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Tension Chylothorax

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Thoracic duct injury resulting in chylothorax is a well-known and documented complication of thoracic surgery. However, chylothorax under tension is a rarely reported complication that results in respiratory and hemodynamic collapse. Early recognition and treatment of this entity are essential for optimal patient outcome. Herein we present two cases of postoperative tension chylothorax followed by a review of the diagnostic work-up and therapy for this complication.

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The incidence of chylothorax after a pneumonectomy is 0.5% to 0.7%, and after a transhiatal esophagectomy the incidence is 2% to 4% [1, 2]. Postoperative chylothorax under tension causing respiratory and hemodynamic collapse is exceedingly rare with few such reports in the literature [3, 4]. Two cases of tension chylothorax, one following a pneumonectomy and another following a transhiatal esophagectomy are presented.

Case Reports

Patient 1

A 70-year-old man underwent a right pneumonectomy and mediastinal lymph node dissection for a T2N1M0 (stage IIB) bronchogenic squamous cell lung carcinoma at another hospital. He recovered well and was discharged home. Fourteen days postoperatively he presented with drainage from his incision. Thoracentesis revealed a milky effusion characteristic of chylothorax. The patient was transferred our institution. Nonoperative treatment was initially successful. However, on postoperative day 22 he sustained a bradycardic respiratory arrest. A chest roentgenogram demonstrated complete filling of the right hemithorax with a tracheal shift to the

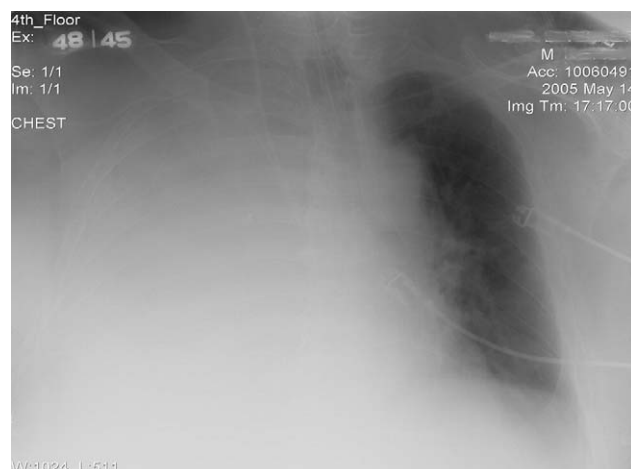


Fig 1. A chest roentgenogram demonstrating complete filling of the right hemithorax with a tracheal shift to the left.

left (Fig 1). Right tube thoracostomy evacuated 7 L of chyle under pressure. Chest tube drainage of 3 L to 4 L daily continued for 2 days. A nasogastric tube was placed, and cream was administered at 90 cc per hour. He was returned to the operating room where the thoracic duct injury was identified, and mass ligation of the thoracic duct was performed at the level of the diaphragm. The chyle leak did not recur. The patient was ultimately discharged to a rehabilitation facility.

Patient 2

A 74-year-old woman underwent a transhiatal esophagectomy and cervical esophagogastric anastomosis for an esophageal perforation complicating an esophagoscopy and dilation of a mid-esophageal stricture. Pathologic analysis revealed T3N0 (stage IIA) squamous cell carcinoma. Eleven days postoperatively she had hemodynamic and respiratory instability. A chest roentgenogram revealed a large right pleural effusion. A right tube thoracostomy evacuated 3.5 L of chyle. The chest tube continued to drain 2 L daily for 2 days. Through a nasogastric tube, cream was administered at 90 cc per hour. She was returned to the operating room where the thoracic duct injury was identified 5 cm superior to the diaphragm. Mass ligation of the thoracic duct at the level of the diaphragm was performed. The chyle leak did not recur. The patient was discharged home 25 days after her esophagectomy.

Comment

Chylothorax complicating a pneumonectomy is typically recognized by an unusually quick filling of the pneumonectomy space in the early postoperative period. Usually 50% to 60% of the pneumonectomy space is filled within 2 weeks of surgery, and 80% to 90% is filled after 6 weeks [3]. Rapid accumulation of fluid under high pressure may lead to hemodynamic and respiratory compromise. Chylothorax after a pneumonectomy is less well tolerated

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than after a lobectomy. After a lobectomy the remaining lung frequently adheres to the chest wall and mediastinum thus sealing the fistula. In a series of 1,800 pneumonectomies, chylothorax occurred in 9 patients (0.5%), and 4 of these 9 (44%) suffered major hemodynamic and respiratory embarrassment [3]. As in patient 1, these 4 patients all had chest roentgenograms demonstrating mediastinal shift away from the pneumonectomy side. Likewise, another series reported one tension chylothorax case among eight postpneumonectomy chylothorax cases [4].

In our institutional experience with 1,960 transhiatal esophagectomies since 1977, postoperative chylothorax occurred in 29 patients (1.48%), 6 of 470 patients (1.28%) had benign disease, and 23 of 1,490 patients (1.54%) had carcinoma. Development of tension chylothorax occurred in 3 of 29 patients (10.34%) with chylothorax, all 3 occurring in the 23 patients (13%) with carcinoma.

The diagnosis of chylothorax may be difficult in the postoperative patient who has not begun eating and may be draining serous-appearing fluid from the chest tube. Excessive chest tube drainage (ie, 400 to 600 cc per 8-hour period) 72 hours after operation should raise suspicion of a possible thoracic duct injury. In a patient eating a normal diet, chyle is milky in appearance, odorless, bacteriostatic, and layers on standing. If the fluid appearance is serosanguinous in a fasting patient, but the clinical suspicion is high, cream can be administered through a nasogastric tube to enhance chyle production and drainage. A change in the character of the fluid is virtually diagnostic. Pleural fluid cholesterol/triglyceride ratio of less than 1 and triglyceride level of greater than 110 mg/dL are characteristic of chylothorax. If doubt persists, lipoprotein analysis demonstrating chylomicrons confirms the diagnosis. Tension chylothorax is typically suspected in a patient with hemodynamic and respiratory compromise coupled with physical findings and imaging consistent with a pleural effusion. Emergent tube thoracostomy is mandatory to relieve tension and improve venous return. The diagnosis can then be verified.

Many authors advocate nonoperative therapy with cessation of oral intake for chylothorax complicating a pulmonary resection for lung cancer [4–6]. Nutrition is maintained parenterally or with a low-fat diet provided by medium-chain triglycerides. Some authors recommend thoracic duct ligation in adults when chylous drainage persists at least 5 days at a rate of 1,500 mL or more per day, when drainage does not decrease for 2 weeks, or when the patient's nutritional status becomes measurably impaired in this period [6]. Other reported strategies include talc pleurodesis, pleuroperitoneal shunting, and percutaneous catheterization with thoracic duct embolization.

When postpneumonectomy tension chylothorax has been diagnosed, there is no role for nonoperative management after the initial decompression. Likewise, most patients with rapid filling of the pneumonectomy space

and mediastinal shift on chest roentgenogram require operation [3]. All such reported patients in the literature have required thoracic duct ligation, and many were performed after failed conservative management.

We and others have long advocated an early aggressive surgical approach to chylothorax complicating a transhiatal esophagectomy [2, 7]. Chylothorax results in substantial fluid shifts, continued loss of serum albumin and protein, and significant decreases in peripheral lymphocytes. The resulting altered immune response is not well tolerated in this patient population.

Transthoracic ligation of the thoracic duct is performed through a limited fifth-interspace thoracotomy or video-assisted thoracoscopic surgery. Importantly, cream is administered by enteric means for 4 to 6 hours at a rate of 60 to 90 mL/hr so that there is an active flow of chyle into the chest at the time of operation. The duct and adjacent soft tissues between the aorta and azygous vein are encircled and ligated above and below the leak. A single chest tube is left to drain the hemithorax.

Before Lampson's report in 1948 describing thoracic duct ligation, mortality rates for postoperative chylothorax approached 50% [8]. With the surgical approach previously described, the operative mortality for thoracic duct ligation should be negligible. Thus we believe that the decision to surgically control a thoracic duct injury should be made promptly. Our policy has been to perform thoracic duct ligation within 3 to 5 days of diagnosis if chest tube drainage exceeds 200 to 400 mL per 8-hour shift for two consecutive shifts.

Tension chylothorax is exceedingly rare after thoracic surgery. Initial immediate decompression to relieve hemodynamic and respiratory compromise is lifesaving. This should be followed soon afterward by an accurate diagnosis and prompt surgical treatment with ligation of the injured thoracic duct.

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