Case Report

Hemothorax in Dialysis Patients: The Importance of History and Differential Diagnoses

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ABSTRACT: Long-term double-lumen central venous catheters are commonly used in patients undergoing hemodialysis but may be associated with rare and serious complications, such as injury to large veins, for example the jugular or subclavian vein. We report the case of a 42-year-old man with chronic kidney disease on hemodialysis and a history of treated extrapulmonary tuberculosis who was found to have a massive, asymptomatic, left-sided hemothorax. Differential diagnoses included tuberculosis recurrence, mesothelioma, and iatrogenic vascular injury related to a long-term catheter. This case underscores the importance of careful clinical history and differential diagnosis when evaluating pleural effusion in dialysis patients.

KEYWORDS: *Hemothorax, hemodialysis, central venous catheters, pleural effusion, iatrogenic complications.*

Introduction

Pleural effusion (PE) is defined as the presence of fluid in the pleural cavity and arises from various underlying causes, representing a common clinical condition with a broad spectrum of etiologies and biochemical profiles [1,7].

Its incidence varies according to geographic and epidemiological factors, with infections, neoplastic, and cardiovascular conditions among the leading causes worldwide [2,5,6].

In Brazil, pleural effusion constitutes a frequent diagnostic challenge in clinical practice, with tuberculosis remaining a major cause of exudative effusions and contributing significantly to disease burden, particularly in endemic regions [3,4].

In patients with chronic kidney disease undergoing hemodialysis, iatrogenic causes assume particular importance due to the frequent need for vascular access.

When arteriovenous fistulas are not viable, long-term central venous catheters, such as Permcath devices, are widely used [8].

Although essential for renal replacement therapy, these catheters are associated with both infectious and mechanical complications, including injury to large-caliber veins such as the internal jugular, subclavian vein, and superior vena cava [9].

Catheter-related vascular complications may result in severe and potentially life-threatening conditions, including massive pleural effusion and hemothorax [10].

Therefore, awareness of these risks is essential when evaluating pleural effusion in patients receiving hemodialysis.

Case Report

A 42-year-old man was diagnosed with type I Diabetes Mellitus 19 years prior and systemic arterial hypertension 12 years prior, with a history of irregular adherence to treatment, resulting in hypertensive encephalopathy, chronic kidney injury and amaurosis.

He initiated renal replacement therapy via hemodialysis 10 years ago, and after losing arteriovenous fistulas due to infection, a long-term catheter was implanted to maintain treatment.

He denied smoking, alcohol consumption or other environmental risk factors.

One year ago, he was diagnosed with mediastinal lymph node tuberculosis through a tuberculin skin test performed at an external facility, presenting with 10kg weight loss and axillary lymphadenopathy.

He began standard treatment, which lasted for six months, with good adherence.

After this period, he continued with routine post-infection examinations to evaluate the possibility of renal replacement treatment, when he arrived at our service asymptomatic and with an external chest radiograph presenting with pleural effusion on the left side.

On physical examination, he presented with massive percussion on the left side and breath sounds that were ipsilaterally abolished (Figure 1).

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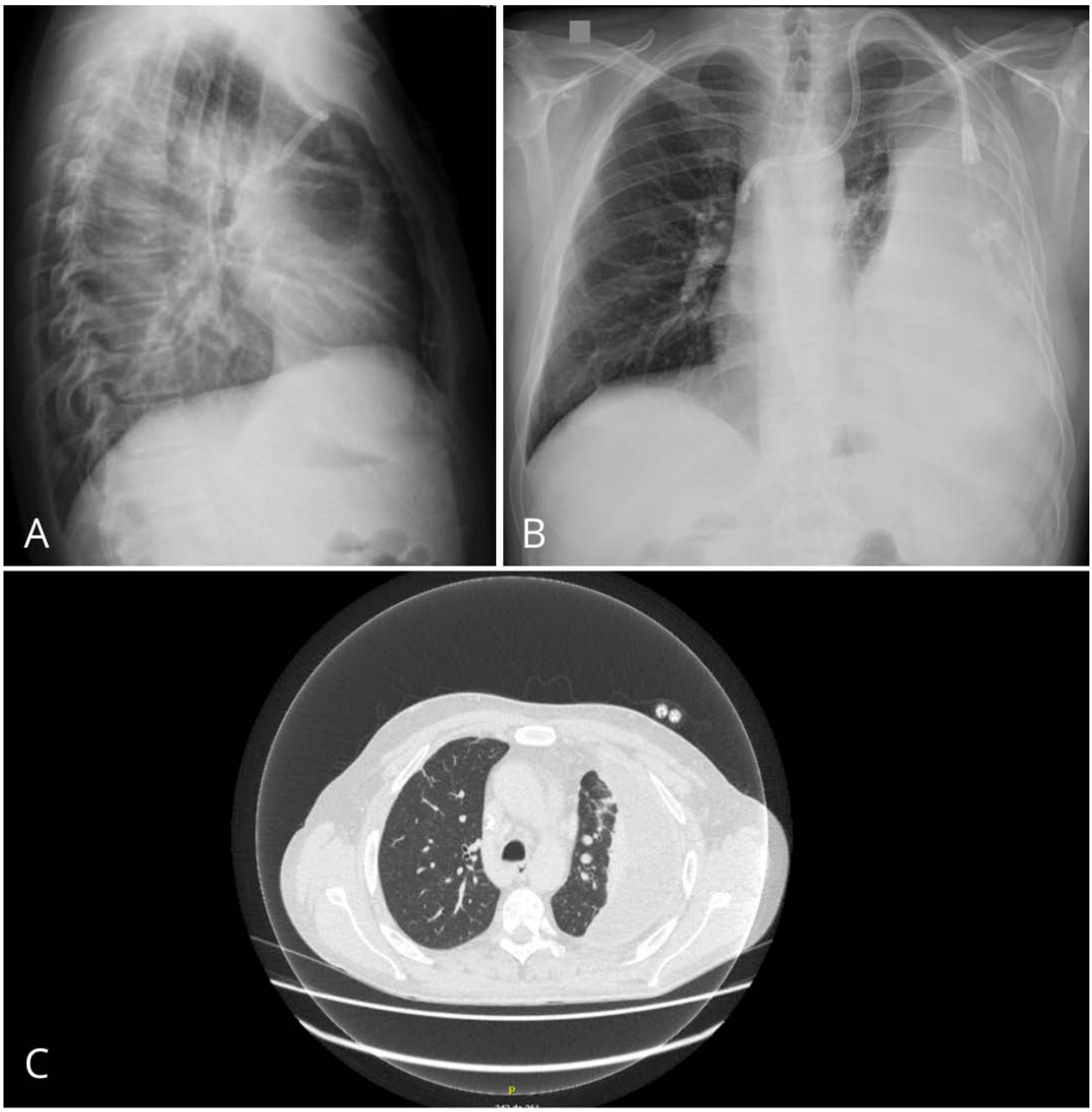

Figure 1 (A) Lateral chest radiograph showing pulmonary retraction to the left. (B) Posteroanterior chest radiograph with consolidated pleural effusion on the left. (C) Computed tomography showing left pleural effusion and atelectasis due to adjacent compression.

Investigative thoracentesis, performed on the same day as the physical and radiological findings, revealed exudate with a hemorrhagic appearance and few leukocytes.

The rapid molecular test for tuberculosis (TB-MRT) performed on the sample collected from the pleural fluid was negative.

After 19 days of investigation, during which the patient was hospitalized for monitoring, pleuropulmonary decortication was performed, revealing diffuse pleural thickening, incarcerated lung parenchyma, and pleural effusion of approximately 2000mL on the left, with macroscopic characteristics of dark hemorrhagic material, with clots and fibrin strands.

Analysis of the surgical collected pleural fluid identified traces of *Mycobacterium tuberculosis DNA*, whereas microbiological tests as sputum and PE smear microscopy of PE for identification of *Mycobacterium tuberculosis* (Acid-fast bacilli staining, Ziehl-Neelsen stain method) and culture of PE were negative, and pleural biopsy showed chronic nonspecific pleuritis, with fibrotic thickening and areas of hemorrhage.

After drainage, no recurrence was observed, and the patient was discharged for renal replacement therapy.

Discussion

Pleural effusion (PE), defined as the presence of fluid in the pleural cavity, has several known causes and presentations depending on biochemical characteristics and underlying causes [9].

Treatment depends on the cause, including drainage and antibiotic therapy for infections, chemotherapy or radiotherapy for malignancies, and anticoagulation for pulmonary thromboembolism (PTE) [9,10].

In this report, radiological examination revealed strictly unilateral PE, commonly seen in neoplastic or parapneumonic effusions, but also in tuberculosis-related effusions, post-cardiac surgeries and PTE [9].

This information guides differential diagnosis and directs subsequent investigations.

Analysis of the pleural fluid revealed an exudate following Light's criteria [9], suggesting mesothelioma, tuberculosis, PTE or PE secondary to cardiac surgery [9].

However, it is important to highlight that in approximately 90% of PE secondary to PTE, the effusion affects less than ⅓ of the pleural cavity, making this cause unlikely [10].

Furthermore, our patient did not have recent cardiac surgery, and only a long-term catheter was inserted in the left internal jugular vein ipsilateral to the PE.

In Brazil, tuberculosis is considered one of the main causes of PE because of its high incidence [8].

Pleural tuberculosis (PT) is typically acute, with respiratory symptoms such as cough, pleuritic chest pain, fever, dyspnea, and PE.

The pleural fluid in PT is exudative with a predominance of lymphocytes [8].

The diagnosis of PT is challenging, as TB-MRT has only 25% sensitivity [5], meaning that a negative result does not rule out the diagnosis of PT.

Thus, pleural biopsy is used to confirm the diagnosis with a sensitivity of approximately 95% [5].

In the present case, TB-MRT was negative, and pleural biopsy did not confirm Mycobacterium tuberculosis.

However, traces of bacteria in the pleural fluid suggested remnants of previously treated lymph node tuberculosis.

Another hypothesis is pleural mesothelioma, which presents with persistent cough, progressive dyspnea, PE, chest pain, and weight loss [7].

It is associated with asbestos exposure in 80% of cases [6].

Although our patient, a truck driver, had no occupational exposure, mesothelioma should always be investigated because of its bad prognosis [7].

Pleural biopsy, the main investigative method, ruled out this etiology.

Finally, iatrogenic injury through a long-term catheter is considered.

Macroscopic analysis of the collected fluid, with a hemorrhagic aspect, could have been correlated with the ratio between the hematocrit of the fluid (hl) and the serum hematocrit (hs).

If this hl/hs value is equal to or greater than 0.5 or 50%, it would suggest trauma and hemothorax, justifying drainage [1].

However, in the present case, this test was not performed.

Permcath is used in hemodialysis patients who are not eligible for native arteriovenous fistulas [2].

Central venous catheter insertion can lead to complications such as arterial puncture, catheter-related infection, pneumothorax, venous thrombosis, improper catheter placement, venous air embolism, and arrhythmia precipitation [2,4].

Thus, lesions in large-caliber veins (internal jugular, subclavian, superior cava) and the carotid artery are rare, representing less than 1% of Permcath complications [4].

Ultrasound-guided venous access significantly reduces complications and is strongly recommended [2,4].

A case in the literature describes a 68-year-old woman with extensive chylothorax and chylopericardium for two weeks due to iatrogenic lymphatic injury from a Permcath [3].

This highlights that medical procedures can lead to complications and should be considered in uncertain diagnoses.

Our case involved hemorrhagic PE for over six months, which was asymptomatic, leading the medical team to suspect iatrogenesis.

Thus, after discarding possible pathologies, this conclusion was reached, as there was no post-drainage recurrence.

Conclusions

This case highlights the importance of a thorough clinical history and careful differential diagnosis when evaluating pleural effusion in hemodialysis patients.

Iatrogenic complications related to long-term central venous catheters, although rare, should be considered after excluding infectious and neoplastic causes.

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Early recognition and appropriate management are essential to prevent morbidity.

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Author Contributions

MC was responsible for literature review and discussions; MCRS was responsible for data collection and writing the history; MVL contributed to data collection and editing the case report; AAC supervised the case and critically reviewed the manuscript.

All authors approved the final version.

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Conflicts of interest

We declare no conflict of interest.

Institutional Review Board

The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of Hospital das Clínicas da Faculdade de Medicina de Ribeirão Preto-USP (Approval number: 8.159.659; CAAE: 95257725.2.0000.5440; approved on February 9, 2026).

Consent Statement

All the procedures in this case report were in accordance with the Ethical Standards of The Institutional Research Committee (Protocol number: 8.159.659) and with the Helsinki Declaration.

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

Data Availability

All data presented in this manuscript are available from the authors upon reasonable request.

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