

## Unusual presentation of more common disease/injury

## Unusual cause of shortness of breath after surgery for thoracic outlet syndrome

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**Summary**

A 31-year-old postal worker was diagnosed with bilateral thoracic outlet syndrome and scheduled for the first of two surgeries. The first procedure involved removal of the right first cervical rib, anterior and middle scalenes. On postoperative day 4, he developed shortness of breath. Chest radiograph showed a new pleural effusion on the right. Thoracentesis revealed a yellowish-red thick effusion. Based on the initial look of the fluid it was thought to be a haemorrhagic effusion with a purulent component, further testing revealed that he had developed a chylothorax. The patient was placed on a medium-chain triglyceride diet followed by chest tube drainage. After one day, the chest tube was removed due to minimal drainage, and he was discharged home the next day. Keeping this patient without food, on total parental nutrition, or pursuing surgical intervention was not necessary, as he had an excellent outcome from a very rare surgical complication.

**BACKGROUND**

Overall this presentation for chylothorax is quite rare. To our knowledge, only one other case of chylothorax after surgery for thoracic outlet syndrome has been reported in the literature. Surgery is the most common cause of chylothorax and the literature surrounding the treatment of chylothorax secondary to trauma usually suggests a more aggressive approach. This case highlights that in otherwise healthy patients conservative management can also be efficacious.

**CASE PRESENTATION**

A 31-year-old male postal worker developed bilateral numbness and tingling in his upper extremities. He was subsequently diagnosed with thoracic outlet syndrome and referred for surgical intervention. He was admitted to the hospital for removal of right-sided first cervical rib along with anterior and middle scalene muscles. The patient tolerated the surgery well and there were no complications during the procedure.

He was kept for 4 days in the hospital for postoperative pain management. On the morning of the fourth day, the patient developed shortness of breath along with oxygen saturation of 86%, which was corrected with 2 litres of oxygen via nasal cannula. The patient denied any history of smoking, cough, fever or orthopnoea.

Physical examination showed that the patient was afebrile, haemodynamically stable, in no acute distress. At the time of examination he was now maintaining oxygen saturation on room air while resting. Chest examination revealed that breath sounds were absent on the right base, cardiac examination revealed no murmurs, rubs or gallops. The surgical site appeared clean, dry and intact. Extremities did not show any cyanosis or peripheral oedema. The rest of his examination was unremarkable.

Laboratory tests revealed a normal complete blood count and basic metabolic panel.

**INVESTIGATIONS**

Chest radiography showed a new large right-sided pleural effusion (figure 1). Thoracentesis was preformed and 1.5 litres of yellowish-red thick fluid was removed (figure 2). The chest CT scan after the thoracentesis revealed trace amounts of pleural effusion and expansion of the lungs, lung architecture was unremarkable. Initial pH of the pleural fluid was 7.7. Full analysis of our patient's pleural fluid showed triglycerides of 1159 (normal <110 mg/dl)



**Figure 1** Chest radiograph obtained after the shortness of breath developed.



**Figure 2** Pleural fluid obtained during thoracentesis.

and cholesterol well within normal limits. The tubes containing the pleural fluid were kept overnight in the lab and examined the next day (figure 3). At this point the diagnosis of chylothorax was confirmed.



**Figure 3** Pleural fluid after 24 h of standing in the lab.

## DIFFERENTIAL DIAGNOSIS TREATMENT

Thoracentesis of the pleural effusion revealed a yellowish-red thick fluid that did not have a foul smell. We thought initially that this was a haemorrhagic effusion with a purulent component. Although afebrile and with no elevation in his white cell count, we started him on broad-spectrum antibiotics. After the diagnosis of chylothorax was obtained, he was started on a low-fat medium-chain triglyceride diet and continued to be monitored. A repeat chest x-ray 2 days after the thoracentesis showed recurrence of the pleural effusion and the decision was made to place a chest tube. This immediately resulted in 400 cc of pleural fluid drainage, and over the next 12 h he produced 100 cc of chyle. The next day the chest tube was removed due to minimal secretions. He continued to improve clinically and was discharged home shortly thereafter.

## OUTCOME AND FOLLOW-UP

The patient was discharged the day after the removal of the chest tube. He was followed up in the clinic and showed no further complications. A few months later, he underwent an identical surgery on the left side with no complications.

## DISCUSSION

Chyle is defined as lymphatic fluid of intestinal origin and consists of triglycerides, lymphocytes, immunoglobulins and all of the fat-soluble vitamins absorbed from the intestines. Chylothorax occurs when there is disruption of the thoracic duct and chyle accumulates in the pleural space. The most common cause is trauma from surgery. With that said, chylothorax is an exceedingly rare complication of thoracic surgery, occurring in less than 1% of thoracic procedures with an overall prevalence of 0.5–2%.<sup>1 2</sup>

Right-sided chylothorax after surgery for thoracic outlet syndrome is an extremely rare occurrence. There has been one other case reported in the literature with this presentation.<sup>3</sup> Overall for chylothoraces the right side is the most common side<sup>4</sup> and iatrogenic trauma is the most common cause.<sup>5 6</sup> Arising from the cisterna chyli, the thoracic duct continues into the thorax on the right side of the descending thoracic aorta immediately anterior to the vertebral column. At the level of the third to sixth thoracic vertebrae, it crosses over to the left side and eventually terminates at the junction of the left subclavian and internal jugular veins. Lymphatic fluid from the right side of the head and neck, right upper extremity, right lung, right side of the heart and convex surface of the liver drain into the right lymphatic duct, which, in turn, drains into the junction of the right subclavian and right internal jugular veins. However, as the lymphatic drainage from the right lymphatic duct does not merge with lymphatic drainage from the intestines it should not contain chyle.<sup>5</sup> Aetiology in both of these cases is a possible anatomical variant of the lymphatic duct that sustained trauma during the surgery.

Treatment strategy is tailored to individual patient's overall clinical picture. For example, in cancer patients chylothorax bodes a very poor prognosis, and aggressive treatment with ligation of the thoracic duct may be the best strategy.<sup>7</sup> This poor prognosis is due to the further immune suppression and malnutrition that accompanies a chylothorax.

In otherwise healthy patients, conservative management is most likely the best course of action.<sup>8</sup> This can be accomplished by a dietary modification, drainage via thoracentesis or chest tube and the addition of octreotide or somatostatin. Dietary modification is made by placing the patient on low-fat medium-chain triglyceride diet or total parental nutrition with nothing by mouth, with the aim of decreasing the production of chyle. Medium-chain triglycerides bypass lymphatic circulation and enter the portal system directly.<sup>9</sup> This reduces the amount of chyle that could be pushed into the pleural space. We chose to monitor the output of the chest tube. If it continued to be high for more than 4–5 days, then we would have pursued a more aggressive approach with ligation of the thoracic duct. There have been limited reports of adult subjects where octreotide or a somatostatin analogue has been utilised.<sup>10–11</sup> As octreotide decreases gastrointestinal secretory enzymes, it would decrease the absorption of the proteins and fats that would become chyle. Alternative approaches in those who are not surgical candidates, or in those who have failed surgical intervention (thoracic duct ligation), would consist of performing a lymphangiogram followed by embolisation of thoracic duct by interventional radiology. There have been articles reviewing the efficacy of interventional techniques and they appear to have very good outcomes.<sup>12–13</sup> However, this approach is limited by lack of accessible retroperitoneal lymphatic ducts suitable for catheterisation due to previous surgeries or trauma.

In summary, chylothorax after surgery is a rare occurrence, in most patients a conservative approach involving thoracentesis and dietary adjustment is effective.

### Learning points

- ▶ When thick yellowish pleural fluid with high pH is obtained chylothorax should be considered.
- ▶ In healthy patients, conservative management with drainage and change in diet is most likely the best option.
- ▶ In patients with more complicated comorbidities (ie, malignancy) more aggressive treatment with ligation or embolisation of the thoracic duct can be pursued earlier.

**Competing interests** None.

**Patient consent** Obtained.

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