



ENCAPSULATING PERITONEAL SCLEROSIS: COMPLICATION OF PERITONEAL DIALYSIS (CASE REPORT)

I. M. Daniliuc¹, I. Guțu², C. David³, I. Checheriță⁴, Al. Ciocâlțeu⁵

¹ Assistant lecturer, MD, Department of Nephrology, "Sf. Ioan" Hospital, Carol Davila University of Medicine and Pharmacy, Bucharest

² MD, Department of Nephrology, "Sf Ioan" Hospital Bucharest

³ Assistant professor, Department of Nephrology, "Sf Ioan" Hospital, Carol Davila University of Medicine and Pharmacy, Bucharest

⁴ Junior assistant lecturer, MD, Department of Nephrology, "Sf Ioan" Hospital, Carol Davila University of Medicine and Pharmacy, Bucharest

⁵ Professor, MD, PhD, Chief of the Department of Nephrology, "Sf Ioan" Hospital, Carol Davila University of Medicine and Pharmacy, Bucharest

Abstract. Encapsulating peritoneal sclerosis (EPS) is a rare but devastating complication of long-term peritoneal dialysis (PD) therapy. EPS is characterized by peritoneal membrane inflammation, followed by progressive peritoneal membrane fibrosis and intestinal encapsulation. Clinical manifestations include ascites and small bowel obstruction. The exact causes of EPS remain unknown but EPS is frequently seen after an increased duration of PD therapy. The prognosis of EPS is poor. Early diagnosis and prompt initiation of treatment is essential. We report a case of EPS following bacterial peritonitis in a peritoneal dialysis patient.

Keywords: Encapsulating peritoneal sclerosis, peritoneal dialysis, complication of peritoneal dialysis, treatment

Introduction

Medical literature presents EPS, also called "sclerosing peritonitis" and "abdominal cooing", as a rare condition characterized by fibrosis of the visceral peritoneum often associated with ascites formation. EPS may occur as an idiopathic process or secondary to PD therapy.

The definition and diagnostic criteria of EPS in PD were described by the Japanese Sclerosing Encapsulating Peritonitis Study Group and subsequently adopted by the International Society for PD (1). EPS is a clinical syndrome characterized by symptoms of intermittent or recurrent bowel

obstruction caused by a wide range of adhesions of a diffusely hypertrophied peritoneum. Morphologically, peritoneal thickening and/or sclerosing peritonitis can be observed.

Epidemiology

The prevalence of EPS in PD patients ranges from 1% to 5% (2,3), one half to two thirds (4) of the patients with EPS developing the syndrome an average of 4 months after withdrawal from PD therapy, with a potential delay of up to 4 years (5). The prevalence increases with the length of PD therapy: 1% in patients on PD therapy for less than 5 years compared with 12% in those on PD therapy for more than 8 years. Patients with diabetic nephropathy as the cause of end stage kidney disease rarely develop EPS, most likely because they do not survive long enough on PD therapy (6).

Ionel Alexandru Checheriță

"Sf. Ioan" Hospital

13, Șoseaua Vitan-Bârzești Str., Bucharest

email: fizij@yahoo.com

Risk factors

Early studies postulated that antiseptics such as chlorhexidine (7,8), acetate dialysate, in-line bacterial filters and peritonitis are important risk factors for EPS. Patients who developed EPS had peritonitis rates 3 times greater than those without EPS (9). *Staphylococcus aureus* and fungal peritonitis have been associated with the development of EPS.

Exposure to beta blockers, especially practolol is cited as a risk factor for EPS (10).

Currently regarded as potential risk factors for EPS are: a long duration of PD therapy (11), high peritoneal membrane transport characteristic (12), discontinuation of PD therapy and loss of ultrafiltration. Eighty percent to 100% of patients diagnosed with EPS have a history of high peritoneal membrane transport characteristic; patients who transferred after 5 to 10 years of PD therapy to hemodialysis therapy had a 9%-10% prevalence of EPS (13). It is tempting to speculate that PD therapy itself may be protective against EPS development by mediating local removal of cytokines and fibrin from the peritoneal cavity.

The accompanying increase in EPS prevalence might be caused by the duration of exposure to the bioincompatible dialysate solution - acetate or lactate buffer, acidity, glucose, high osmolality, even in the icodextrin era of PD prescription - modern non glucose based PD solutions have been shown to interfere with the formation of intrabdominal adhesions in the gynecologic literature (14).

The presence of the foreign body – PD catheter, a genetic predisposition and environmental factors may all contribute to EPS.

Several centers have recently reported an increase in the number of cases of EPS in PD patients with a history of renal transplantation (19). The use of calcineurin inhibitors coupled with peritoneal injury secondary to exposure to PD fluid and/or infection may further propagate the profibrotic and inflammatory processes already existing in visceral peritoneum.

The current understanding is that EPS mostly occurs in patients on long term PD and that it is related to changes in peritoneal membrane.

Pathogenesis of EPS

The pathogenesis of EPS remains largely elusive. It is likely that several factors are at play. The “2 hit hypothesis” appears to be widely accepted (15,16). During the first “hit”, peritoneal injury is initially

slow and insidious – the pathogenic role of glucose based PD solutions, glucose degradation products (GDP), and advanced glycosylation end-products promoting ongoing peritoneal inflammation, fibrosis and neovascularization (17).

A second “hit” is then superimposed leading to the development of EPS. Potential precipitating events may include an episode of PD peritonitis and cessation of PD, coupled with a genetic predisposition for the development of EPS. Explorations of several candidate gene polymorphisms are underway and include cytokines involved in the cellular signaling of inflammation – IL6, TNF – and mediators of peritoneal neoangiogenesis and fibrosis (VEGF, RAGE) (18).

A recent study reported a pathogenic role of beta 2 microglobulin. If the retention itself of middle molecular uremic substances influences the biocompatibility of PD solutions, it might be worthwhile to attempt combined CAPD and hemodialysis treatment in patients with high beta 2 microglobulin levels, but this also requires further study. We should not pay attention only to PD solutions but also to the retention of middle molecular uremic substances.

Diagnosis

Initially vague gastrointestinal symptoms and decreased peritoneal ultrafiltration (UF) dominate the clinical picture. Progressive sclerosis further compromises the gastrointestinal function, resulting in nausea, vomiting, diarrhea or constipation, abdominal distension and episodes of complete or partial bowel obstruction. Abdominal masses consisting of matted loops of intestine can be found on examination. Weight loss and malnutrition then ensue. A bloody peritoneal dialysate can be observed. Patients diagnosed with EPS after PD therapy cessation frequently present with gastrointestinal symptoms in conjunction with recurrent ascites (table 1).

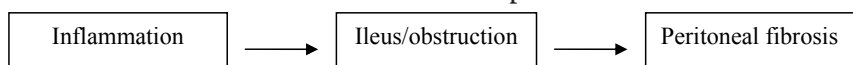
Laboratory findings are not useful in diagnosing EPS. The levels of circulating inflammation markers can be elevated but they are nonspecific; such markers are elevated in many patients with end stage renal disease.

Radiological studies: abdominal plain film and barium studies detect dilated loops of small bowel with air fluid levels, dilated bowel loops and calcifications in the peritoneal and abdominal wall. CT and MRI remain the choice diagnostic imaging

techniques. Findings may include a thickened intestinal wall with peritoneal membrane thickening, dilated bowel loops with air-fluid levels, loculated ascites and peritoneal calcifications.

Conclusion

Our current understanding of EPS and its pathogenesis is incomplete. EPS remains a difficult disease to prevent and treat. The best we can do at present



<ul style="list-style-type: none"> • increased body temperature • ascites • fatigue • weight loss • increase in peritoneal membrane transport status • hemoperitoneum • abdominal discomfort 	<ul style="list-style-type: none"> • appetite loss • nausea • vomiting • abdominal pain • diminished bowel sounds • anorexia • weight loss 	<ul style="list-style-type: none"> • bloody peritoneal effusion • abdominal discomfort • ascites • abdominal masses • ultrafiltration failure • recurrent bowel obstruction
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Table 1 Clinical presentation of encapsulating peritoneal sclerosis

A laparotomy diagnostic revealing typical findings of small bowel encapsulation remains the gold standard for diagnosis (14).

Treatment

Current treatment strategies appear to be dependent on the stage of presentation. During the inflammatory phase, discontinuation of PD, supportive nutritional therapy and use of corticosteroids alone or in combination with Azathioprine may be successful. Case reports describing the use of Tamoxifen alone or in combination with immunotherapy suggest that it may aid the recovery from EPS (20).

After peritoneal fibrosis becomes established and progressive bowel encapsulation and obstruction lead to total parenteral nutrition, bowel rest, drainage of loculated intra-abdominal fluid collections and switch to hemodialysis therapy are often required.

Surgical therapy includes lysis of intestinal adhesions and stripping of the fibrous cocoon; these are indicated in persistent or recurrent bowel obstruction, failure to respond to medical therapy, failing nutritional status.

Novel therapies including the use of the immunosuppressant Sirolimus with antifibrotic properties seem promising (21).

Despite treatment, the mortality rate of EPS remains high, ranging from 24% to 83%.

is to make peritoneal dialysate more biocompatible, prevent peritonitis and improve its treatment, limit chemical exposure of the peritoneum and heighten the index of suspicion when PD patients present with vague gastrointestinal symptoms.

Case report

A 56 year old man with end stage renal disease caused by chronic glomerulonephritis, who received PD for 5 years, was admitted to our department of Nephrology – the Sf Ioan Hospital, Bucharest – with fever, nausea, vomiting and diffuse abdominal pain.

The patient’s PD regimen included 5 exchanges of 2 L of PD solution daily. All exchanges were performed using 2.27% dextrose solution for 4 years and during the past year, one of the exchanges had been replaced by 7,5% icodextrin. His peritoneal equilibrium test was at a low average during the first 3 years but it became high over the past 2 years.

He had one episode of peritonitis in the first year.

He used beta blockers and calcium blockers for blood pressure control.

Physical examination – acutely ill-looking man with a temperature of 38.5°C; distended and tympanic abdomen, hypoactive bowel sounds and diffuse abdominal tenderness and rebound.

Laboratory findings included leukocytosis, hypochromic anemia, elevated erythrocyte sedimentation rate, elevated RCP.

- The analysis of the peritoneal effluent revealed an increased white blood cell count of 500 cells/

microliter with 50% neutrophils.

- The PD effluent culture grew *Staphylococcus aureus*.

Intraperitoneal cefazoline with ceftazidime was used for 10 days.

After this treatment, leukocytosis, nausea and vomiting persisted, the PD catheter was removed and the patient was shifted to hemodialysis therapy. Due to the fact that the vomiting continued and the patient lost 5 kg, total parenteral nutrition was started. An abdominal plain film showed dilated bowel loops and calcification in the pelvis. Abdominal computed tomography showed dilated bowel loops with thickened walls, peritoneal thickening, loculated ascites and peritoneal calcification.

Diagnosis: EPS after bacterial peritonitis.

The treatment consisted of Tamoxifen 20 mg/day and Methylprednisolone 40 mg /day. After 7 days of treatment, bowel motility improved and the patient could begin an oral nutritive intake. The patient was discharged 2 weeks later with daily oral Tamoxifen 20 mg/day and Methylprednisolone 30 mg/day. He continued on hemodialysis therapy and had no symptoms of bowel obstruction after 4 months.

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