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# Transudative Chylothorax in a Cirrhotic Patient without Concomitant Chylous Ascites

**Maria Borg Xuereb, Joanna D'Amato, Karl Sapiano, Brendan Caruana Montaldo**

Department of Respiratory Medicine, Mater Dei Hospital, Msida, Malta
Email: maria.d.xuereb@gov.mt

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## Abstract

Chylothorax is a condition characterized by the accumulation of chyle in the pleural space, diagnosed when pleural fluid shows triglyceride levels greater than 1.24 mmol/L and the presence of chylomicrons, giving it a milky white appearance. It can be subdivided into exudative or transudative, the latter of which is an infrequent manifestation and in current literature has only been cited in case reports. Here, we present the case of a 79-year-old male with a history of alcoholic liver cirrhosis, type 2 diabetes mellitus, chronic kidney disease stage 3a and hypertension who presented with a right-sided pleural effusion and minimal abdominal ascites. A thoracentesis and abdominal paracentesis were performed, and fluid analyses demonstrated a transudative chylothorax with concomitant non-chylous ascites. In this review, we aim to highlight the rarity of this condition and discuss the pathogenesis and management.

## Keywords

Chylothorax, Ascites, Thoracentesis, Indwelling Pleural Catheter

## 1. Introduction

A chylothorax can be defined as the presence of chyle in the pleural space. This can be due to traumatic & non-traumatic causes. Traumatic chylothoraces occur most commonly secondary to the disruption or obstruction of the thoracic duct via surgery. Non-traumatic chylothoraces can result from a neoplastic process, lymphoma being the most common, from infections such as tuberculosis, or can be idiopathic or congenital [1]-[4]. Most chylothoraces are usually exudative; in our case, pleural fluid analysis demonstrated a transudative effusion. This is frequently associated with heart failure, liver cirrhosis and nephrotic syndrome. In this report, we highlight the case of a 79-year-old man with a history of liver cirrhosis with por-

tal hypertension in the presence of minimal non-chylous ascites who was managed successfully with an IPC insertion with consecutive talc pleurodesis.

## 2. Case Report

A 79-year-old man with a background of liver cirrhosis secondary to chronic alcohol consumption, type 2 diabetes mellitus managed with oral hypoglycaemic agents, chronic kidney disease and hypertension was referred to the Emergency Department following the incidental finding of a large right-sided pleural effusion on a community chest radiograph. On further questioning, it was also noted that he had a 2-month history of significant weight loss and thus was admitted for further investigation.

Thoracic ultrasound confirmed a large anechoic pleural effusion, measuring approximately four rib spaces. Thoracentesis was performed which yielded white, chylous-appearing pleural fluid, as per Figure 1. This was analysed for pH, cytology, microscopy and culture, biochemical profile, differential cell count, and lipids. Results demonstrated a transudative chylothorax, as summarised in Table 1. The transudative nature was indicated by low total protein (24 g/L), and a pleural-to-serum protein ratio of 0.34 (<0.5) consistent with Light's criteria.

The diagnosis of chylothorax was based on the milky appearance of the fluid, the elevated triglycerides (3.45 mmol/L; normal <1.24 mmol/L) and the low cholesterol level (0.89 mmol/L), in keeping with a chylous effusion. Chylomicrons, which may also be present in transudative chylothorax, were not assessed in this case.

Infective causes were excluded with a negative MC&S and a pH of 7.407. Additionally, a serum NT-proBNP level of 147 pg/mL made a cardiogenic cause unlikely. Malignancy, tuberculosis, and traumatic thoracic duct injury were considered less likely based on CT imaging (Figure 2), lymphangiography/scintigraphy findings, and the absence of recent trauma or surgery, as will be described later on.

**Figure 1.** Chylous fluid being drained into a Woulfe bottle.

**Table 1.** Pleural & ascitic fluid analysis.

| Characteristic | Fluid Type | | |
|---|---|---|---|
| | Right sided Pleural Effusion | Ascitic Fluid | Serum |
| Appearance | Milky White Fluid | Serous Fluid | N/A |
| pH | 7.407 | 7.390 | 7.360 |
| Total Protein | 24 g/L | 4.0 g/L | 70.8 g/L |
| Glucose | 6.0 mmol/L | N/A | 6.28 mmol/L |
| Triglyceride | 4.33 mmol/L | 1.0 mmol/L | 0.88 mmol/L |
| Cholesterol | 0.89 mmol/L | 0.90 mmol/L | 3.57 mmol/L |
| Cytology | No malignant cells seen | No malignant cells seen | |

During admission, he developed increasing dyspnoea with progressive enlargement of the effusion, necessitating insertion of a 12-Fr chest drain using the Seldinger technique. Over six days, approximately 5 litres of fluid were drained, achieving radiological resolution. The patient was discharged with a planned follow up CT Thorax (Figure 2), reported as having a recurrence of the right sided pleural effusion with compressive atelectasis of the right lower lung lobe, chronic partial thrombosis of the main portal vein, splenomegaly and minimal ascites.

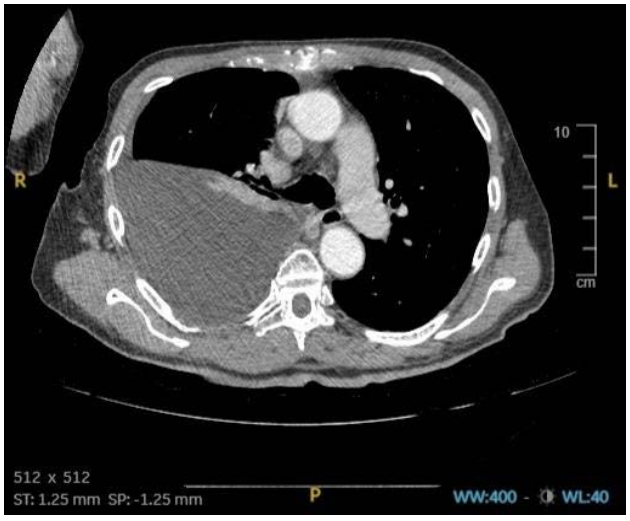


**Figure 2.** CT Thorax showing a right-sided pleural effusion.

He re-presented 3 days after the CT, before scan results were available, with worsening dyspnoea accompanied by increasing abdominal distension. Multidisciplinary review with gastroenterology input was undertaken. Abdominal ultrasound revealed very small-volume ascites in pockets, not initially amenable to paracentesis. This was successfully done later on and found to be non-chylous in nature with a confirmed low triglyceride level of 1.0 mmol/l. A lymphangiogram followed by lymphoscintigraphy was also performed to identify a potential chyle

leak; however, no evidence of lymphatic extravasation was demonstrated.

A second 12-Fr chest drain was inserted but failed to achieve dryness after one week, with ongoing drainage of at least 1 litre daily. The drain was subsequently dislodged, requiring reinsertion. Conservative measures were optimised, including dietary modification with a low-fat, medium-chain triglyceride–enriched, high-protein diet. Octreotide was initiated and escalated to maximum dosing of 500 micrograms three times daily. These measures were maintained for 2 months with no significant reduction in pleural fluid output. Transjugular intrahepatic portosystemic shunt (TIPSS) was considered by the gastroenterology team to facilitate resolution; however, it was deemed to carry an unacceptably high risk in view of the patient's comorbidities and the elevated likelihood of post-procedural hepatic encephalopathy.

Given the persistent high-output chylothorax and repeated need for chest drainage, an indwelling pleural catheter (IPC) was inserted to facilitate regular bi-weekly drainage. Talc pleurodesis was successfully performed two and a half months after IPC insertion, resulting in sustained resolution of the effusion. The indwelling pleural catheter was removed four weeks later following repeated radiological confirmation of no reaccumulation.

## 3. Discussion

This particular case demonstrates that a chylothorax may be transudative, can occur secondary to liver cirrhosis without concomitant chylous ascites, and may be successfully treated with intrapleural catheter insertion with consecutive talc pleurodesis [5].

Chylothorax refers to chyle accumulation in the pleural space. The main function of chyle is the transport of fat and fat-soluble vitamins into the venous circulation after digestion. It is composed mainly of chylomicrons which are produced by the coalescence of long chain triglycerides, from dietary sources, with cholesterol and phospholipids. These are then taken up via lacteals in the small intestinal wall into the thoracic duct. Other constituents include immunoglobulins and lymphocytes obtained from the liver and GI tract [1].

While most chylothoraces are exudative, transudative variants are rare and have primarily been reported in association with systemic conditions such as cirrhosis, nephrotic syndrome, lymphangioleiomyomatosis, and heart failure [2] [6]-[14]. In our case, we note an association between our patient's end stage liver cirrhosis and chylothorax, without concomitant chylous ascites.

Reference [6] reports a similar case of chylothorax occurring in the absence of concomitant ascites. To our knowledge, no cases have been reported describing chylothorax associated with minimal non-chylous ascites. Several mechanisms have been proposed to explain the development of chylothorax. The most widely accepted involves increased pressure within the splanchnic circulation in cirrhotic patients, leading to disruption of lymphatic channels and leakage of lymph into the peritoneal cavity. This fluid may then pass across the diaphragm into the pleu-

ral space.

In cases where chylous ascites is absent, an alternative explanation may involve a dynamic balance between the production and drainage of ascitic fluid, with preferential flow into the lower-pressure pleural space [7]. In our patient, the presence of non-chylous ascites suggests that intermittent elevations in portal pressure may have contributed to direct leakage of chyle from the thoracic duct into pleural space, resulting in chylothorax formation [5].

Our patient was treated both conservatively, pharmacologically and interventionally. Conservative management mainly revolved around dietary modification, changing to a high-protein, low-fat diet with medium chain triglyceride. A number of pharmacological agents are available, such as Octreotide, somatostatin, midodrine and sirolimus, all of which have been shown to aid in chyle formation reduction. In our patient neither dietary nor pharmacological measures were successful in achieving resolution. TIPSS was also considered however was deemed too high risk despite favourable outcomes in reported case reports [11]. An IPC which was kept for 2.5 months with consecutive talc slurry insertion finally achieved successful pleurodesis. As shown by DePew et al, the use of IPC should be considered early in the case of persistent benign chylothorax and has been shown to be an effective and safe option [5]. However, in view of loss of chyle this requires regular patient monitoring aimed at preventing significant nutritional or immunological compromise.

## 4. Conclusion

Transudative chylothorax is an uncommon but important complication of advanced liver cirrhosis and may occur even in the absence of chylous ascites. This case highlights the importance of considering chylothorax in the differential diagnosis of pleural effusions in cirrhotic patients, regardless of fluid characteristics. Management can be challenging, particularly in patients unsuitable for TIPSS, and may require a combination of conservative, pharmacological, and interventional strategies. Early consideration of an indwelling pleural catheter with pleurodesis may provide an effective and safe treatment option in refractory cases.

## Learning Points

1) Transudative chylothorax is a rare but important differential in cirrhotic patients with pleural effusion.

2) Chylothorax may occur without concomitant chylous ascites, and its absence does not exclude a hepatic origin.

3) Pleural fluid triglycerides and chylomicron analysis are essential for diagnosis.

4) Management is multimodal, and refractory cases may not respond to conservative or pharmacological therapy alone.

5) Indwelling pleural catheter with pleurodesis is an effective option when definitive treatments such as TIPSS are contraindicated.

## Ethics Statement

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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