

The Importance of Peritoneal Imaging in the Workup of Genital Edema in Patients on Continuous Ambulatory Peritoneal Dialysis

PAUL G. DAVIDSON, M.D.¹, HAKAN USAL, M.D.², MICHAEL A. FIORILLO,
M.D.³, AND ALBERT MANISCALCO, M.D.⁴
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¹Instructor in Surgery, Mount Sinai School of Medicine, New York, NY; ²Fellow in Plastic Surgery, New York University Medical Center, New York, NY; ³Plastic Surgeon, New City, NY; and ⁴Attending Physician, Departments of Surgery and Medicine, Staten Island University Hospital, Staten Island, NY and Assistant Clinical Professor of Medicine, SUNY Health Sciences Center at Brooklyn, Brooklyn, NY.

Address correspondence to Paul G. Davidson, M.D., F.A.C.S., 1130 Victory Boulevard, Staten Island, NY 10301.

Abstract

Background: Genital edema is a well-reported complication of peritoneal dialysis. This phenomenon has been associated with extravasation of dialysate from the peritoneal cavity through a defect in the abdominal wall or through an inguinal hernia (or patent processus vaginalis, persistent sac). In the first case, fluid tracks through the soft tissues of the abdominal wall and settles in the dependent genitalia. In the second, fluid tracks through the inguinal hernial defect and infiltrates into the tissues distal to the defect. It is difficult to precisely diagnose the etiology of many of these cases but it is obviously important.

Method: We report a case of a patient who presented with penile and scrotal edema and was eventually found to have bilateral patent processus vaginalae. We used computed tomography and peritoneal scintigraphy in order to ascertain the diagnosis.

Results/Conclusions: We believe that computed tomography and peritoneal scintigraphy are extremely helpful in the workup of genital edema in patients on continuous ambulatory peritoneal dialysis.

Key Words: Genital edema, continuous ambulatory peritoneal dialysis, complications, adverse effects, hernia.

Introduction

Continuous Ambulatory Peritoneal Dialysis (CAPD) has been shown to be useful in treating patients with chronic renal failure, and has many advantages over hemodialysis (1). Its most common and serious complication is peritonitis (2). Genital edema is reported more frequently. It can be an immediate or late complication of this form of dialysis. Penile and scrotal edema develop by either of two mechanisms (3). In the first, dialysate extravasates from the peritoneal cavity through the catheter insertion site or a ventral or incisional hernia; the fluid tracks through the soft tissues of the abdominal wall to settle in the dependent genitalia. In the second mechanism, fluid extravasates through an inguinal hernia of patent processus vaginalis (persistent sac) directly into the tunica vaginalis and surrounding tissues. Obviously, determining which one of these problems exists is vital to the proper treatment of the patient. We report a case in which a patient developed both scrotal and penile edema shortly after beginning CAPD. We learned to appreciate the difficulty in establishing a definitive etiology for this patient's genital edema and found peritoneoscintigraphy and computerized axial tomography with contrast material added to the peritoneal dialysate to be invaluable in our workup. We feel that at least one, and perhaps both, of these tests should be used to ascertain a diagnosis before surgical therapy is initiated.

Case Report

A 61-year-old white male with a past medical history of chronic renal failure due to diabetic nephropathy had a Cruz peritoneal dialysis catheter (Corpak Medsystems, Wheeling, IL) placed via an open lateral transrectus incision in an ambulatory setting without incident. Seven weeks later, after initiation of CAPD, the patient developed penile and scrotal edema. CAPD was withheld for a few days until the edema resolved. After resuming CAPD, the genital edema recurred.

Physical examination failed to reveal inguinal hernia or cough impulse. Examination of the catheter exit site and implantation incision failed to reveal evidence of leakage, hernia or subcutaneous fluid collection. There was no abdominal wall edema present.

The penile edema suggested to us that there was leakage from around the catheter as it passed through the abdominal wall. He was taken to the operating room for exploration. We were unable to demonstrate a leak or hernia by direct examination and intraoperative fluoroscopy. The catheter was removed and a new catheter was placed. Peritoneal dialysis was withheld for one week and when it was resumed, the problem recurred.

The patient was then reevaluated using CT scan and peritoneal scintigraphy. The nuclear study was performed using 7.6 mCi of ^{99m}Tc labeled albumin colloid mixed with 2 liters of dialysate which was then infused into the peritoneal cavity via the peritoneal dialysis catheter. The patient was scanned using a gamma camera, in anterior and oblique views. After 10 minutes, the isotope was seen to be present in the groin areas bilaterally, consistent with bilateral patent processus vaginalae (**Fig. 1**). After 2 hours, the dialysate fluid was drained from the peritoneal cavity and another scan was then performed (**Fig. 2**). Subsequently, 2 liters of dialysate, to which was added 100 mL of 60% diatrizoate meglumine contrast medium, was instilled into the peritoneal cavity.

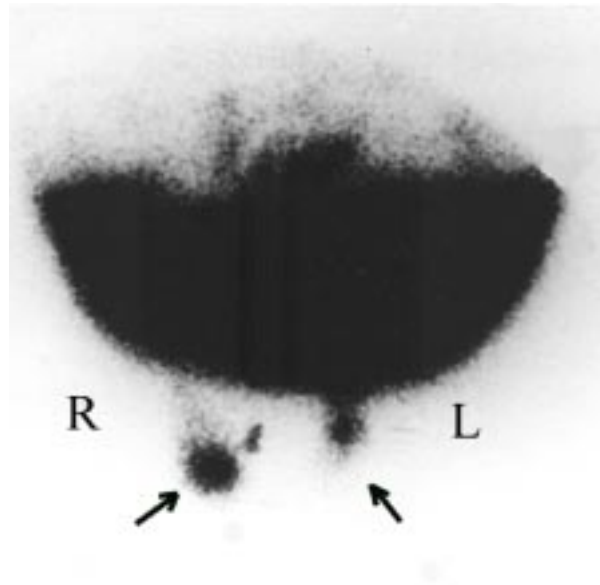


Fig. 1. Peritoneal dialysis fluid, to which a radioisotope has been added, has been instilled into the abdomen. Fluid is evident in both inguinal canals and in the right hemiscrotum (arrows) at 10 minutes in this anterior view of the pelvis.

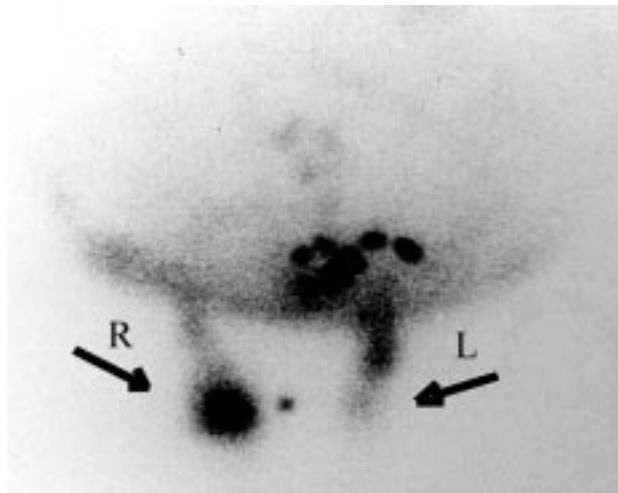


Fig. 2. Two hours post-instillation of radioisotope containing peritoneal dialysis fluid, the fluid has been removed from the abdomen. With the patient erect, radioactivity is clearly seen in the inguinal canals and right hemiscrotum (arrows) in the same view as in **Fig. 1**

same high pressure can cause movement of dialysate through living membranes such as the peritoneum (7). Genital edema was first reported as a complication of CAPD by Khanna et al. (8) in 1981. In a retrospective study of 450 of their CAPD patients, Abraham et al. (9) found the incidence of this complication to be 4%; Kopecky and his associates (3) reported a 10% incidence in 81 patients.

There are two distinct mechanisms that can cause genital edema. In the first, a leak at the insertion site of the peritoneal dialysis catheter in the abdominal wall or other area of disruption of the peritoneo-fascial barrier allows extravasation of hypertonic peritoneal dialysate into the abdominal wall tissues. This fluid settles in the dependent genitalia. In the second mechanism, the increase in the intra-abdominal hydrostatic pressure, produced by the dwelling dialysate, causes translocation of this fluid through the peritoneal membrane that makes up an inguinal hernia or patent processus vaginalis (persistent sac) into the surrounding tissues. The incidence of indirect inguinal hernia is between 10 and 25% (7). A postmortem study of adults who died without clinically apparent inguinal hernias found a patent processus vaginalis (persistent sac) in 20% (10).

The etiologic mechanism that caused the genital edema is often impossible to detect by physical examination. This fact is, unfortunately, clearly illustrated in our case. The penile edema and absence of a palpable inguinal hernia, with which our patient presented, suggested to us that there was a leak of dialysate into the anterior abdominal wall. We took the patient to the operating room and instilled radiographic contrast into the peritoneal cavity. We hoped that fluoroscopic examination at that time would reveal the defect. In fact, no leakage along the catheter tract at the peritoneo-fascial insertion site or into a hernia was demonstrated. We elected to remove the peritoneal dialysis catheter and place a new one at a new site.

When the patient developed genital edema immediately upon resuming CAPD four weeks after placement of the new catheter, we performed two helpful diagnostic tests. Peritoneoscintigraphy was performed first. Gamma camera scanning identified radioactivity in the scrotum on both sides. Following this, the patient underwent CT scan as described above. This study, too, identified contrast material in both hemiscrota; no viscera were seen in the canals. The findings in both studies were consistent with bilateral patent processus vaginalae.

The patient later underwent bilateral inguinal hernia repairs with high ligation of the patent processus vaginalae. He has done well on CAPD without recurrence of genital edema over the past two years.

This case confirmed to us the necessity of performing at least one of these two diagnostic studies when encountering the CAPD patient with genital edema. Although our case illustrates the effectiveness of these studies in the patient with a patent processus vaginalis, others have reported similar success in the patient with anterior abdominal wall leaks (11, 12). These investigators have suggested that CT peritoneography is superior to peritoneoscintigraphy in the diagnosis of abdominal wall leaks because of its better anatomic resolution. Maxwell et al. (12) suggest repeating the scan

at 4 and up to 24 hours after instillation of the contrast material in negative or equivocal cases when abdominal wall or genital edema is present.

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