 3, to soft meals on day 4, and regular diet was administered on day 5. The patient was discharged on the postoperative day 10, and was alive and without problem 18 months after the operation. A chest computed tomography taken on the

first year follow-up demonstrated no recurrence.

Discussion

Diaphragmatic muscle flaps have been used for reconstructive procedures in the esophagus and tracheobronchial tree for more than 40 years (5,6). Since the diaphragmatic muscle is strong, elastic, well vascularized, and resistant to necrosis, with good regeneration capacity, Westaby *et al.* (7) proposed its use as an ideal material for reconstruction within the chest. Mineo and Ambroggi (3) presented their technique in four patients, and concluded that diaphragmatic muscle flap was helpful in closing postoperative bronchopleural fistulas. The abovementioned data favored the use of diaphragmatic muscle flaps (3,5-7). Despite these favorable data, the “best evidence topic” study of Llewellyn-Bennett *et al.* (1) demonstrated that the use of diaphragmatic muscle flaps for reconstructive procedures in thoracic surgery did not become popular, and the surgeons mostly preferred tissue flaps or muscle flaps other than the diaphragm. The reason for that is not given in details, but may be simply due to surgeon’s preference or due to the trend toward a lower morbidity compared to intercostal muscle flaps, as reported by Lardinois *et al.* (4).

Mineo and Ambroggi (8) reported some complications including arrhythmia, respiratory insufficiency, and empyema after diaphragmatic muscle flap use in 25 patients. They did not report any visceral herniation for 11 patients who survived more than 1 year. Lardinois *et al.* (4) compared the intercostal muscle flaps with diaphragmatic muscle flaps for the bronchial stump reinforcement in cases undergoing pneumonectomy. In their study, they preferred diaphragmatic muscle flaps in 13 patients, and reported three (23%) visceral herniations in the early phase of their experience. Besides these two abovementioned studies, there exist no reports concerning the outcome (early and/or late) of diaphragmatic muscle flaps in the bronchial stump coverage.

Our patient developed visceral herniation 5 years after the pneumonectomy operation. He was advised to undergo surgery for repair when the small herniation was detected, but he denied the proposal since he had been asymptomatic. Later on, he admitted with signs and symptoms of acute abdomen 9 years after surgery, and underwent an urgent diaphragmatic repair with an uneventful recovery. To our knowledge, this is the first reported case about the late development of a visceral herniation after diaphragmatic muscle flap usage.

Conclusions

The use of the diaphragmatic muscle flaps has not been popular in thoracic surgery. The rate of early visceral herniations following diaphragmatic muscle flaps is not low. Although not reported before, one should keep in mind that even years after the procedure, it is possible to face with a late visceral herniation.

Acknowledgements

None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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