

Peritoneo-Vaginal Leaks in Peritoneal Dialysis: A Report of 3 Cases

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Abstract

Introduction: Peritoneal dialysis (PD) is an extra-renal purification technique indicated for patients with end-stage kidney disease (ESKD). Although it has many advantages, it also has a number of complications, such as peritoneo-vaginal leakage of dialysate. **Cases Reports:** Three male patients, aged 70, 50 and 77 respectively, with ESKD were placed on PD. All three patients presented with inadequate drainage and the progressive appearance of bilateral hydrocele, which occurred one year (late leakage), two and four days (early leakage) respectively after the initiation of exchanges. The etiological investigation led to the conclusion of a peritoneo-vaginal leak associated with an inguinal hernia in only one case. The two cases of early leakage were treated by temporary suspension of PD, with a good response in one case and failure in the second, leading to hisdefinitive transfer to hemodialysis (HD); however, the hernia repair enabled immediate resumption of PD in the third patient. **Discussion and Conclusion:** Peritoneo-vaginal leakage is a rare mechanical complication in PD. The clinical examination plays an essential role in confirming the diagnosis and in the therapeutic decision. If the diagnosis is uncertain, or if there is a clinical need to show the anatomy of the leak, an imaging approach becomes desirable. This complication should not prevent the progression of PD in the management of patients with ESKD.

Keywords

Peritoneal Dialysis, Peritoneal Leakage, Hernia-Peritoneal Scintigraphy

1. Introduction

PD is a replacement technique widely used for patients with ESKD. It has many advantages, but also some complications, such as péritonéo-vaginal leakage, a rare mechanical complication corresponding to a loss of peritoneal cavity tight-

ness, with dialysis fluid passing outside the abdominal cavity via inguinal hernias or a persistent péritonéo-vaginal canal [1] [2] [3].

We report three cases of peritoneal-vaginal leak having occurred during PD. The objective of our work is to show the interest and usefulness of the clinical examination in the screening and diagnosis of peritoneal leaks.

Multiple modalities can be used to diagnose dialysate leakage if the diagnosis is uncertain, or if there is a clinical need to show the anatomy of the leak, an imaging approach becomes desirable [4].

Depending on the cause of the leak, PD can be pursued with small volumes with a cyclor. In other cases, it must be interrupted and the patient transferred to HD, in order to permit the peritoneal cavity to regain its integrity by cicatrization or with surgical intervention. Imaging can help to make sure peritoneal cavity has regained its integrity after this period of transition [4].

Peritoneal scintigraphy is a simple examination, that allows both diagnosing and locating these complications because it allows acquiring images at the time of infusion, as well as remotely and after drainage of the dialysate. Tomoscintigraphy coupled with scanner SPECT/CT (Single Photon Emission Computed Tomography/Computed Tomography) can also help narrow the diagnosis [5].

Prevention of PD leaks essentially depends on individual risk factors such as obesity or anterior abdominal surgeries [4].

2. Case Reports

Observation 1: A 70-year-old patient with ESKD due to nephroangiosclerosis, started on PD in May 2012 with two 2-liter exchanges per day with good purification and ultrafiltration (UF) (Residual renal function (RRF) > 2 ml/min). One year after the start of exchanges (June 2013), the patient presented with bilateral hydrocele more significant on the right, without signs of overload with temporary suspension of PD and optimization of the dose of diuretics (1 g of furosemide). The scrotal oedema disappeared one week after PD was stopped. Resumption of small-volume exchanges (1-liter) was responsible for the reappearance of the hydrocele. Suspicion of a peritoneo-vaginal leak led to a thorough clinical examination, which revealed a right inguinal hernia. An abdomino-pelvic ultrasound showed a persistent right peritoneo-vaginal canal, measuring 14 mm, with passage of small intestine into scrotum. The diagnosis of inguino-scrotal hernia on persistence of the peritoneo-vaginal canal was retained and the patient benefited from a hernia cure with closure of the peritoneo-vaginal canal and immediate resumption of exchanges (2 exchanges of 2-liter/day) until 2016. He then died of a dyspnoea pneumonia caused by Aspergillosis.

Observation 2: A patient aged 50, ESKD with undetermined nephropathy, was put on PD in 2017 with 2 exchanges per day. Two days after the start of exchanges, the patient presented with bilateral hydrocele. Examination of the hernial orifices was free, abdomino-pelvic ultrasound revealed no abnormalities apart from a right epididymal cyst. The diagnosis of a peritoneo-vaginal leak was

evoked, leading to the suspension of PD for 3 weeks, with a marked regression of the hydroceles a result. Resumption of exchanges with a gradual increase in injection volumes 1 month after (VI = 2 litres) was uneventful.

Observation 3: A 77-year-old patient with ESKD due to diabetic nephropathy since 2019 was put on PD in March 2021. 4 days after starting exchanges, the patient presented a loss of UF with progressive appearance of a bilateral hydrocele. Temporary cessation of PD for 1 month and resumption of exchanges by automated peritoneal dialysis (APD) with small infusion volumes did not allow the hydrocele to disappear. A péritonéo-vaginal leak was suspected. The patient refused all radiological exploration and the closure of the peritoneo-vaginal canal, hence his definitive transfer to HD.

3. Discussion

PD is an endocorporeal dialysis method that uses the peritoneum as a membrane for exchanges between blood and dialysis fluid. Complications may compromise the success of this technique; they may be immediate or delayed, of infectious or mechanical origin, in particular dialysate leakage, which results from an increase in intra-abdominal pressure associated with dialysate perfusion [6] and consequently predisposes to hernias and leaks.

Their early detection, both clinically and radiologically, is essential in order to reduce transfer to HD [7].

The incidence of dialysate leaks reported in the literature varies considerably, making accurate estimation of this complication difficult, as the majority of studies have been limited to a single type of leak.

Peritoneo-vaginal and pleural leaks are the main mechanical complications in PD patients, occurring in more than 5% of patients on continuous ambulatory peritoneal dialysis (CAPD) [1] [8].

Indirect inguinal hernias are the most frequent cause of this pathology, with an incidence ranging from 0.8% to 4.4% [8].

Pathologies of the peritoneo-vaginal canal are congenital affections due to the persistence of the canal, which is an excrescence of the parietal peritoneum crossing the abdominal wall towards the scrotum in men and the labia majora in women. It is in place by the 3rd month of intrauterine life and gradually obliterates between the 8th and 9th months to form Cloquet's ligament [9]. Failure of this duct to close will be the cause of four anatomic-clinical entities: communicating or non-communicating hydroceles, inguinal or inguino-scrotal hernias, and spermatic cord cysts (**Figure 1**) [10] [11]. The latter is evident in 90% of infants at birth, but only around 15% of adult men have a patent duct. Non-obliteration of the duct may remain clinically silent for life, or only become evident in specific cases, such as the onset of PD [12].

Peritoneo-vaginal leakage in PD is due to increased intra-abdominal pressure and loss of peritoneal membrane integrity, although the most frequent cause is fluid extravasation from an indirect hernial sac or persistence of the peritoneo-vaginal canal [1].

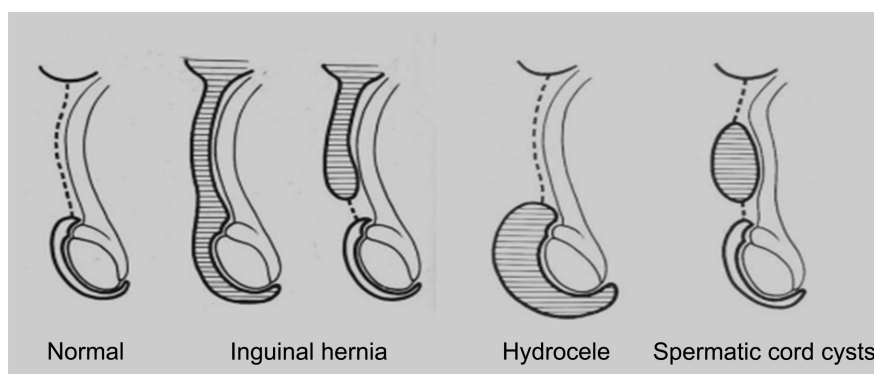


Figure 1. Abnormal closure of the péritonéo-vaginal canal [11].

Patients undergoing PD have an increased risk of inguinal hernia, particularly in at-risk populations: multiparous women, the elderly, obese patients, patients with polycystic kidney disease or patients undergoing long-term corticosteroids treatment [13].

Peritoneo-vaginal leaks tend to develop during the first year of PD (late leaks), whereas early leaks are generally observed within 30 days of PD catheter insertion [14]. In our series, peritoneo-vaginal leakage was late in one case and early in two patients occurring within two and four days respectively of initiation of PD exchanges.

There are several clinical manifestations that can be diagnosed by loss of UF, weight gain, or clinically by the appearance of a hydrocele, uni or bilateral. In the case of bursal swelling, transillumination (a light source behind the scrotum) can be used to distinguish whether the swelling is liquid or solid, thus confirming the diagnosis of hydrocele [15].

The clinical examination plays an essential role in confirming the diagnosis and in the therapeutic decision. If the diagnosis is uncertain or if there is a complication or a clinical need to show the anatomy of the leak, an imaging approach becomes desirable.

Abdomino-pelvic ultrasound plays an important role in establishing the diagnosis and assessing complications. It is necessary to demonstrate the persistence of the peritoneo-vaginal canal and to assess the contents of the hernia sac and the vascularisation of incarcerated structures in the event of an associated hernia.

Peritoneography by computed tomography (CT) remains the reference examination due to its simplicity, accessibility and ease of use, enabling the entire peritoneal cavity to be explored. This examination confirms the diagnosis and makes it possible to establish a precise lesion assessment in the event of associated hernia [16] [17]. It consists of opacifying the peritoneal cavity by injecting iodinated contrast product (ICP) into the dialysate infused into the patient. The patient should be advised to mobilize before the examination to distribute the ICP more evenly and allow it to diffuse into the breach.

Peritoneography can also be performed using magnetic resonance imaging

(MRI) with injection of Gadolinium into the peritoneal cavity, indicated in cases of allergy to PCI.

Peritoneal scintigraphy with isotope injection into the peritoneal cavity is a simple, non-invasive, low-radiation examination with no risk of allergy, enabling peritoneo-vaginal leaks to be diagnosed and located, thanks to the possibility of acquiring images both at the time of infusion and at a distance and after drainage of the dialysate. This test is highly sensitive for detecting small-volume leaks. It involves injecting an isotopic tracer (Technecium 99m) into the dialysate, which is infused into the peritoneum. Acquisitions are made every 5 minutes for 1 hour (**Figure 2**) [12] [18].

The new generations of gamma cameras can be used to produce scintigraphic images (SPECT) coupled to the CT (SPECT/CT: Single Photon Emission Computed Tomography/Computed Tomography) with the aim of merging the images obtained by each modality to obtain a mixed image (hybrid imaging). The principle involves injecting a radioactive tracer that emits gamma rays. The SPECT camera detects the rays emitted and generates an image in all 3 spatial planes. These techniques increase the sensitivity and specificity of the examination and provide better anatomical location if a small leak is suspected (**Figure 3**) [18] [19] [20] [21].

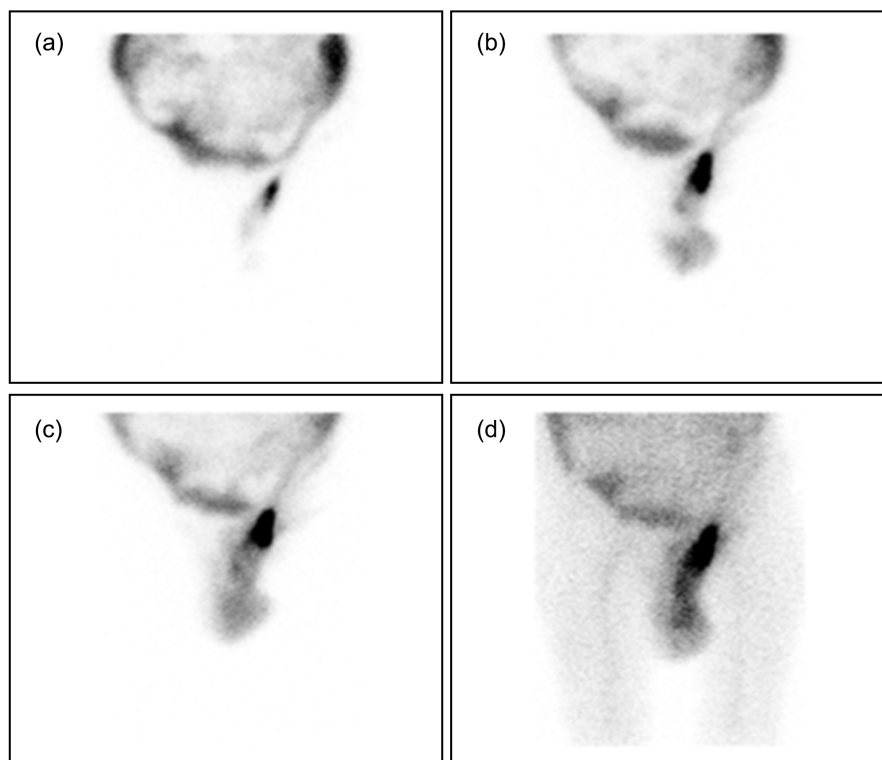


Figure 2. 99mTechnetium (99mTc) sulphur colloid scintigraphy showing peritoneo-scrotal communication: (a) 20 min static image showing tracer distribution within the peritoneal cavity; (b), (c) movement of tracer into the left side of the scrotum at 1 and 3 h; (d) image at 5 h following i.v. 99mTc pertechnetate injection: the path of tracer movement into the scrotum is seen against background body activity [12].

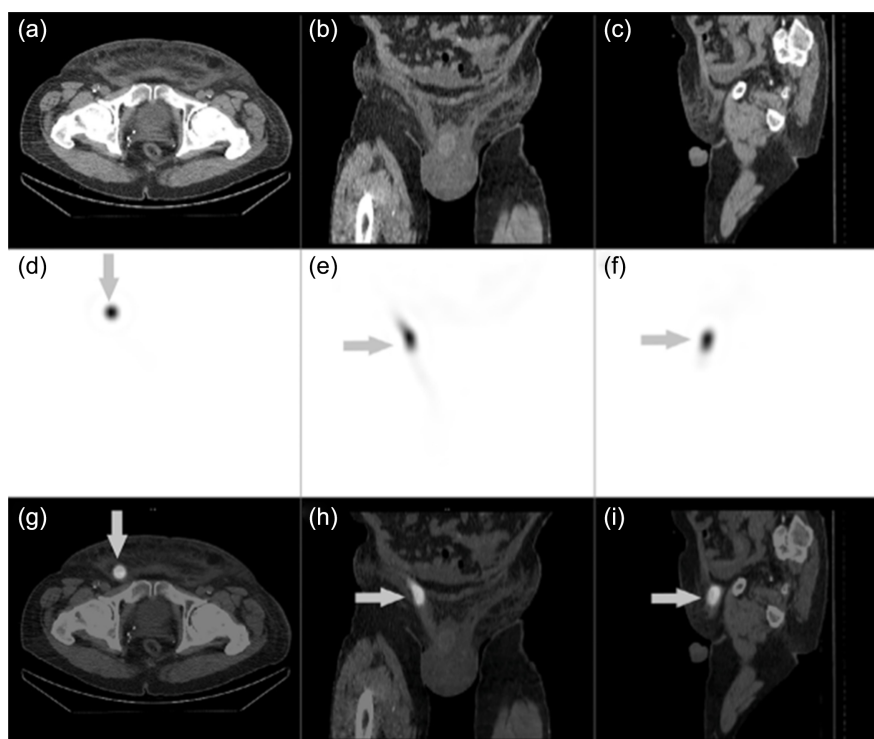


Figure 3. At 5 hours postinjection of ^{99m}Tc -MAA, further evaluation with low-dose CT with axial (a), coronal (b), and sagittal views (c), corresponding SPECT (d)-(f) and fusion SPECT/CT imaging (g)-(i) localized the uptake (arrows) at the right inguinal canal, consistent with a patent processus vaginalis. The axial fusion image (g) clearly demonstrates the uptake at the superficial inguinal ring, an extraperitoneal structure. The coronal (h) and sagittal (i) fusion images further illustrates the communication between the peritoneum and the right inguinal canal [21].

In our unit, two patients underwent abdomino-pelvic ultrasound imaging, which showed an inguino-scrotal hernia with persistence of the peritoneo-vaginal canal in one patient, and a right epididymal cyst in the second. The diagnosis of péritonéo-vaginal leakage was clinically evoked in all three cases.

Approaches to the management of peritoneo-vaginal leaks and current data are insufficient to state which option is the best in this respect. Several treatment modalities for dialysate leaks have been advocated, including surgical repair, temporary transfer to HD, and supine APD with small volumes (500 to 1500 ml) leaving the peritoneal cavity empty during ambulatory periods [22].

According to the literature, for early leaks, temporary cessation of dialysis for 1 to 3 weeks generally results in spontaneous cessation of the leak. Surgery is only indicated in the event of recurrence [1] [23]. For late leaks, transfer to HD, DPA or surgery are various treatment options, although surgical treatment has been suggested to offer longer remission periods without recurrence [1] [24] [25].

In the case of an associated hernia, surgical management must ensure a perfectly tight closure so that the patient can immediately continue PD postoperatively without going to HD [26].

In our unit, the two cases of early leaks were treated by temporary suspension of PD, with a good response in one case and failure in the second, leading to definitive transfer to HD; however, the hernia repair enabled immediate resumption of PD in the third patient without going to HD.

4. Conclusions

Peritoneo-vaginal leakage is a rare mechanical complication in PD. Clinical examination plays an essential role in confirming the diagnosis and in the therapeutic decision. This complication should not prevent the progression of PD in the management of patients with ESKD, for which the ISPD 2019 [27]. Recommends:

- We recommend that initiation of dialysis following catheter placement be delayed for 2 weeks when possible to minimize the risk of leaks (1B).
- We recommend that acute and urgent start of PD 2 weeks following catheter placement utilize a recumbent, low volume, intermittent dialysis regimen, leaving the peritoneal cavity dry during ambulatory periods to minimize the risk of leak (1C).
- We recommend the use of CT peritoneography or peritoneal scintigraphy to investigate suspected peritoneal boundary dialysate leaks (1A).

Conflicts of Interest

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

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