Case Report

Peritoneal dialysis exit-site leak complicated by peritoneal dialysis-related peritonitis due to *Actinomyces neuui*

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Introduction: *Actinomyces neuui* is a rare cause of peritoneal dialysis-related peritonitis.

Case presentation: A 66-year-old male had end-stage renal disease on peritoneal dialysis treatment for 30 months. He developed exit-site leak with infection. Diphtheroids were isolated and considered initially as skin commensals. Dialysis treatment was suspended and on reinstitution he developed peritoneal dialysis-related peritonitis. The organism isolated from the peritoneal dialysis fluid was *A. neuui*.

Conclusion: This case was treated successfully with peritoneal dialysis catheter removal and oral amoxicillin.

Introduction

Peritoneal dialysis-related peritonitis is the commonest complication that carries a high risk of mortality and morbidity including treatment failure amongst peritoneal dialysis patients (Li *et al.*, 2010). The commonest organisms isolated in these cases are coagulase-negative staphylococci, although infection with other Gram-positive organisms, including *Staphylococcus aureus*, and Gram-negative organisms is not uncommon (Zelenitsky *et al.*, 2000). *Actinomyces* spp. are extremely rare causes, with four cases to our knowledge having been reported in the literature (De Santo *et al.*, 1976; Benevent *et al.*, 1986; Hir-emath & Biyani, 2006; Varughese & Bargman, 2014). We present another case of *Actinomyces neuui* peritoneal dialysis-related peritonitis.

Case report

This is a case of a 66-year-old Caucasian male with end-stage renal disease secondary to diabetic nephropathy. He was on automated peritoneal dialysis for 30 months. Other past medical history of note was proliferative diabetic retinopathy and well-controlled hypertension. Diabetes was reasonably controlled. Although he was medically fit to be considered for a kidney transplant, he declined this option. Peritoneal dialysis adequacy was satisfactory with the tests showing urine volume of 1.5 l/24 h, creatinine clearance of 97 l/week and *Kt/V* of 1.98. He was using four exchanges of 2 l Dianeal 1.36 % fluid bags and 2 l icodextrin during the day time. Following insertion of

a double-cuffed Tenckhoff peritoneal dialysis catheter, he had reported one episode of exit-site infection 1 year prior to the peritonitis episode in spite of using Bactroban cream regularly on the exit site. Diphtheroids were isolated from the exit site but were considered skin commensals at the time and on two other occasions just prior to that. The patient was offered a 1 week course of flucloxacillin for the exit-site infection but he declined as he felt the exit site became a lot better, without any further discharge. Prior to this hospital admission, he complained of intermittent exit-site leak 2 days after moving heavy objects. The leaking fluid was sent for analysis and the exit site was swabbed. He was advised to stop the day dwell and to maintain night dwells only for 2 weeks to be followed by review. At the review visit, he reported no further leak with dry exit site. He restarted the day dwells with smaller volumes at 1 l without reporting recurrence of the leak. Five days later, he presented to the hospital with cloudy effluent bags. The fluid was sent for microbiological analysis. Clinically, he was afebrile with normal blood pressure at 144/58 mmHg and heart rate of 67 beats min⁻¹. There was mild generalized abdominal tenderness without any systemic features. Effluent fluid was also inoculated in blood culture bottles. The patient received 2 g intraperitoneal vancomycin as per local protocol. Following culture and sensitivity results, intraperitoneal vancomycin was stopped and the patient was then started on oral amoxicillin 500 mg three times a day which lasted for 6 weeks. The peritoneal dialysis catheter was removed the day after hospital admission and modality of dialysis was changed to haemodialysis through a tunnelled vascular access.

Investigations

Before hospital admission, biochemical testing of the collected fluid leak in a colostomy bag confirmed the peritoneal dialysis fluid nature of the leak. Culture of the exit-site swab yielded diphtheroids which were reported as skin commensals.

On the day of hospital admission, the cloudy fluid revealed a white cell count of 600 ml^{-3} with 90 % lymphocytes and 10 % neutrophils. There were no identifiable organisms on Gram stain and no growth on direct culture of the fluid. There was an increase in the inflammatory marker C-reactive protein serum levels from baseline of 3.7 to 30 mg l^{-1} on admission.

Three days after admission, culture results of the dialysis fluid yielded *A. neuui* by API Coryne (bioMérieux) (Fig. 1). The API Coryne strip demonstrated positive results to NIT, PYZ, β GAL, α GLU, RIB, XYL, MAN, MAL, SAC and CAT. The following were negative on the strip: PyrA, PAL, β GUR, β NAG, ESC, URE, GEL, O, GLU, LAC and GLYG. The organism was susceptible to amoxicillin, erythromycin, tetracycline and vancomycin.

Diagnosis

Peritoneal dialysis peritonitis with the causative organism as *A. neuui*.

Treatment

A 6 week course of oral amoxicillin and peritoneal dialysis catheter removal.

Fig. 1. *A. neuui* organism isolated and recultured from the peritoneal fluid and stained with Gram stain.

Outcome and follow-up

The patient made a full recovery and remained well on haemodialysis with normal inflammatory markers 4 months after treatment.

Discussion

A. neuui rarely causes disease in humans and was first described in 1985 as 'CDC coryneform group 1' (Coudron *et al.*, 1985). In 1994, after determination of the nucleotide sequence of the gene encoding group 1 and group 1-like coryneform bacteria, this organism was assigned to the genus *Actinomyces* and renamed *A. neuui* (Funke *et al.*, 1994). On Gram stain, they appear diphtheroidal or coccoid, and lack the usual branching normally associated with other species of *Actinomyces* and can therefore be mistaken for diphtheroids. *A. neuui* represents 17 % of all clinical *Actinomyces* isolates (Funke & von Graevenitz, 1995) although it does not cause typical actinomycosis; in particular, sulphur granule formation. The literature is very variable about the exact reported cases of infection caused by this organism with the range between 100 and 137 reported cases (Gómez-Garcés *et al.*, 2010; von Graevenitz, 2011). Abscesses and infected atheromas are the most frequent types of infections, followed by infected skin structures, endophthalmitis, bacteraemias and endocarditis. Intra-abdominal and intrathoracic infections were not described (von Graevenitz, 2011), except for a newly reported case of peritoneal dialysis-related peritonitis (Varughese & Bargman, 2014). *Actinomyces* are known colonizers of the human body, but only one study has shown *A. neuui* in the oral flora of healthy individuals (Persson *et al.*, 2008) and in our case there was no history of any dental treatment prior to the peritonitis episode.

This case raises questions about the exact timing of catheter removal in late exit-site peritoneal dialysis leak and whether antibiotic cover is strongly indicated in these cases even with disappearance of the leak after successful conservative management. More interestingly, was there any relationship between the positive exit-site swabs with 'diphtheroids' 1 year earlier than the episode of *A. neuui* peritonitis, given the microbiological similarity between diphtheroids and *A. neuui*? We therefore suggest that the presence of diphtheroids in exit-site swabs needs careful evaluation to exclude the possibility of *A. neuui*, especially if isolated repeatedly, as it may initially be misidentified as diphtheroids. This should then inform treatment decisions if *A. neuui* is isolated from the exit site and the patient subsequently develops peritoneal dialysis peritonitis.

A. neuui peritoneal dialysis-related peritonitis is successfully treated with oral amoxicillin for 6 weeks. What is not clear is whether peritoneal dialysis catheter removal is mandatory in these cases or not. The peritoneal dialysis catheter was removed in our case, but a recently reported case of peritoneal dialysis-related *A. neuui* peritonitis was success-

fully treated without peritoneal dialysis catheter removal (Varughese & Bargman, 2014).

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