



## Salmonella Peritonitis: Clinical Case from Our Center

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### Abstract

Peritoneal dialysis is an effective treatment modality for patients with end-stage renal disease. Peritoneal dialysis-related peritonitis remains the major complication and primary challenge to the long-term success of peritoneal dialysis. Among PD patients, *Salmonella* peritonitis is extremely rare. In our center, a 67-year-old man who had been undergoing peritoneal dialysis for 4 years and half presented with complaints of 3-days abdominal pain and diarrhea. The patient had no fever, his abdomen was mildly tender to palpation, and Tenckhoff catheter exit-site was clean. When we further explored his history, he mentioned raw eggs ingestion, and serodiagnosis of infection with *Salmonella typhi*, using the Widal agglutination assay, was positive at a titer of 1/320. Antibiotic treatment with Meropenem and Ciprofloxacin was started and the patient was transferred to hemodialysis, and surgery was performed in order to drain purulent peritoneal fluid and remove Tenckhoff catheter. At discharge, Widal test was negative. Actually, after 5 months, the patient has a good health compatible with his chronic kidney disease and his return to peritoneal dialysis is planned.

### Introduction

*Salmonella* is an intracellular pathogen member of the *Enterobacteriaceae* family [1]. Bacteria of the genus *Salmonella* are highly adapted for growth in both humans and animals and cause a wide spectrum of disease [2]. The growth of serotypes *Salmonella typhi* and *Salmonella paratyphi* is restricted to human hosts, in whom these organisms cause enteric (typhoid) fever [2]. The remaining serotypes, Nontyphoidal *Salmonella* (NTS), can colonize the gastrointestinal tracts of a broad range of animals, and many serotypes are pathogenetic to humans, in whom they cause gastroenteritis and can be associated with localized infections and/or bacteremia. *Salmonella* infections invariably begin with ingestion of organisms, most commonly in contaminated food or water. The infectious dose is  $10^3$ - $10^6$  colony-forming units [2]. Worldwide, there are an estimated 22 million cases of enteric fever, with 200,000 deaths, annually [2].

*Salmonella* is an extremely rare agent causing peritonitis (0.15%), with the particularity of being an extremely complicated organism to eradicate, and in most of the cases described, it was necessary to remove the Tenckhoff catheter [1]. Literature is scarce on the ideal therapeutic approach [1]. We report a 67-years old male who presented to our peritoneal dialysis unit with diarrhea and abdominal pain and was diagnosed to have *Salmonella* peritonitis managed with successful.

### Case Presentation

A 67-year-old man who had been undergoing peritoneal dialysis for 4 years and half presented with complaints of 3-days abdominal pain and diarrhea.

His medical history was relevant for Systemic Lupus Erythematosus (SLE), hypertension, steroid diabetes, Coronary Artery Disease (CAD), diverticulosis and past *Escherichia coli* peritonitis. He was being treated with systemic corticosteroids for bullous pemphigoid.

The patient had no fever, his abdomen was mildly tender to palpation, and Tenckhoff catheter exit-site was clean. Peritoneal effluent was not cloudy; peritoneal effluent testing by dipstick was negative for leucocytes.

Pending peritoneal fluid culture results, the patient was treated for diarrhea on an outpatient basis; later, culture came out negative.

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Received Date: 04 Dec 2023

Accepted Date: 19 Dec 2023

Published Date: 25 Dec 2023

#### Citation:

Paribello G, Papa F, Ganzerli MC, Del Prete C, Capuano I, Rizzo M, et al. *Salmonella* Peritonitis: Clinical Case from Our Center. *Clin Case Rep Int*. 2023; 7: 1643.

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After two days, due to increased severity of abdominal pain with abdominal bloating and positive dipstick testing for leucocytes, intraperitoneal empiric antibiotic treatment with Ceftazidime and Teicoplanin was performed and culture was replicated; antibiotic treatment was later switched to Ceftazidime and Piperacillin/Tazobactam owing to poor clinical response.

Further peritoneal fluid culture yielded *Salmonella* Group B, *Escherichia coli*, *Enterococcus raffinosus*, and *Streptococcus uberis*. When we further explored his history, he mentioned raw eggs ingestion, and serodiagnosis of infection with *Salmonella typhi*, using the Widal agglutination assay, was positive at a titer of 1/320.

The patient was admitted to our nephrology ward and antibiotic treatment with Meropenem and Ciprofloxacin was started (later switched to Vancomycin and Ceftazidime owing to susceptibility test). He was transferred to hemodialysis, and surgery was performed in order to drain purulent peritoneal fluid and remove Tenckhoff catheter.

Complications (i.e. non-operable diverticular perforation and PICC infection) prolonged hospital stay, and he was treated with several antibiotic associations (Vancomycin+Merrem, Tygecyclin+Ceftazidime, Gentamicin, Daptomycin). At discharge, Widal test was negative.

Actually, after 5 months, the patient has a good health compatible with his chronic kidney disease and his return to peritoneal dialysis is planned.

## Discussion

Peritoneal dialysis is an effective treatment modality for patients with end-stage renal disease. Peritoneal dialysis-related peritonitis remains the major complication and primary challenge to the long-term success of peritoneal dialysis [3]. The catheter provides a portal of entry for organisms into the normally sterile peritoneum. Most cases of PD-related peritonitis are the result of “touch contamination”, where the patient or their helper inadvertently breaks sterile technique and contaminates the catheter or its connections. The most common pathogens are coagulase-negative staphylococcal species (e.g., *Staphylococcus epidermidis*) that commonly colonize human skin and hands, and *Staphylococcus aureus*, which together are responsible for 50% or more of infections in most series [4-6]. Exit-site and tunnel infections may also lead to peritonitis. Less commonly, the abdomen itself may be the source. Diverticulitis, appendicitis, cholecystitis, or

a perforated viscus may be the source, as well as intra-abdominal surgery, colonoscopy, hysteroscopy, and transmigration of bowel flora from constipation. In cases with an intra-abdominal source, the infecting organisms are usually Gram-negative enteric bacteria, streptococci and anaerobic bacteria. Bacteremia from another source may also seed the peritoneum [3].

Among PD patients, *Salmonella* peritonitis is extremely rare. In patients with *Salmonella* peritonitis were administered prolonged antibiotic treatment with or without catheter removal [1]. In most cases, where it was decided not to remove the catheter, peritonitis eventually relapsed. In one case, however, where the catheter was not removed, the patient completed three weeks of intraperitoneal ciprofloxacin, but no follow-up was provided [1]. However, we would like to highlight that due to the small number of described cases, there is no consensus regarding Tenckhoff catheter removal and duration of anti-biotherapy. Therefore, decision making should be performed in an individualized manner [1]. We conclude that the initial treatment should include at least a quinolone or a third generation cephalosporine, and it should last more than four weeks. Then, it should follow peritoneal effluent cultures as fitted. There is no consensus regarding Tenckhoff catheter exchange in cases of *Salmonella* peritonitis in PD. However, we believe that this procedure is to be executed in this particular circumstance.

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