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Use of Octreotide in association with talc poudrage for the management of a severe chylothorax: A case report

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ABSTRACT

INTRODUCTION AND IMPORTANCE: Chylothorax is an uncommon form of pleural effusion characterized by the presence of chylomicrons, triglycerides and cholesterol in the physical and chemical examination of the pleural fluid. It may have poor prognosis if not properly treated. Currently, conservative measures are the first line of treatment for managing chylothorax. The aim of our study is to show and suggest the use of octreotide in association with talc poudrage as good option to manage post-operative a severe chylothorax.

CASE PRESENTATION: A 59-year-old male patient who underwent a replacement of the ascending aorta, aortic hemiarch and surgery of the aortic valve for aortic dissection showed a severe pleural effusion three months after surgery. Because the physical and chemical examination of the pleural fluid revealed high levels of triglycerides and cholesterol, a conservative treatment with pleural drainage, TPN and *nilhil per os* was attempted, with the introduction of 0.3 mg/die of octreotide on day thirty-four. With the application of talc poudrage, the chylothorax completely resolved.

CLINICAL DISCUSSION: Octreotide has been shown to significantly decrease chylous effusion in many studies, but the dose and duration of therapy have not yet been defined. Our patient responded partially to octreotide after two days of treatment, with the drainage leak reduced to less than 100 mL/day.

CONCLUSION: After octreotide treatment associated with talc poudrage, the drainage leak was drastically reduced, suggesting that this could be a useful approach in the management of severe chylous leaks.

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1. Introduction

Chylothorax is a rare form of pleural effusion characterized by the accumulation of chyle in the pleural cavity due to the obstruction or disruption of lymphatic vessels, in particular the thoracic duct or its main tributaries [1–4]. Bartolet described it for the first time in 1633 [2]. It has poor prognosis if not treated appropriately, with mortality rates of up to 75% [3–6].

The thoracic duct transports about 70% of ingested fat to the blood stream. Chyle fat concentration is about 0.4–0.6 g/dl, and it contains proteins, white blood cells, coagulation factors, electrolytes and water [4].

Low-volume chylothorax is often silent, whereas a high-volume or rapidly occurring chylous effusion is characterized by cough, dyspnea and chest pain [3].

The standard criterion for diagnosing chylous effusion is the presence of chylomicrons in the lipoprotein electrophoresis of the pleural fluid [1,2]. Originally, in clinical practice the diagnosis of chylothorax was based on a milky appearance of pleural fluid, although this characteristic frequently could not be observed – for example because of malnutrition [2].

Today we use simpler diagnostic criteria based on levels of pleural triglycerides greater than 110 mg/dl, a ratio of pleural fluid cholesterol to pleural fluid triglycerides lower than 1.0 and a ratio of pleural fluid triglycerides to serum triglycerides greater than 1.0 [1,2,4]. Moreover, triglyceride levels lower than 50 mg/dl may rule out a diagnosis of chylothorax (with a 5% chance of error) [2–4]. In chylothorax, cholesterol level is lower than 200 mg/dl; in pseudochylothorax, cholesterol is greater than 200 mg/dl and triglycerides are less than 110 mg/dl.

Chylothorax can have traumatic, non-traumatic or idiopathic causes [1–3]. Traumatic chyle effusions usually occur after cardiac surgery (incidence of 0.3%–1.5%), after thoracic surgery (incidence

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Table 1
Physical and chemical examination of pleural fluid.

| | Day 0 | Day 22 | Day 26 | Day 29 | Day 42 |
|------------------------------|-------|--------|--------|--------|--------|
| Triglycerides (mg/dl) | 1722 | 40 | 26 | 135 | 71 |
| Cholesterol (mg/dl) | 81 | 44 | 6 | 40 | 74 |
| LDH (U/l) | 261 | 771 | 216 | 729 | 2173 |
| Proteins (g/l) | 52 | 30 | 4 | 20 | 34 |
| Specific gravity | 1038 | 1024 | 1004 | 1018 | 1026 |

of 0.5%–1%), after abdominal aortic aneurism repair, because of direct injury to lymphatic vessels [1–3].

Non-traumatic chylothorax is commonly caused by infiltration of lymphatic ducts due to a malignant disease such as lymphoma, lymphoproliferative disorders or a metastatic carcinoma; other possible causes are congenital anomalies, protein-losing enteropathy, tuberculosis, thoracic duct thrombosis, amyloidosis, hepatic cirrhosis, radiation injury and hypercoagulability [1,2]. Chylous effusion may also be exudative (the majority) or transudative (about 25% of cases) [2,3,6]. Malnutrition, dehydration and immunological impairment such as loss of lymphocytes and antibodies, of loss of proteins and coagulation factors are typical complications of this affliction. For these reasons, patients are often in poor general conditions [3,5].

Conservative measures such as pleural drainage, a medium-chain triglyceride (MCT) diet, total parenteral nutrition (TPN) and *nilhil per os*, subcutaneous injection of octreotide and chemical pleurodesis are recommended as the first line of treatment and are successful in 20%–80% of cases [1,3–5]. Video-assisted thoracoscopic (VATS) thoracic duct ligation is considered the first surgical approach if the conservative approach fails, followed by open surgery treatment. In case of failure, a pleuro-peritoneal shunt should be performed [4,5,7,8]. After the failure of surgery, interventional radiological treatment such as thoracic duct embolization can be considered [3].

In the literature, octreotide has been shown to be a successful treatment for the management of chylothorax [4,9–13].

In our study, this treatment was not completely successful with a persistence of moderate pleural effusion. The aim of this clinical case is to suggest the use of subcutaneous octreotide associated with pleurodesis with talc poudrage to manage a severe post-operative chylous leak. In summary, in our clinical case report, we would like to show and describe how a chylothorax, after a cardiothoracic operation, may be treated and solve trying to avoid as much as possible a new surgical approach. This work has been reported in line with SCARE criteria [14].

2. Case presentation

A 59-year-old male patient with history of right partial nephrectomy, left hemicolectomy and following adjuvant chemotherapy for bowel cancer, underwent replacement of the ascending aorta, aortic hemiarch and surgery of the aortic valve in November 2019 for aortic dissection. Family history was negative for drug assumptions and for any relevant genetic information or psychosocial disorder.

After three months, because of dyspnea and shortness of breath, a chest radiograph was taken and it revealed an abundant left pleural effusion (Fig. 1A). A pneumologist performed a thoracentesis which showed chylous fluid, then the patient underwent left chest drain insertion by a thoracic surgeon of our team and exhibited a chyle leak of over 1500 mL. Physical and chemical examination of the drainage showed the fluid had an exudative nature (LDH: 261U/l, proteins: 52 g/l, specific gravity: 1038); the triglycerides level was 1722 mg/dl; the cholesterol level was 81 mg/dl. The cultural and cytological evaluation were both negative (Table 1).

A conservative treatment with an MCT diet was attempted. Due to a chylous leak of more than 700 mL/day and a high triglycerides level (1186 mg/dl on day three, 365 mg/dl on day five), on post-operative day six we placed a central vein catheter and TPN and nothing by mouth.

On post-operative day twenty-two, because the leak was under 400 mL/day, we tried to reintroduce an MCT diet by mouth and reduce TPN. The triglycerides and cholesterol levels in the drainage decreased to 40 mg/dl and 44 mg/dl, respectively; the total proteins from the physical and chemical examination were 30 g/l; the LDH level was 771 U/l; the specific gravity 1024 (Table 1).

On day twenty-six, because the drainage was under 300 mL/day, we further reduced the TPN and restored a free diet. The triglycerides and cholesterol level of the drainage decreased to 26 mg/dl and 6 mg/dl, respectively, with proteins level of 4 g/l, LDH level of 216 U/l, specific gravity of 1004 and percentage of granulocyte neutrophils of about 50% (Table 1). Because the drainage was about 250 mL/day, on day twenty-eight we performed pleurodesis with talc poudrage with a good tolerability and no consequences for the patient and we stopped TPN on the following day. Physical and chemical examination of the drainage showed the triglycerides and cholesterol level had increased to 135 mg/dl and 40 mg/dl, respectively (Table 1).

On day thirty-four, as drainage was still about 400 mL/day and did not seem to be decreasing, we performed subcutaneous injection of octreotide (0.3 mg/day) and instituted an MCT diet. After 2 days, the drainage decreased significantly to less than 100 mL/day. The chest radiograph showed an almost complete resolution of the left pleural effusion.

After a second chemical pleurodesis was performed on day forty by our team with no complications, we noted no drainage leak, and the levels of triglycerides had decreased to 71 mg/dl and cholesterol had increased to 74 mg/dl, so we stopped the octreotide injections on day 42. The chest tube was removed on day 48 and the patient was discharged (Fig. 1B).

Five days after discharge, the patient was admitted for hypoxic respiratory failure with hypocapnia. Because a chest radiograph revealed left pleural effusion, a thoracentesis was performed, with leak of 1300 mL of opalescent fluid. Physical and chemical examination of the fluid showed a granulocyte neutrophil percentage of 44.7%; the cultural and cytological examination were both negative. The patient underwent a left chest drain insertion, resulting in a fluid leak of more than 2000 mL. In the physical and chemical examination of pleural fluid, we noted that the triglycerides and cholesterol level were 21 mg/dl and 17 mg/dl, respectively. (Table 1, Fig. 2).

After a chest tomography was successively performed, we noted a 4.4 × 2.2 cm subcarinal lymph node, on which Endobronchial Ultrasound Transbronchial Needle Aspiration (EBUS-TBNA) was performed; its cytological examination was negative.

Six days after the chest drain placement, the drainage decreased significantly, and the chest radiograph showed almost a complete resolution of the left pleural effusion, so the tube was removed, and the patient was discharged. For the fact that chylothorax derived from a benign origin, patient perspectives were good and confirmed by the chest x-ray performed after three months from the discharge, showing a stable condition without pleural effusion (Fig. 3).

3. Discussion

Chylothorax is a rare complication of cardiac surgery that is characterized by lymphatic vessel injury and an accumulation of chyle in the pleural cavity. It typically occurs in pediatric surgery, but it occurs even in adult patients [8,9].

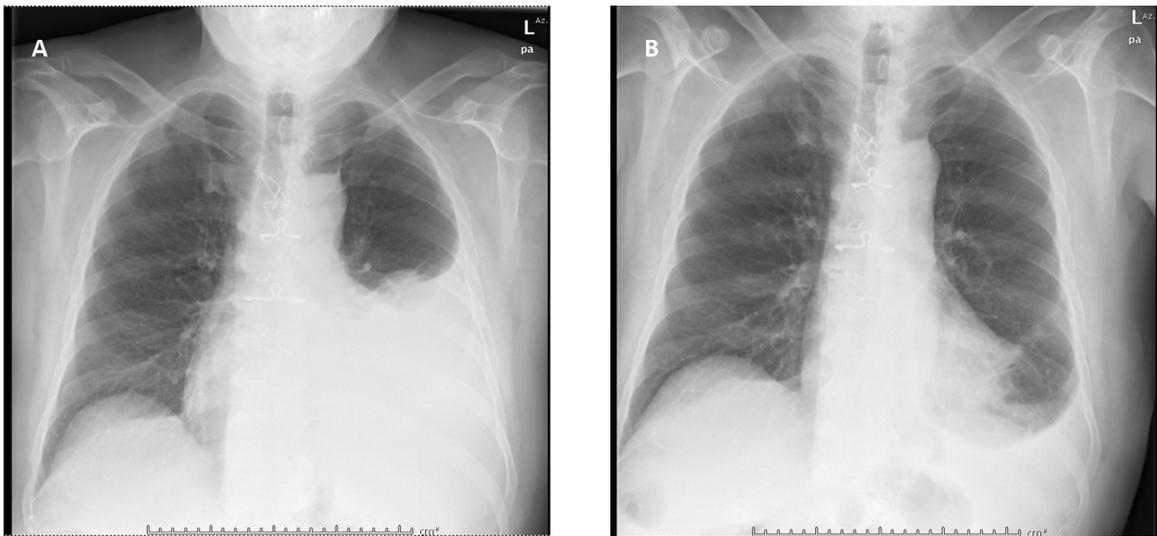


Fig. 1. A. Chest radiograph at admission. B. Chest radiograph at discharge after talc poudrage in association with subcutaneous octreotide.

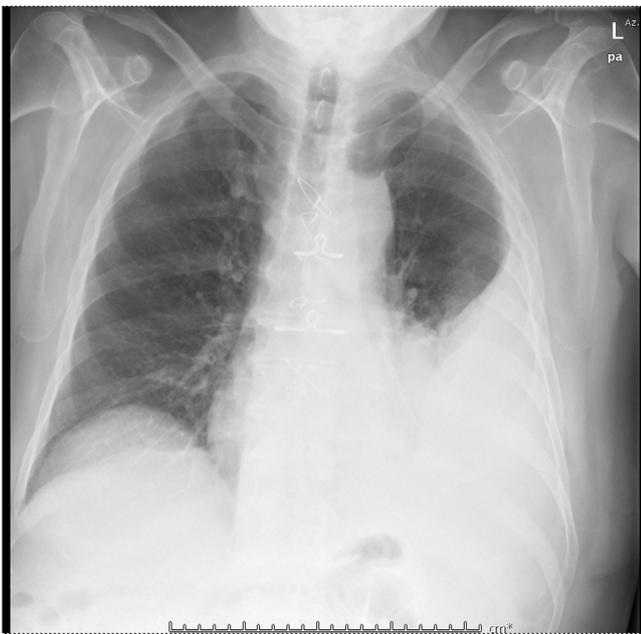


Fig. 2. Chest radiograph after pleural effusion relapse with no evidence of chylothorax at physical and chemical examination.

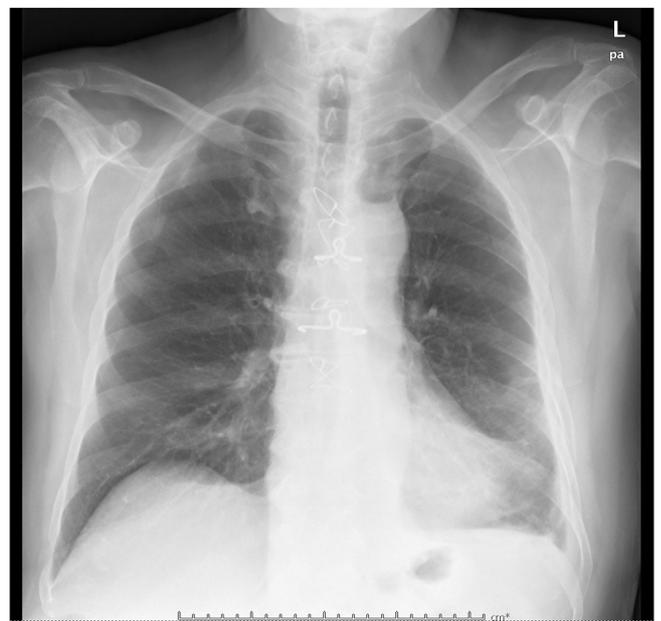


Fig. 3. Chest radiograph at three months follow up showing a complete resolution of the pleural effusion.

Conservative measures, such as adequate hydration, an MCT diet, TPN, thoracentesis, pleural drainage, pleurodesis and treatment with octreotide are recommended as a first line of treatment, and these are successful in 20%–80% of cases [1,3–5].

If a conservative approach fails and chylous drainage persists, VATS surgery is required, followed by open surgery treatment in case of failure [4,5,8]. Surgical treatments are thoracic duct ligation or pleuro-peritoneal shunt in case of failure of the first surgery [3–5,8].

After the failure of surgical procedures, interventional radiological treatment such as thoracic duct embolization may be attempted, and this is successful in 70% of patients [3].

Octreotide is a long-acting somatostatin analog that increases splanchnic arteriolar resistance and reduces gastrointestinal blood flow. It may increase blood glucose levels, so glycaemia should be monitored during the whole duration of therapy [12].

Many authors have demonstrated that conservative treatment for 48 h with octreotide reduced drain output and led to a complete resolution of chylous effusion [4,10–13]. Gabbieri et al. [12] recommended the early use of octreotide to reduce a chylous leak. Octreotide treatment should be instituted for 1 week before surgery is considered [1]. A surgical approach is indicated when the drain output is greater than 1000 mL/day after 1–2 weeks of treatment [12].

In our case, we attempted an MCT diet after chest drain insertion. Because the pleural leak was above 700 mL/day and the triglyceride level was above 110 mg/dl, we started TPN and *nihil per os*.

After 16 days, with a progressive decrease in drainage leak, we tried to reduce TPN and reintroduce an MCT diet. Because of the progressive decreasing of the chylous leak to less than 250 mL/day, we performed talc poudrage and stopped TPN on day 28, restoring a free diet.

Because triglyceride levels increased to 135 mg/dl and the drainage leak was over 400 mL/day, on day 34 we started 300 mcg/day subcutaneous octreotide and instituted an MCT diet, with a significant reduction in and complete resolution of the chylous leak after 2 days of treatment and a second talc poudrage. Octreotide injections were suspended after 8 days. The triglyceride level was 71 mg/dl.

Five days after discharge, the patient was admitted for relapsed pleural effusion. Physical and chemical examination of the pleural fluid showed that it was characterized by a triglyceride level of 21 mg/mL, demonstrating the non-chylous nature of the pleural fluid.

Thus, our patient responded to octreotide therapy within two days of treatment and to chemical pleurodesis with complete resolution of chylothorax. Injections were suspended after 8 days and no further conservative or surgical approaches were required – as has already been shown by many authors [4,10–13].

4. Conclusions

Pharmacological treatment using octreotide – a long-acting somatostatin analog – has been shown to significantly decrease chyle output in many studies [1,4,5,10–12], even though the dose and duration of this therapy has yet to be defined [1,5]. Manasvini et al. [1] noted that in retrospective studies, the consensus view was to institute octreotide therapy for 1 week before considering a surgical approach. Treatment is considered successful when drain output decreases significantly within 48–72 hours [3,7].

Our patient responded partially to octreotide injections within 2 days of treatment, with a drainage leak of less than 100 mL/day. The association of talc poudrage to the octreotide treatment significantly reduced fluid leak to zero.

In our case report, we suggested that the use of octreotide in association with talc poudrage may be useful in the management of severe chylous leaks that are refractory to conservative treatment with an MCT diet or TPN and *nihil per os*.

Patient was very satisfied to avoid eventual surgical approach and to solve the pleural effusion with a medical treatment, especially for the fact that he was recently underwent to a cardiothoracic operation.

Declaration of Competing Interest

The authors report no declarations of interest.

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Ethical approval

Ethical Board approval is not required for a single case report in our Center.

Consent

Patient signed the consent for the publication of this case report.

Author contribution

EL and BA wrote the manuscript; UM, AS, VM read and approved the manuscript.

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Registration of research studies

Not applicable.

Guarantor

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