



## **Bacterial Peritonitis Following Esophagogastroduodenoscopy in a Patient on Peritoneal Dialysis**

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. Authors RA and TF designed and written the case report, including initial draft and final version. Authors MBP and TF collected the patient's clinical data. Authors RA, TF and EC managed the literature searches. Authors MSM, EC, TF further edited the manuscript and provided critical commentary. All authors read and approved the final manuscript.*

### **Case Study**

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### **ABSTRACT**

**Aims:** To recognize the importance of considering perforation of viscus in the differential of peritonitis after upper gastrointestinal endoscopy in peritoneal dialysis patients and to address the potential benefit of antibiotic prophylaxis in PD patients undergoing upper GI procedures.

**Presentation of Case:** We report the case of a 54-year-old African American female with end-stage renal disease on peritoneal dialysis presenting with generalized abdominal pain, along with nausea and vomiting. Peritoneal fluid revealed a WBC count of 1,499/mm<sup>3</sup>. Two days earlier, she had undergone an esophagogastroduodenoscopy with biopsy. Broad spectrum antibiotics were started to treat possible peritonitis.

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Surgical exploration revealed no perforation but murky peritoneal fluid was noted and gram stain showed mixed flora (both gram negative and gram positive rods); however, blood and peritoneal fluid culture grew only *Streptococcus pneumoniae*.

**Discussion and Conclusion:** An occult perforation, which may not be obvious to the naked eye or signs of contrast extravasation can occur after esophagogastroduodenoscopy with manipulations and can lead to peritonitis, especially in high-risk patients such as those with end-stage renal disease on peritoneal dialysis. To our knowledge, this is the first reported case of mixed peritonitis attributable to suspected micro-perforation after esophagogastroduodenoscopy. Whether pre-procedure antibiotics are warranted to decrease the occurrence of infectious complications in PD patients undergoing upper gastrointestinal procedures remains uncertain and not well studied. The prompt recognition of possible mixed bacterial infection remains essential after these procedures.

**Keywords:** Continuous ambulatory peritoneal dialysis; end-stage renal disease; gastrointestinal endoscopy; viscus perforation; peritonitis.

## 1. INTRODUCTION

Peritonitis is a common complication in patients with end-stage renal disease (ESRD) undergoing peritoneal dialysis. Peritonitis in this group of patients can lead to considerable morbidity, technique failure and may require conversion to hemodialysis. Peritonitis causes up to 18% of the infection related deaths in patients on peritoneal dialysis (PD) and almost 4% of peritonitis episodes in PD patients lead to death [1].

This complication most commonly occurs due to contamination of the catheter with pathogenic skin flora or direct contamination of the fluid bag connector [2]. Other important causes of peritonitis in these patients include cholecystitis, appendicitis, ruptured diverticulum, transmural migration of infection in severe constipation, and perforation of the viscus during various gastrointestinal (GI) procedures. Two rare causes of peritonitis are hematogenous spread of the infection and vaginal leak. The case described in this report reports possible viscus perforation due to esophagogastroduodenoscopy (EGD) in a patient with end-stage renal disease on continuous ambulatory peritoneal dialysis (CAPD).

## 2. PRESENTATION OF CASE

A 54-year-old African American female with ESRD on CAPD presented with a two-day history of generalized abdominal pain with nausea and vomiting. Two days before presenting to the hospital she underwent EGD which showed mild gastritis and a small hiatal hernia. Multiple biopsies from esophagus, stomach and duodenum were obtained during the procedure. No antibiotic prophylaxis was given during EGD. Shortly after the procedure, she developed crescendo diffuse abdominal pain accompanied by fatigue, nausea and generalized weakness.

Her past medical history included ESRD, systemic lupus erythematosus, diabetes mellitus, hypertension, a history of methicillin-resistant *Staphylococcus aureus* infection, and deep venous thrombosis of the left lower extremity. The patient's medications included sevelamer 800 mg three times a day with meals, insulin, sustained-release diltiazem 360 mg twice a day, renal multivitamin, and esomeprazole 40 mg daily. She was allergic to methotrexate,

enalapril, and codeine. Review of systems was negative other than the presenting complaints.

On admission, the patient had tachycardia with a heart rate of 145 beats per minute, blood pressure of 135/66 mmHg, tachypnea with a respiratory rate of 35, rapid shallow breathing and looked acutely ill with moderate discomfort secondary to her abdominal pain. Chest exam was normal. There was moderately diffuse tenderness and involuntary guarding of the abdomen. A clean peritoneal dialysis exit site without erythema or exudate was noted on physical examination.

Arterial blood gases revealed a combination of respiratory alkalosis and a metabolic acidosis with  $P^H$  7.48,  $PaCO_2$  28 mmHg,  $PaO_2$  85, bicarbonate 18 mmol/l and lactate 7.2 mmol/l. The patient's white cell count was elevated to  $15,100/mm^3$ , and her hemoglobin was 120 gm/l, platelets  $297,000/mm^3$ . Electrolyte levels included sodium 129 mmol/l, potassium 7.7 mmol/l, chloride 91 mmol/l, blood urea nitrogen 26.06 mmol/l, creatinine 686.34  $\mu$ mol/l, and glucose 4 mmol/l. An erect view of abdominal X-ray showed an unremarkable bowel gas pattern and a portable chest X-ray did not show any infiltrate or pulmonary consolidation. Electrocardiogram indicated sinus tachycardia at a rate of 168 bpm without any T wave changes. Initial CT of the abdomen was taken without oral contrast as the patient was unable to ingest oral contrast. CT study revealed an abnormally thickened appearance of the duodenum and proximal jejunum which were assumed to be inflammatory processes due to the patient's systemic lupus erythematosus. It also showed a small amount of peritoneal free fluid and air that could be attributed to the peritoneal dialysis.

Initially the patient was given I.V. vancomycin and gentamycin to treat possible peritonitis in the Emergency Department. In addition, she was given a combination of insulin, 50% dextrose and bicarbonate i.v for the treatment of hyperkalemia and acidosis. Peritoneal fluid studies revealed WBC  $1,499/mm^3$  (90% neutrophil granulocytes), and RBC  $3/mm^3$ . Gram stain of PD fluid showed both gram negative and gram positive rods without any fungal elements but culture grew only *Streptococcus pneumoniae*. Intravenous piperacillin/tazobactam was subsequently added to broaden coverage for polymicrobial infection. Emergency surgical consultation was obtained and the patient underwent emergent exploratory laparotomy and PD catheter removal, which revealed murky peritoneal fluid and thickened proximal jejunum but no obvious perforation of the viscus or obstruction of bowel lumen were noted. Blood cultures grew gram positive cocci, also finalized as *S. pneumoniae*. Repeated blood cultures were negative for any organism and the patient was initiated on hemodialysis uneventfully. Initially, lupus was entertained in the differential of peritonitis and abnormal thickening of the duodenum and methylprednisolone 20 mg two times a day was started. Glucocorticoids were rapidly discontinued after visual hallucinations emerged, and subsequent clinical evaluation and serologic work-up ruled out flare or significant lupus activity. Thereafter, the patient recovered smoothly and discharged home after seven hospital days with continued in-center outpatient dialysis via a tunneled dialysis catheter.

### 3. DISCUSSION

Peritonitis is the major complication of peritoneal dialysis and can lead to catheter loss, transfer to other forms of renal replacement therapy, increased morbidity and mortality. These complications most commonly result from contamination of the catheter with pathogenic skin bacteria or from contamination of the peritoneal dialysis procedure itself. Although EGD is considered safe and effective, complications occasionally occur such as

perforation. The risk of perforation is increased if the endoscopy is associated with manipulations such as biopsy, sclerotherapy, and dilatation. A study in a tertiary care center showed that the rate of perforation during endoscopy ranged from 0.02% to 0.04% [3]. Patients having perforation as a complication, who present with typical peritonitis or septic shock and extravasation of contrast on radiological studies are more likely to undergo surgical intervention, whereas a minority of patients can present without contrast extravasation on radiological studies with mild symptoms and can be treated non-operatively. Prompt appreciation of the mixed bacterial flora, strongly suggestive of intestinal origin was critical for successful outcome in our case. Contamination of the catheter and dialysis procedure is predominantly associated with single organism, usually gram positive [1,4]. To our knowledge, this is the first reported case of mixed bacterial peritonitis attributable to suspected micro-perforation after EGD.

The patient described in this case report was unable to ingest the contrast during radiological procedure and no perforation of the viscus was identifiable during surgical exploration. A perforation which is not obvious to the naked eye without signs of contrast extravasation can occur after EGD with manipulations and can lead to PD peritonitis due to with compromised host immunity, low  $P^H$  and high glucose concentration of dialysate, as well as the presence of a foreign body in the abdomen (dialysis catheter). Polymicrobial PD peritonitis, rather than single-organism infection, has been associated with worse outcomes, including hospitalization, death and PD modality failure with permanent transfer to hemodialysis [5]. It is important to note that this patient also had systemic lupus erythematosus with potential gastrointestinal manifestations adding to the risk of complications during EGD [6].

It is essential to recognize the significance of antibiotic prophylaxis to decrease the occurrence of infectious complications in PD patients undergoing gastrointestinal procedures. Case reports of similar events mostly occurred during colonoscopy procedures to date [7]. A Chinese series of flexible colonoscopy procedures among PD patients noted a 6.3% incidence of peritonitis without pre-procedural antibiotics, while none in the patients receiving antibiotic prophylaxis [8]. Current recommendations [1,4,9,10] have focused on antibiotic prophylaxis for PD patients undergoing lower gastrointestinal procedures, especially colonoscopy. To decrease the risk of peritonitis, ampicillin and an aminoglycoside with or without anaerobic coverage (metronidazole) should be given prior to the procedure and the abdomen should also be emptied of any dialysate fluid before starting the procedure. In contrast, there are no definitive data or any specific guidelines for antibiotic prophylaxis in upper GI procedures on PD patients. A single case report described *S. viridans* PD peritonitis after upper GI endoscopy and sclerotherapy for bleeding ulcer [11] and another publication documented recurrent PD peritonitis after gynecological and gastroscopic examinations, subsequently successfully prevented with pre-procedure antibiotics [12]. It should be noted that proton-pump inhibitor exposure, widely used and perhaps over-used in the current clinical practice, may promote bacterial colonization of the stomach and has been shown to be risk factor for spontaneous bacterial peritonitis, at least in liver diseases [13].

#### 4. CONCLUSION

Perforation may occur with GI procedures and clinically mimics regular peritoneal dialysis-associated peritonitis. These patients need early institution of broad antibiotic coverage, including for anaerobic organisms, immediate surgical consultation and potential abdominal exploration, with consideration for PD catheter removal. Whether pre-procedure antibiotics

are warranted to decrease the occurrence of infectious complications in PD patients undergoing upper gastrointestinal procedures remains uncertain and not well studied. In addition to continued meticulous exit site and PD catheter care, key preventive measures are to empty the peritoneal space before the GI procedure and not resume peritoneal dialysis for several hours after the procedure.

## **CONSENT**

All authors declare that written informed consent was obtained from the approved parties for publication of this case report.

## **ETHICAL APPROVAL**

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee (University of Mississippi Medical Center's Institutional Review Board) and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

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## **COMPETING INTERESTS**

The authors have no competing interests to declare. The authors have no funding from any source.

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