Chryseobacterium meningosepticum infections in a dialysis unit

Shalinie Perera[1] and **C Palasuntheram**[2]

Abstract

Background *Chryseobacterium* species are Gram-negative bacteria with an unusual antibiotic profile. *Chryseobacterium meningosepticum* is the species most commonly encountered as a human pathogen.

Objectives To study the microbiological, clinical and therapeutic features of *C. meningosepticum* infections in patients on dialysis, at Sri Jayewardenepura General Hospital (Teaching) (SJGH), and to trace the source of infections.

Design A retrospective descriptive study.

Setting Dialysis unit of SJGH.

Patient population Patients who underwent long term haemodialysis (HD) and manual intermittent peritoneal dialysis (IPD) in the dialysis unit.

Methods Clinical and microbiological records of patients with *C. meningosepticum* infections over a period of 2 years were reviewed retrospectively. Environmental screening was carried out to detect a possible source of infection.

Results Thirty five episodes of infection due to *C. meningosepticum* in 33 patients on HD and IPD were detected. There were 30 episodes of peritonitis, four of bacteraemia and one of asymptomatic colonization of a PD catheter.

Isolates were resistant to aminoglycosides, chephalosporins and aztreonam, and sensitive to cotrimoxazole, vancomycin and rifampicin. They showed variable sensitivity to imipenem and ciprofloxacin. All except one patient had a favourable outcome. *C. meningosepticum* was

[1]*Senior Registrar,* [2]*Microbiologist, Sri Jayewardenepura General Hospital (Teaching), Nugegoda, Sri Lanka.* Correspondence: SP, *Tel. +94 11 2 852 019, e-mail: <nhvn@sltnet.lk>* *(Competing interests: none declared). Received 26 September 2003 and accepted 5 October 2003.*

cultured from a sink in the dialysis unit, but the original source of the organism was not known.

Conclusion C. meningosepticum could be an important pathogen in a dialysis unit, and fluoroquinolones and vancomycin are effective as empiric therapy.

Introduction

Chryseobacterium spp.*(=Flavobacterium* spp.*)* were first recognised in 1959 associated with meningitis in infants [1]. These organisms are inhabitants of soil and water and they can live in municipal water supplies despite adequate chlorination [2,3]. They have been recovered from hospital environment often in conjunction with clusters of clinical isolates [2,3].

Chryseobacterium spp. are Gram-negative, thin, long and filamentous organisms. They grow well in 24 hours on blood agar and chocolate agar and at a much slower rate on MacConkey agar.

They are non-motile, catalase and oxidase positive, and weakly fermentative. Of importance is their unusual antibiotic sensitivity pattern, increasing resistance to antibiotics commonly used to treat infections caused by Gram-negative organisms (betalactams and aminoglycosides), but often susceptible to agents used to treat Gram-positive bacteria (rifampicin, clindamycin, cotrim-oxazole, vancomycin) [2,4,5].

They are of low virulence, capable of colonising the upper respiratory tract of humans, and acting as opportunistic pathogens [6]. They give rise to severe infections in immunocompromised hosts [7], and the species most commonly encountered as a human pathogen is *C. meningosepticum* [2,5]. Meningitis is the commonest infection in the neonates, whereas pneumonia and sepsis are the common syndromes in the postneonates [8]. In this study, 35 episodes of infection in patients undergoing IPD or HD in a dialysis unit were evaluated to study the microbiological, clinical and therapeutic features. Environmental screening was done to trace the source of infection.

Patients and methods

A retrospective review of clinical and microbiological records of patients on chronic peritoneal dialysis and haemodialysis, who were infected with *C. meningosepticum* over a period of 2 years was done. The patients, who had end stage renal disease, underwent HD or IPD in the dialysis unit two to three times a week. IPD was achieved manually without the use of a machine. This involved manual connection and disconnection of the dialysis fluid bottles to the catheter via a connecting set. HD patients were connected to the dialysis machine via a primary A-V fistula. A central venous catheter without cuffs was used when one A-V fistula failed to function.

Peritoneal fluid effluent that was cultured were from patients who either had signs and symptoms of peritonitis or a cloudy dialysate during dialysis. Blood cultures were done in patients who presented with septicaemia, and peritoneal dialysis and central venous catheter tips were cultured routinely whenever they were removed. Specimens were cultured on blood and MacConkey agar, and the plates incubated overnight at 37 ºC . The resultant colonies were identified using standard microbial identification procedures and API 20E [9]. The antibiotic sensitivity assays were carried out by the disc diffusion method [10]. Zone diameter breakpoints for Enterobacteriacae were used, and for vancomycin and rifampicin zone diameter breakpoints for staphylococci were used [10].

An environmental screening was done in an attempt to detect the possible source of infection. Swabs were taken from dressing trolleys, bedsides tables, sinks and from the inside of sink taps. The disinfectants such as povidone-iodine, surgical spirits used for cleansing the skin, and 70% alcohol solution used for storing peritoneal dialysis catheter stoppers and gluteraldehyde solution used to store the peritoneal dialysis catheter stilettes were also cultured.

Results

During the 2-year period, 35 infections caused by *C. meningosepticum* in patients on manual IPD and HD were detected. The 30 episodes of peritonitis detected in 28 patients during the period, constituted 19% of all episodes of peritonitis seen in patients who underwent peritoneal dialysis. The overall rate of infection in patients undergoing manual IPD in the dialysis unit was 11.1 episodes / patient year , according to an earlier study [11]. There were four episodes of septicaemia in patients undergoing HD, and one episode of asymptomatic colonisation of the PD catheter. Clinical, microbiological, and therapeutic features of these infections were studied.

Clinical features

Abdominal pain was the commonest symptom with peritonitis. Fever was a feature in six cases, diarrhoea in four and vomiting in two. One patient presented asymptomatically and the PD fluid of this patient was cultured because of turbidity of the effluent. The patients with septicaemia presented with fever with chills and rigours, and no one went into septicaemic shock.

Microbiological features

Culture on blood agar yielded grey round colonies, 2–3 mm in diameter after 18 to 24 h of incubation. The non-lactose fermenting colonies on MacConkey agar were much smaller. Gram stain showed Gram-negative, thin, long, non-motile bacilli. Biochemically they gave positive results in catalase, oxidase, aesculin hydrolysis and gelatin liquefaction tests and were non-fermentative. All isolates were resistant to ampicillin, augmentin, ceftazidime, cefotaxime, aztreonam, gentamicin and amikacin.

All were sensitive to cotrimoxazole, vancomycin and rifampicin. All, except one isolate was sensitive to ciprofloxacin and 31 isolates were resistant to imipenem.

Therapeutic features

The outcome of different therapeutic regimens for peritonitis and bacteraemia are given in Tables 1 and 2.

Table 1. **Therapeutic outcome of peritonitis**

Treatment	*Number treated*	*Number responded*	*Number not responding*	*Response not known*
Ciprofloxacin (intraperitoneal)	12	10	1	1
Vancomycin (intraperitoneal)	7	6	0	1
Rapid cycles of dialysis (without antibiotics)	6	1	2	3

Table 2. **Therapeutic outcome of septicaemia**

Treatment	*Number treated*	*Number responded*	*Number not responding*	*Response not known*
Ciprofloxacin (intravenous)	1	1	0	0
Vancomycin (intravenous)	3	3	0	0

Environmental screening

C. meningosepticum was cultured from one sink while all other environmental samples were negative. The organism was not found in the disinfectants tested.

Discussion

C. meningosepticum is best known for its ability to cause meningitis, pneumonia and sepsis in neonates and immunocompromised hosts, and peritonitis has only rarely been documented. This is surprising, considering the presence of risk factors in dialysis, such as frequent hospital admissions, presence of indwelling devices and severe kidney disease. Hence, 30 episodes of peritonitis in our study are significant.

Clinically, peritonitis was mild, with the majority presenting with only abdominal pain, in contrast to peritonitis caused by other Gram-negative bacteria, which is associated with severe disease [12]. Patients with septicaemia presented with only a low grade fever, not associated with shock, unlike in other Gram-negative sepsis.

The antibiotic sensitivity of the *C. meningosepticum* isolates of our study was similar to that reported in most studies, being resistant to aminoglycosides, cephalosporines, aztreonam and carbapenems, and sensitive to vancomycin, rifampicin, clindamycin, fluoroquinolones and cotrimoxazole.

The successful use of vancomycin and ciprofloxacin to treat patients with infections caused by *C. meningosepticum* have been previously documented [13]. However, clinical failure with vancomycin therapy has also been reported [14].

The use of vancomycin in dialysis-associated peritonitis due to *C. meningosepticum* is not documented and our study shows that vancomycin can be successfully used to treat sepsis as well as dialysis-associated peritonitis caused by it.

The most likely portal of entry of the organism is the lumen of the catheter in both HD and IPD, as it was observed that during connection and disconnection to the dialysis system, which was repeated several times in IPD, there was no adherence to strict aseptic procedures. Even though the organism was isolated from one of the sinks, the original source of *C. meningosepticum* in our dialysis unit remains unknown.

Conclusion

Our study suggests that *C. meningosepticum* could be an important pathogen in a dialysis unit, and ciprofloxacin and vancomycin are effective as empiric therapy.

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