

Left Chylothorax Associated with Hemodialysis Treatment: Clinical Case

Maura Alicia Flores-Uzcanga

Hospital General de Zona #2, IMSS, San Luis Potosí, San Luis Potosí, México

Carolina Carrillo-Vázquez

Hospital General de Zona #2, IMSS, San Luis Potosí, San Luis Potosí, México

Edgar Omar Narvaez-Anzures

Hospital General de Zona #2, IMSS, San Luis Potosí, San Luis Potosí, México

Guillermo Padrón-Arredondo

Hospital General de Zona #2, IMSS, San Luis Potosí, San Luis Potosí, México

ABSTRACT

Introduction: Chylothorax is the accumulation of chyle in the pleural space. Thoracentesis confirmed a triglyceride concentration of more than 110 mg/dL or positive chylomicrons in the pleural fluid. Chylothorax formation has an extensive list of traumatic and non-traumatic etiologies. Approximately 50% of cases of chylothorax are due to traumatic etiologies and can be classified as surgical causes, with esophagectomy and corrective operations for congenital heart disease being the most common and non-surgical causes, such as chest radiation and blunt trauma. **Clinical Case:** A 60-year-old female with the following history: transfusions seven times due to chronic kidney disease (CDK). Surgeries: complicated cholecystectomy that caused acute tubular necrosis, which did not recover function, and replacement treatment with hemodialysis. Diabetes Mellitus 2 type and Hypertension Arterial for 18 years. CKD in usual treatment. Hemodialysis three sessions per week QS 300 QD 500, Na 138 K2, Ca2 Temp: 36° C, HCO₃ 38 uf adjust dry weight 51.0, heparin 1000 IU bolus and 500 IU maintenance, filter 18 kt/v 1.2, seal with pure heparin. **Discussion:** The internal jugular vein is an essential option for central venous access for many different purposes, including hemodialysis. The internal jugular vein and the other cephalic veins undergo a complicated process of embryonic development, with innumerable opportunities for abnormal development, regressions, or anastomoses, creating many different anatomical variants. **Conclusions:** The chylothorax in this patient was due to an accident when puncturing the vein, which is not uncommon, and these procedures are performed by trained personnel and with the support of ultrasound guidance. However, the subclavian access is used more in our service.

Keywords: Renal insufficiency, Hemodialysis, Chylothorax, Thoracentesis, Catheter device.

INTRODUCTION

Chylothorax is the accumulation of chyle in the pleural space. Thoracentesis confirmed a triglyceride concentration of more than 110 mg/dL or positive chylomicrons in the pleural fluid. Chylothorax formation has an extensive list of traumatic and non-traumatic etiologies. Approximately 50% of cases of chylothorax are due to traumatic etiologies and surgical causes, with esophagectomy and corrective operations for congenital heart disease being the most common and non-surgical causes, such as chest radiation and blunt trauma. On the other hand, some non-traumatic causes of chylothorax include malignant neoplasms, which account for 17 to 46% of all cases, with lymphoproliferative neoplasms being the most frequent. Lymphatic abnormalities, sarcoidosis, infections such as tuberculosis, and transdiaphragmatic movement of chylous ascites in the context of liver cirrhosis constitute the majority of the remaining causes (1). Chylothorax is due to the destruction of the thoracic duct due to trauma, thoracic tumors, severe infection, and occasionally superior vena cava syndrome. In cases of chylous collection, > 500 mL can cause shortness of breath, chest tightness, palpitations, and dyspnea (2). The clinical picture of a patient with chylothorax is insidious and develops as fluid accumulates in the pleural cavity; asymptomatic at first, then progresses to cough and dyspnea; fever and pleuritic pain are rare findings. There is unilateral or bilateral dullness and decreased breath sounds on physical examination. The diagnosis, based on clinical suspicion in patients with a suggestive clinical picture and compatible radiological findings (pleural effusion on simple chest X-ray or ultrasound), is made by thoracentesis. The fluid extracted from the pleural cavity is white, odorless, and milky white, but it can also be serosanguineous. (>50%), with a protein content between 2 and 3 mg/dL and low lactate dehydrogenase levels. If diagnostic doubt persists, the preferred method is an analysis of chylomicrons in the biological fluid with a positive result. After the confirmatory diagnosis, other tests used to aid the investigation are CT and MRI and more specific tests to assess the lymphatic system, such as lymphangiography and lymphoscintigraphy. Depending on the location of the thoracic duct rupture, also considering anatomical variations, a unilateral collection (more frequent on the right side) or, more rarely, bilateral (in one-sixth of cases) can be detected (3).

CLINICAL CASE

A 60-year-old female with the following history: transfusions seven times due to CKD. Previous surgeries: cholecystectomy that was complicated and caused acute tubular necrosis, which did not recover function, and on June 22, replacement treatment with hemodialysis was started. DM2 and HTA for 18 years losartan 1x12 h, nifedipine 1x12 h, prazosin 1x12 h. CKD undergoing treatment with erythropoietin 4000 IU every third day, folic acid one tablet every 24 h, and B complex one tablet every 24 h, has been dependent on home oxygen for the past six months secondary to the surgical process due to the requirement of invasive management of the airway. Hemodialysis 3 sessions per week QS 300 QD 500 Na 138 K2 Ca 2 t: 36 HCO₃, 38 uf adjust dry weight 51.0 heparin 1000 IU bolus and 500 IU maintenance filter 18 kt/v 1.2 seal with pure heparin. She has a history of type 2 DM, systemic arterial hypertension, and chronic kidney disease on hemodialysis with a history of hospitalizations due to left subclavian Mahurkar-type catheter dysfunction. He was referred to the emergency room from his hemodialysis unit due to dysfunction of the left Mahurkar catheter and dyspnea, nausea, and hyporexia of two weeks' evolution. On physical examination, pleuropulmonary effusion syndrome in the infrascapular and left lower axillary region stands out. She was admitted to the nephrology service for a pneumology consultation due to left pleural effusion (Fig. 1).



Figure 1: Chest X-ray on admission. Left pleural effusion.

Thoracentesis and a 7 Fr intrapleural catheter placement in the left safety triangle. The cytology and cytochemistry of the pleural fluid reported turbid appearance, brown/white color, leukocytes 550/mm³, polymorphonuclear 90%, mononuclear 10%, glucose 110 mg/dL, cholesterol 94.6 mg/dL, triglycerides 807.50 mg/dL, lactic dehydrogenase 145 IU/L, total protein 4.39 g/dL, albumin 2.11, fluid pH 7. Negative for malignancy and no bacterial growth. A pleural LDH/serum LDH ratio of 0.82 corresponds to exudate by Light's criteria. The complete blood count with leukocytes is $8.8 \times 10^9/L$, hemoglobin 8.3 g/dL, DHL 176 IU/L, Albumin 3.4 g/dL. The chest CT axial cuts of 5 mm did not show involvement of the mediastinal stations; likewise, the mediastinal compartments without lesions suggestive of malignancy, no observed pericardial or pleural thickening, only left free pleural effusion and atelectasis of the ipsilateral lower lobe.



Figure 2: Chest tomography. Left pleural effusion, passive atelectasis, without pleural thickening and lesions in the lung parenchyma. No evidence of mediastinal lesions.

The intrapleural catheter was retired due to less than 200 cc of pleural fluid in 24 hours. We replaced the left Mahurkar catheter during hospitalization and continued his hemodialysis sessions. Subsequently, is requested a new assessment for the recurrence of effusion. Once again, a 7 Fr intrapleural catheter was placed with cytology and cytochemistry of the pleural fluid: cloudy appearance, white, leukocytes 0, glucose 99 mg/dL, triglycerides 198.5 mg/dL, total protein 2.23, fluid pH 8.0, and density 1.015.



Figure 3: Red arrow small lumen intrapleural catheter.

The water seal was kept bypass with costs of less than one liter per day. Therefore, a diet free of long-chain fats was indicated octreotide 50 micrograms every 8 hours for seven days. The nephrology service decided to remove the left Mahurkar catheter, and later, carotid USG was performed with permeable vessels, and was placed a USG-guided catheter in the right jugular. Eleven days after the intrapleural catheter placement, it was removed after spending less than 200 ml in 24 hours, pleural symphysis by PA chest X-ray, and pleural fluid cytochemicals without criteria for chylothorax.

DISCUSSION

Chylothorax and chylopericardium refer to the accumulation of chyle in the pleural and pericardial space, respectively. Chyle is a milky-appearing fluid containing high levels of fats, proteins, and immunoglobulins, which are transported back into the venous system from the cistern of Pecquet through the thoracic duct. This structure originates in the cistern and ends at the junction of the left subclavian and internal jugular veins. The volume of Chyle ranges from 10 to 100 mL/kg of body weight in an average adult, affected by factors including diet, intestinal absorption, and the degree of physical activity. Both chylothorax and chylopericardium may be a direct consequence of superior vena cava syndrome (SVC), which is best described as obstruction of the SVC that disrupts the average venous return of blood from the head, upper extremities, and thorax to the right atrium (4). The internal jugular vein (IJV) is an essential option for central venous access for many different purposes, including hemodialysis. The IJV and the other cephalic veins undergo a complicated process of embryonic development, with innumerable opportunities for abnormal development, regressions, or anastomoses, creating different anatomical variants. Before puncturing the IJV, it is essential to identify the anatomical structures of the patients in order to avoid complications such as inadvertent arterial puncture, pneumothorax, hemothorax, chylothorax, hematoma, brachial plexus injury, gas embolism, catheter tying, arrhythmia, fistula arteriovenous veins, right atrial perforation, vocal cord paralysis, and severe respiratory obstruction. All complications increase morbidity, prolonged stays, and hospital costs. The variants in the positions of the vessels commonly used for catheter access comprise a pitfall that increases the rates of complications (5). For this reason, detecting anatomical variants of the IJV using Doppler vascular ultrasound results in tremendous insertion success (5, 6). Most cases of chylothorax in hemodialysis patients are associated with Superior Vena Cava Syndrome. Although our patient had a right-sided VJ catheter, we could not identify any clinical features or radiological evidence of SVC syndrome. This raised the suspicion of direct injury to the lymphatic system. Previous case reports have described left-sided thoracic duct injuries after inserting left subclavian vein catheters. Although there have been cases resolved with conservative management, our decision for surgical correction was based on the severe weight loss and recurrence of the effusion after the reintroduction of a regular fat diet. In conclusion, chylothorax is a rare complication after central venous catheter placement. However, it should be included in the differential diagnosis when weight loss and pleural effusion appear after its insertion (7-11).

CONCLUSIONS

In patients with chronic kidney disease on hemodialysis treatment, it is important to understand that the relationship between CKD, hemodialysis and chylothorax is not direct. However, there are some ways through which these patients could develop chylothorax: 1) Cardiovascular complications such as congestive heart failure. 2) Changes in vascular

permeability (blood and lymphatic vessels). 3) Complications related to hemodialysis and 4) Other complications of CKD such as alterations in metabolism and the immune system.

References

1. Owda F, Mallah S, Ayyad M, et al. A Very Uncommon Case of Transudative Chylothorax: A Case Report and Literature Review. *Cureus*, April 30, 2023; 15(4): e38320. Doi 10.7759/cureus.38320
2. Wan Z (2022) Case report: Severe dry cough associated with superior vena cava syndrome—caused recurrent chylothorax. *Front Cardiovasc Med*, 2022; 9:970783. Doi: 10.3389/fcvm.2022.970783
3. Lima-Rodríguez AL, das Neves-Romanelli MT, Darío-Ramos C, et al. Bilateral spontaneous chylothorax after severe vomiting in children. *Rev Paul Pediatr*, 2016; 34(4):518-21. <http://dx.doi.org/10.1016/j.rppede.2016.04.003>
4. Livesay J, Biney I, Turner Jr. JF. Chylothorax and Chylopericardium: A Complication of Long-Term Central Venous Catheter Use. *Hindawi Case Rep Pulmonol*, 2019; Article ID 4908259, 5 pages <https://doi.org/10.1155/2019/4908259>
5. Souza CG, Días LPC, Vargas R, Nascimento LAD, Volino-Souza M, Oliveira GV. A rare variation of the right internal jugular vein: a case study. *J Vasc Bras*, 2018; 17(4):358-61. <http://dx.doi.org/10.1590/1677-5449.007018>.
6. Akamine-Asari AI, Barros RAV, Borges MAP. An anatomic variant of the internal jugular vein and its importance in vascular access for hemodialysis. *J Vasc Bras*, 2019; 18: e20190014. <https://doi.org/10.1590/1677-5449.190014>
7. Nair SK, Petko M, Hayward MP: Aetiology and management of chylothorax in adults. *Eur J Cardiothorac Surg*, 2007; 32:362-9. <https://doi.org/10.1016/j.ejcts.2007.04.024>
8. Torres Guinea M, De Arriba G, Basterrechea MA, Ocaña J. Chylothorax: An uncommon cause of pleural effusion in patients on hemodialysis]. *Nefrol*, 2008; 28: 353-5.
9. Adekile A, Adegoroye A, Tedla F, Levin D, Salifu MO. Chylothorax and chylopericardial tamponade in a hemodialysis patient with catheter-induced superior vena cava stenosis. *Semin Dial*, 2009; 22:576-9. <https://doi.org/10.1111/j.1525-139X.2009.00622.x>
10. Campistol JM, Cases A, López-Pedret J, Revert L: Thoracic duct injury: An unusual complication following subclavian catheterization for hemodialysis. *Nephron*, 1987; 46: 390-1, <https://doi.org/10.1159/000184414>
11. Mhlana N, Ismail Z, Chothia M-Y. Dyspnea and Weight Loss following Left Internal Jugular Vein Dialysis Catheter Placement. *Kidney360*, Sept 3, 2022; 1654-5. Doi: <https://doi.org/10.34067/KID.0002842022>