Journal of Nephrology (2025) 38:787–789
https://doi.org/10.1007/s40620-024-02132-1

NEPHROLOGY ZEBRA

An unexpected cause of dyspnea in a peritoneal dialysis patient: the hidden connection

Florian Lacave[1] · Inès Dufour[1] · François Jamar[2] · Eric Goffin[1]

Received: 23 August 2024 / Accepted: 28 September 2024 / Published online: 14 January 2025

What is your diagnosis?

Case description

The patient was a 64-year-old woman who had started Peritoneal Dialysis (PD) five months earlier. Chronic kidney disease was secondary to polycystic kidney disease associated with orofaciodigital syndrome type I. Other than experiencing slight pain during drainage at the initiation of automated PD, she had no treatment-related complications. Four days prior to admission, she developed sudden-onset dyspnea accompanied by a dry cough. Additionally, she had gained two kilograms over the last few days and reported negative ultrafiltration, even during the day-exchanges with icodextrin solutions.

Physical examination on admission revealed tachypnea, inaudible breath sounds, and dullness to percussion over the right lower hemithorax. Blood laboratory tests showed no acute phase response and electrocardiogram was unremarkable. Chest X-ray revealed a large right pleural effusion (Fig. 1). Thoracentesis was performed, resulting in a dramatic clinical improvement. Fluid was yellow-citrine and there was a high pleural fluid-to-serum glucose ratio (1.2) along with low pleural fluid-to-serum protein and lactate dehydrogenase ratios, respectively.

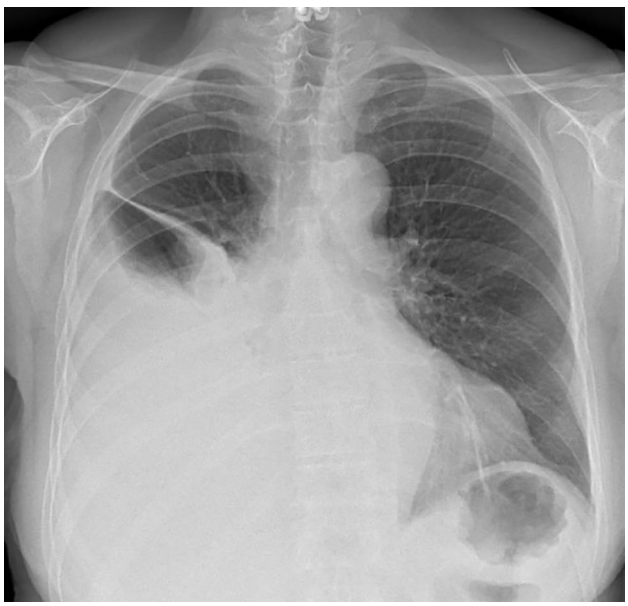

Fig. 1 Chest X-ray shows a voluminous right pleural effusion, and complete lower lobe and partial middle lobe atelectasis

✉ Florian Lacave
florianlacave@gmail.com

Inès Dufour
ines.dufour@saintluc.uclouvain.be

François Jamar
francois.jamar@saintluc.uclouvain.be

Eric Goffin
eric.goffin@saintluc.uclouvain.be

[1] Division of Nephrology, Cliniques Universitaires Saint-Luc, Brussels, Belgium

[2] Division of Nuclear Medicine, Cliniques Universitaires Saint-Luc, Brussels, Belgium

Case solution

Peritoneal scintigraphy with injection of 99 m-technetium (99mTc) within a glucose-based solution showed a transdiaphragmatic passage of the dialysate within 20 min, confirming the presence of a right pleuroperitoneal leak (Fig. 2).

After discussing the treatment options, such as pleurodesis or volume reduction in PD, the patient decided to discontinue PD. Her choice was based on avoiding surgery and pleural pain secondary to pleurodesis, considering also a significant risk of recurrence of pleuroperitoneal leak. Being in good condition and wanting to remain on autonomous dialysis, the patient opted for home hemodialysis (HD). The pleural effusion completely resolved after four days of HD. The transition between dialysis techniques went smoothly.

Pleuroperitoneal leak is a relatively rare complication of PD, with reported incidence varying from 1.6% to 10% [1]. The clinical presentation may be associated with dyspnea, chest pain, cough, weight gain and loss of ultrafiltration.

Pleural effusions resulting from pleuroperitoneal leak can be congenital or acquired, influenced by factors such as diaphragmatic muscular weakness, increased pressure gradients, and/or lymphatic drainage issues [2]. Polycystic kidney disease and prior episodes of peritonitis are associated risk factors, with women being more frequently affected than men [1, 3]. Pleuroperitoneal leak predominantly occurs on the right side, a finding that may be accounted for by the presence of the heart on the left side, which prevents communications.

Pleural fluid in pleuroperitoneal leak cases is typically transudative, and elevated levels of pleural glucose (compared to serum concentration), creatinine or lactate suggest a pleuroperitoneal communication. Alternative PD solutions, like icodextrin, that do not contain glucose may hamper the interpretation of the results. There is no single radiological technique considered the gold standard for diagnosing pleuroperitoneal leak. Computed tomography peritoneography (CTP) is the most widely used technique, as it confirms and precisely localizes the leak. Peritoneal scintigraphy is easy to perform and confirms the presence of a breach, but may be less effective in locating narrow leaks. However, peritoneal scintigraphy is suitable for patients allergic to iodinated contrast agents [4].

In cases of pleuroperitoneal leak, stopping peritoneal dialysis is often necessary. Thoracentesis may be required and patients are typically switched to hemodialysis for several weeks to allow the peritoneum to heal. Continuing PD with smaller volumes may be an option in some cases, especially if a kidney transplantation is imminent. However, pleural effusions due to pleural leaks often recur, with a low success rate for conservative approaches [1].

If the patient prefers to remain on PD, surgical or chemical pleurodesis using sclerosing agents such as talc, autologous blood, or tetracycline can effectively correct pleuroperitoneal communication [5]. The first option, video-assisted thoracoscopic surgery, has a better success rate and is less painful than chemical pleurodesis. Nonetheless, most patients with pleuroperitoneal leak managed conservatively or who undergo chemical pleurodesis eventually switch to HD [1].

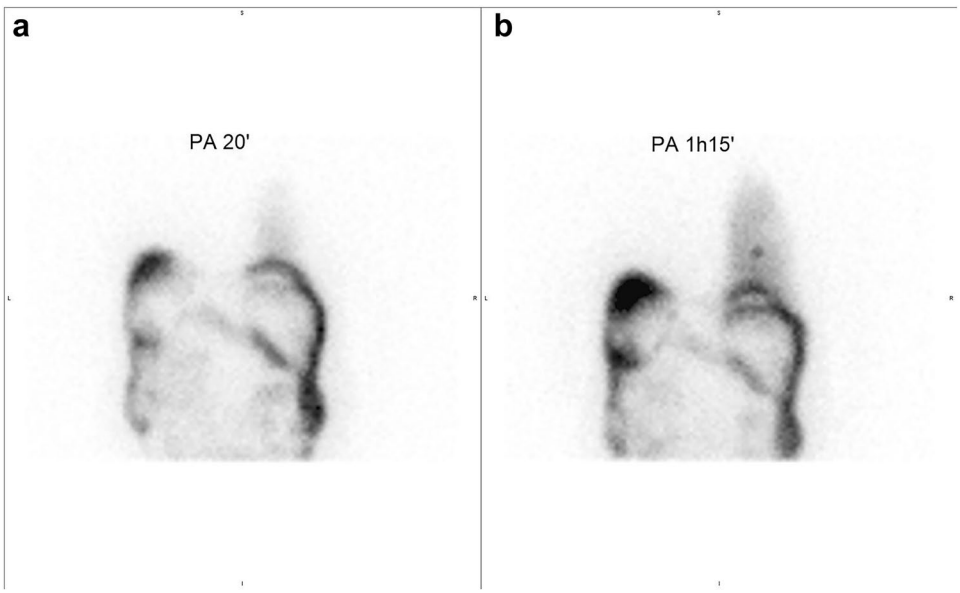

Fig. 2 Postero-anterior (PA) images of the upper abdomen and chest obtained 20 (**a**) and 75 (**b**) minutes after injection of ^{99m}Tc-labelled nanocolloids from the dialysate through the peritoneal dialysis catheter. The images show normal and homogeneous distribution of the tracer in the upper peritoneal cavity, with progressive accumulation in the right pleural space. The small spot observed in the delayed image may be related to scissure stasis

Conclusion

Although pleural effusion can be indicative of congestive heart failure with volume overload or a local pulmonary problem, pleuroperitoneal leak should be considered in a PD patient, especially if the effusion is right-sided.

Acknowledgements We confirm that this work is original and has not been published.

Author contributions All the authors have participated in the care of the patient and in the preparation of the paper.

Funding No funding was received to assist with the preparation of this manuscript.

Data availability Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

Declarations

Conflict of interest We have no conflict of interest to disclose.

Human and animal rights This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent Informed consent was obtained from the patient.

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