

Diagnosis of dialysis leak in children on peritoneal dialysis using radionuclide technique

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Abstract

Dialysis leak from the peritoneal cavity into various tissue planes, most often into subcutaneous tissue around a previous surgical incision or through umbilical hernia is known complication of continuous ambulatory peritoneal dialysis (CAPD). This complication leads to bed ultrafiltration and compromise the peritoneal dialysis. Usually computed tomography (CT) makes the diagnosis of dialysate leakage. However there are other techniques that have been shown useful in particular occasions. Peritoneoscintigraphy is an underestimated noninvasive technique for diagnosis of dialysate leakage.

We refer a 9-year-old girl who was on CAPD for 2 years and presented with genital edema and failure of ultrafiltration. Using peritoneoscintigraphy we diagnosed leakage of dialysate in subcutaneous tissue through umbilical hernia. CT has proved this finding.

We conclude that the peritoneoscintigraphy is an instrumental technique to identify the causes of genital edema in patients on peritoneal dialysis. Hippokratia. 2012; 16 (2): 184-186

Key words: genital edema, hernia, continuous ambulatory peritoneal dialysis, peritoneoscintigraphy

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The abdominal wall hernias are common complication in children treated with CAPD. Dialysate leaking from the peritoneal cavity into various tissue planes, most often into subcutaneous tissue around a previous surgical incision or through umbilical hernia is another complication^{1,2}.

This complication leads to bed (insufficient) ultrafiltration and compromise the peritoneal dialysis.

Diagnostic imaging of the complications of CAPD is important because such evaluation can aid in the treatment decision process.

Abdominal CT in conjunction with intraperitoneal infusion of contrast material was used as early as 1979 to assess the dynamics of the intraperitoneal fluid³. However, CT peritoneography has several limitations involving multiplanar imaging capabilities, and in addition, iodinated contrast material is required⁴. In smaller children CT peritoneography can be difficult to perform because of bad cooperation. Peritoneoscintigraphy does not require cooperation and it is not associated with X ray exposition and with exposition of possibly allergised substances, therefore it may be useful alternative in diagnosis of dialysate leaking. It has been shown that this technique is sensitive in diagnosing of such complication⁵.

We here report a girl treated with CAPD who after previous surgery of umbilical hernia presented genital

edema, where by using peritoneoscintigraphy diagnosis of PL was made.

Case Report

The 9-year-old girl treated by CAPD for two years was admitted at our department because of appearance of genital and abdominal wall edema with failure of ultrafiltration. Six months ago she had surgery because of umbilical hernia - a common complication of PD.

On physical examination her temperature was 36.7 C, her pulse rate was 70/min, and her blood pressure was 110/70 mm Hg.

Laboratory evaluation was normal except for high values of degradation products (urea: 15 mmol/l and creatinin: 320 µmol/l) and mild anemia and hypoproteinemia. There were no signs for umbilical hernia by inspection.

The suspicion for dialysate leaking into subcutaneous tissue through occult umbilical hernia was considered.

Peritoneoscintigraphy was made by using 5 mCi of ^{99m}Tc labeled albumin colloid mixed with 1 liters of dialysate, which was then infused into the peritoneal cavity via the peritoneal dialysis catheter.

Two hours post-instillation of radioisotope containing peritoneal dialysis fluid, the fluid has been removed from the abdomen. The presence of radioactivity in umbilical area after emptying of the peritoneal cavity and 24 hours

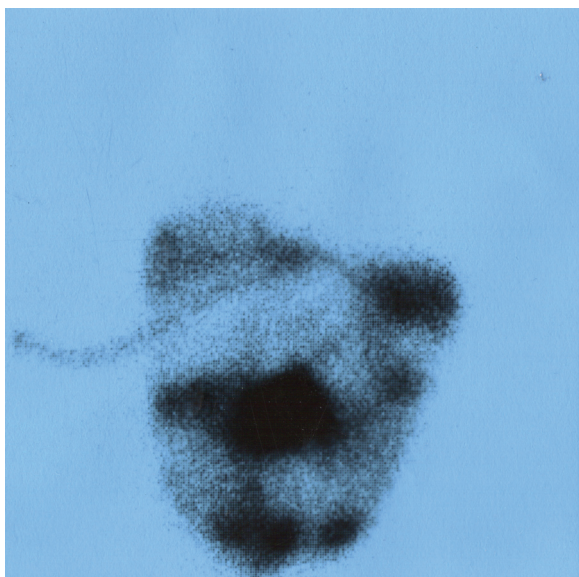


Figure 1: Radioactivity around umbilical region 24 hours after instillation of the contrast material.

later was in favor to the diagnosis of dialysate leaking (figure 1). CT confirmed this finding (figure 2).

The umbilical hernia was treated surgically and the child was transferred on automated peritoneal dialysis with frequent small volume dialysate exchanges during the following month period.

Control peritoneoscintigraphy was negative for dialysate leaking and the child was retransferred to the CAPD. There was no recurrence of the patient's genital edema. After more than two years of follow-up, the patient is tolerating CAPD well; there has been no recurrence of the patient's genital edema or umbilical hernias.

Discussion

Patients on CAPD have a high incidence of abdominal hernias caused by chronically increased intraperitoneal pressure. This high pressure can cause movement of dialysate through living membranes such as the peritoneum⁶. Leakage may result either in open extravasation of dialysate along the catheter tunnel or in abdominal wall edema from diffusion of the fluid into the subcutaneous tissue. This fluid settles in the dependent genitalia. Genital edema as a complication of CAPD was first reported by Khanna et al.⁷ in 1981. In a retrospective study of 450 of their CAPD patients, Abraham et al.⁸ found the incidence of this complication to be 4%; Kopecky and his associates⁹ reported a 10% incidence in 81 patients.

Numerous catheter designs and surgical techniques have been used in attempts to reduce the prevalence of this problem^{10,11}.

Ultra filtration problems, suspected dialysate leaks, and outlet problems are indications for radiological examinations. Usually, abdominal CT is used for differentiate these problems. However this investigation is associated with significant radiation exposition, exposition to the iodinated

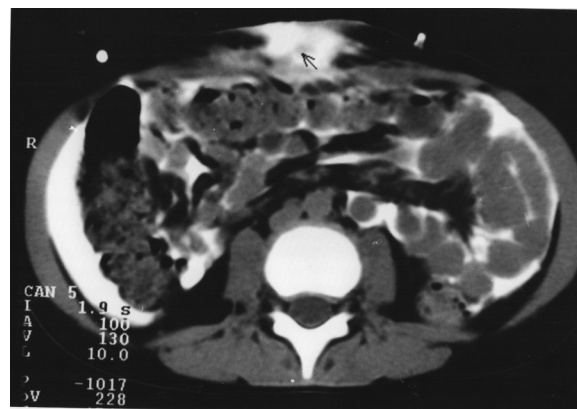


Figure 2: CT images illustrate fluid near the umbilical region and subcutaneous soft tissue of abdominal wall secondary to leaks of dialysate.

contrast with risk of allergy and requires cooperation of the patient. However this investigation is with significant radiation exposition, use of the iodinated contrast with risk of allergy and requires cooperation of the patient. It is not always possible especially if small aged children. The peritoneoscintigraphy is an alternative method associated with minimal radiation dose, with no risk of allergy and does not require patient cooperation¹². What investigation will be used at least partially depends from the local affinity and tradition of different centers¹³.

In our opinion the role of peritoneoscintigraphy in diagnosis of peritoneal leaking in patients with CAPD is underestimated and the method has not reached full usefulness. The others have reported similar success¹⁴⁻¹⁷. 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 al⁵ 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.

In our case we suspected peritoneal leaking although there was no obvious recidivate of umbilical hernia. We considered the possibility for occult umbilical hernia with leaking of dialysate. Our suspicion was confirmed by using peritoneoscintigraphy, giving the opportunity for urgent surgical correction and possibility for continuing peritoneal dialysis.

In conclusion, in our case peritoneoscintigraphy allowed not only the diagnosis of peritoneal leaking and suspected hernia but also the following and evaluation of the success of surgery intervention. This technique is a relatively safe, simple, and effective method for detecting structural abnormalities and localizing the origin of leakage, and should be include in the diagnosis, especially in low compliance children.

No conflict of interest was stated.

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