

## Case Report

# Encapsulating peritoneal sclerosis following a peritoneal foreign body reaction to Dacron fibres—a case report

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### Abstract

The aetiological factors and the pathophysiological mechanisms of encapsulating peritoneal sclerosis (EPS) have not been fully elucidated. We present a patient on continuous ambulatory peritoneal dialysis whose peritoneal catheter was exchanged due to repeated episodes of bacterial peritonitis. Immediately afterwards, he experienced severe abdominal pain, nausea and fever. Peritoneal biopsy, taken 12 days after the operation, revealed fibrotic thickening of the peritoneum and a foreign body inflammatory reaction to particles manifesting striking similarity to the Dacron fibres of the catheter cuff. Shedding of Dacron fibres into the peritoneum may have elicited the acute fulminant phase of the EPS diagnosed in this case.

**Keywords:** Dacron cuff; encapsulating peritoneal sclerosis; foreign body reaction; peritoneal dialysis

### Background

Encapsulating peritoneal sclerosis (EPS) is the most serious complication of peritoneal dialysis. It is characterized by transformation of the peritoneal membrane into a sclerotic cocoon encapsulating and strangling the intestines. EPS leads to withdrawal from peritoneal dialysis, and in spite of improved medical and surgical treatment, it is still associated with considerable morbidity and mortality [1, 2]. Duration of peritoneal dialysis and high transporter status are well-known risk factors whereas peritonitis may trigger the onset of EPS [3–5].

Most often, the onset of the EPS process is insidious but an acute fulminant form of the disease has been reported [6, 7]. These patients manifest a severe systemic inflammatory reaction and steroid treatment may be life saving [6].

We report a case of fulminant EPS, which coincided with a peritoneal foreign body reaction to foreign body fibres identical to the Dacron fibres of the catheter cuff.

### Case report

The patient is a male born in 1982. In September 2004, advanced chronic renal failure due to IgA nephropathy was diagnosed. Two months later, continuous ambulatory peritoneal dialysis was started, using a double-cuffed coiled Tenckhoff catheter, made of medical-grade silicone rubber with Dacron cuffs (Kimal plc, Uxbridge, England) and the dialysis fluids Physioneal and Extraneal (Baxter Inc., Deerfield, IL). There were no clinical or technical complications during the first 31 months of treatment.

In June 2007, the transfer tube was punctured by an unknown instrument resulting in a leakage. Within a few hours, the transfer set was exchanged and antibiotics administered. Nevertheless, the patient developed *Staphylococcus epidermidis* peritonitis. During the next 10 weeks, the patient had further three episodes of peritonitis due to a *Corynebacterium* species, a *Bacillus* species and a *Corynebacterium* species, respectively. All the peritonitis episodes were adequately treated with regard to the cultured bacteria and their sensitivity to antibiotics. After each course of treatment, the peritoneal dialysis fluid was culture negative and the serum C-reactive protein (CRP) concentration approached normal values. The patient did not feel well during this period and he lost weight but there were no abdominal complaints that could not be explained by the episodes of bacterial peritonitis.

After treatment of the fourth peritonitis episode, the peritoneal catheter was removed and a new catheter of the same type was laparoscopically inserted during the same procedure. The catheter was easily inserted and the surgeon did not notice anything unusual. The following day, the patient experienced severe abdominal pain, nausea and high fever. The serum CRP concentration rose rapidly and fluctuated between 200 and 300 mg/L. Cultures of dialysis fluid were negative. A computed tomography scan showed a thickened peritoneal membrane and dilated intestinal loops. Since EPS was now suspected, the peritoneal catheter was removed 12 days after insertion. This time, the surgeon had difficulties in introducing air into the peritoneal cavity and he observed thickened peritoneum covering the intestinal loops. Peritoneal biopsies showed thickened fibrotic

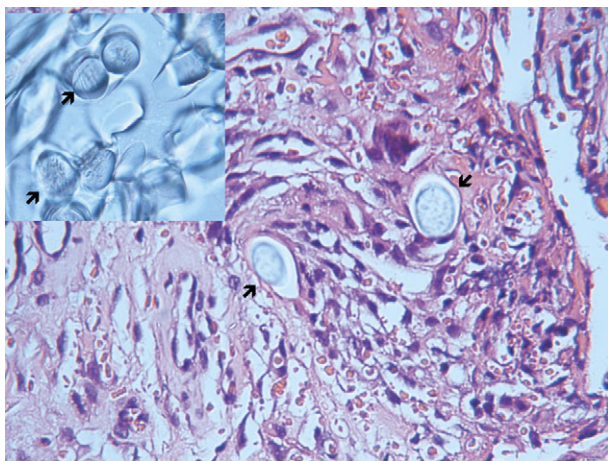
tissue. There was also a marked inflammatory response of a foreign body type, including giant cell reaction. A foreign body material was detected, which had the appearance of oval particles with finely granular or homogeneous appearance, when examined with conventional microscopy on a haematoxylin- and eosin-stained slide (Figure 1). When these foreign particles were examined in a contrast phase microscope, the birefringence of this material illuminated as shown in Figure 2. This material showed a striking resemblance to Dacron fibres (Figures 1 and 2).

At this point, clinical, radiological, surgical and histopathological findings indicated fulminant EPS. Haemodialysis treatment was started and prednisolone administered at the dose of 30 mg daily. Soon, the patient felt much better; nutrition was improved and the serum CRP concentration came down to 20 mg/L. However, within a few weeks, repeated subileus attacks were observed. In January 2008, a laparotomy revealed marked thickening of the peritoneum with multiple adhesions leaving the small intestine in a bundle. Enterolysis was performed and peritoneal biopsy was sent for histology. This showed a very thickened and fibrotic peritoneum, which histologically consisted of paucicellular fibrosis containing capillary-type vessels but no foreign-type material or foreign-type inflammatory reaction.

After a successful enterolysis, the patient rapidly recovered. In March 2008, he was transplanted with a kidney from his mother. The immunosuppressive regimen consisted of tacrolimus, mycophenolate mofetil and prednisolone. The transplanted kidney is still functioning well and there have been no abdominal complaints.

## Discussion

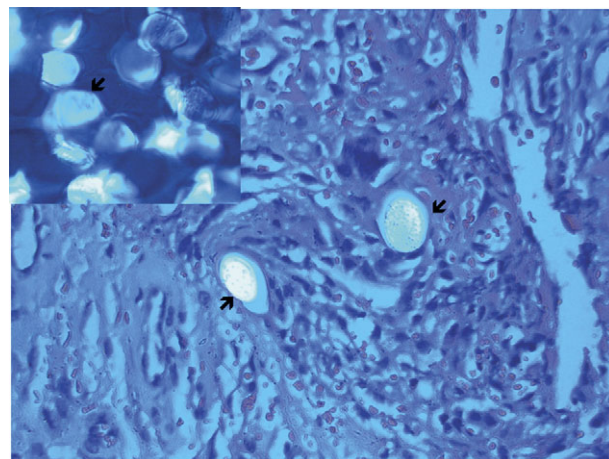
At the time of diagnosis of EPS, our patient had only been on peritoneal dialysis for 34 months and he had never experienced problems with ultrafiltration. He was asymp-



**Fig. 1.** In the larger image, a haematoxylin- and eosin-stained section of the peritoneal biopsy is present, showing foreign body-type giant cell inflammation with foreign body particles (arrows) (magnification  $\times 400$ ). The inserted image (magnification  $\times 400$ ) illustrates a histology section from the Dacron cuff of the catheter showing Dacron fibres (arrows) with appearance identical to the foreign particles in the peritoneum.

tomatic until he was hit by repeated episodes of peritonitis, caused by different bacteria. His malaise and weight loss can be explained by the bacterial infections as such or by EPS, induced or catalysed by multiple episodes of peritonitis. However, even though we cannot accurately determine the time at which the development of EPS began, the fulminant phase of the disease started immediately after removal of the peritoneal catheter and insertion of a new one indicating an association between this surgical procedure and the acute illness. The initial peritoneal biopsy, collected 12 days after the catheter exchange, showed a marked foreign body-type inflammatory response to fibre-like objects. These findings raised the suspicion that foreign bodies had found their way into the peritoneal cavity during the catheter exchange. The foreign bodies did not look like any recognizable material. The only possible foreign object that the authors could think of having come in contact with the patient's peritoneum was the peritoneal catheter. Consequently, various parts of a catheter were processed histologically in the same way as the peritoneal biopsies. This revealed a striking similarity between the foreign bodies and the Dacron fibres of the catheter cuff. Thus, we hypothesize that the Dacron fibres came loose during either the removal of the peritoneal catheter or the insertion of a new one resulting in a peritoneal foreign body inflammatory reaction and subsequent sclerosis. No foreign bodies were observed in the biopsy obtained during the enterolytic procedure, 4 months after the catheter exchange. This can be explained either by a sampling error or phagocytosis and eventual elimination of the foreign bodies.

Dacron is a trade name of polyethylene terephthalate (PET), a widely used synthetic polymer, which is known to elicit a moderate inflammatory response and fibroblast proliferation [8, 9]. Animal studies have also shown that implantation of PET material in subcutaneous tissue leads to a foreign body reaction and fibrous encapsulation [10]. Moreover, studies of the deep cuff of Tenchoff's catheter, removed from dialysis patients, showed birefringent material surrounded by prominent giant cells, foreign body



**Fig. 2.** In this figure, a haematoxylin- and eosin-stained section from the peritoneum and an inserted image of the Dacron fibres from the catheter cuff are examined in a phase contrast microscope, the foreign material and the fibres illuminating in identical manner (arrows) (magnification  $\times 400$ ).

granulomata and fibrosis [11]. Upon introduction to the peritoneum, PET would be expected to induce inflammation and foreign body reaction. Our patient had suffered from repeated episodes of bacterial peritonitis at short intervals. The reaction to the Dacron fibres might have acted as a 'second hit' in a patient who was already predisposed to EPS.

*Conflict of interest statement.* None declared.

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