

Bacterial and Mycotic Organisms Isolated from Infected Peritoneal Effluent in CAPD Patients at Srinagarind Hospital

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แบคทีเรียและเชื้อราที่แยกได้จากน้ำในช่องท้องของผู้ป่วยที่มีการล้างไตทางช่องท้องชนิดถาวรในโรงพยาบาลศรีนครินทร์

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*ภาควิชาจุลชีววิทยา, **ภาควิชาอายุรศาสตร์, ***หน่วยไต โรงพยาบาลศรีนครินทร์, คณะแพทยศาสตร์, ****ภาควิชาจุลชีววิทยาคลินิก คณะเทคนิคการแพทย์ มหาวิทยาลัยขอนแก่น

ผลการเพาะเชื้อจากน้ำในช่องท้องของผู้ป่วยที่มีการล้างไตทางช่องท้องชนิดถาวร (Continuous ambulatory peritoneal dialysis : CAPD) ในโรงพยาบาลศรีนครินทร์ จำนวน 45 คน จากจำนวนสิ่งส่งตรวจทั้งหมด 427 ตัวอย่าง แยกเชื้อได้ 38 ตัวอย่าง กิดเป็นร้อยละ 8.9 แยกแบคทีเรียได้ 35 สายพันธุ์ (isolates) แยกเชื้อราได้ 11 สายพันธุ์ แบคทีเรียในกลุ่มแกรมบวกรูปกลมที่แยกได้มากที่สุด คือ *Staphylococcus coagulase negative* รองลงมาได้แก่ *Streptococcus group D enterococci* และ *Streptococcus not group D* แบคทีเรียในกลุ่มแกรมลบรูปแท่งที่พบได้มากที่สุดได้แก่ *Enterobacter sp* รองลงมาได้แก่ *Pseudomonas aeruginosa*, *Acinetobacter calcoaceticus var anitratus*, *Klebsiella pneumoniae* และ *Bacteroides sp.* สำหรับเชื้อราที่แยกได้มากที่สุดได้แก่ *Trichosporon inkin* รองลงมาได้แก่ *yeast cells* และ *Candida rugosa* ในรายงานนี้ได้แสดงผลการทดสอบความไวต่อยาต้านจุลชีพของแบคทีเรียที่แยกได้จากน้ำในช่องท้องดังกล่าวด้วย *Staphylococcus coagulase negative* ไวต่อยา cephalothin ร้อยละ 89 แต่ไวต่อยา gentamicin เพียงร้อยละ 25

Abstract:

The microbiological culture techniques were utilized to isolate microorganisms in peritoneal effluent samples collected from 45 continuous ambulatory peritoneal dialysis (CAPD) patients at Srinagarind Hospital. Almost 9 percent (38 of 427) were positive cultures for microorganisms. Thirty-five bacterial and 11 fungal isolates were detected. The most common bacteria among the gram positive cocci was coagulase negative *Staphylococcus*. The less commonly recovered organisms were *Streptococcus* group D enterococci and *Streptococcus* other than group D. Among gram negative bacilli, *Enterobacter* sp. was the most frequently isolated. *Pseudomonas aeruginosa*, *Acinetobacter calcoaceticus var anitratus*, *Klebsiella pneumoniae* and *Bacteroides* sp. were less commonly observed. *Trichosporon inkin* was the most frequently found among the fungal organisms followed by yeast cells and *Candida rugosa*. Antimicrobial susceptibility patterns of the bacteria isolated are as follow : coagulase negative *Staphylococcus* was 89% sensitive to cephalothin, but only 25% to gentamicin.

Introduction

Continuous ambulatory peritoneal dialysis (CAPD) is one of the therapeutic modalities for end state renal failure patients while waiting for a renal transplantation. The advantage of this method is that the patients can treat and care for themselves at home with less suffering. However, CAPD has a few complications, among them the peritonitis is the most common and serious⁽¹⁾.

In this study, the sorts of bacterial and mycotic organisms isolated from the peritoneal effluent samples were identified. Antimicrobial susceptibility patterns of the bacteria were also investigated.

Materials and methods

Peritoneal effluent samples were collected from 45 CAPD patients (24 males and 21 females, age 30-70 years) who attended CAPD clinic in Srinagarind Hospital, Khon Kaen University during October 1990 to November 1991. The samples were microscopically examined by Gram staining, cultured on blood, MacConkey (Difco), chocolate, Sabouraud dextrose agar (Difco) and thioglycolate medium (Difco). Aerobic gram positive cocci were identified by using the colonial morphology and the biochemical properties⁽²⁾. Aerobic gram negative bacilli were isolated by Lennette's method⁽²⁾. The peritoneal effluents in thioglycolate media were incubated at 37°C for 18-24 hours and subsequently cultured on the Brain heart infusion blood agar with vitamin K under anaerobic condition at 37°C for 48 hours. The anaerobic bacteria were identified by the method of Holdeman⁽³⁾ and the antimicrobial susceptibility tests were performed by Kirby-Baure's disc method⁽⁴⁾.

Yeast identification was based on the sugar fermentation, the assimilation test, the morphology of chlamydospore on the Cornmeal agar, and the germ tube morphology in plasma broth⁽⁵⁾. The mold isolates were studied by the slide culture technique, mounted with lactophenol cotton blue and identified by Mc Ginnis' method⁽⁶⁾.

Results

Thirty-eight of 427 specimens (8.9%) were positive cultures for microorganisms. Thirty-five bacterial and 11 fungal isolates were detected (Table 2). The most common organism among the gram positive cocci was the coagulase negative *Staphylococcus* (9/46), and the less common were *Streptococcus* group D enterococcus (4/46), and *Streptococcus* other than group D (2/46)

in that order. The gram negative bacilli recovered from the cultures were *Enterobacter sp.* (3/46), *Pseudomonas aeruginosa* (2/46), *Acinetobacter calcoaceticus var anitratus* (2/46), *Klebsiella pneumoniae* (2/46), and *Bacteroides sp.* (2/46). *Trichosporon inkin* was the most frequently found (4/46) among the isolated fungal organisms followed by yeast cell (3/46) and *Candida rugosa* (2/46). Patterns of antimicrobial susceptibility of isolated bacteria were presented in Table 3. The coagulase negative *Staphylococcus* was highly susceptible to cephalothin (89%) but less sensitive to gentamicin (25%). Every isolate of *Enterobacter sp.* was susceptible to imipenem but only 33% were sensitive to gentamicin. *Pseudomonas aeruginosa* was susceptible to amikacin, gentamicin, netilmicin, piperacillin and ticarcillin, but resist to ceftazidime. *Acinetobacter calcoaceticus var anitratus* was susceptible to imipenem and augmentin, but resist to amikacin, gentamicin, kanamycin and netilmicin. *Klebsiella pneumoniae* was susceptible to augmentin, imipenem and cefuroxime, but resist to amikacin, gentamicin, kanamycin and netilmicin. *Staphylococcus coagulase positive* was susceptible to cephalothin, chloramphenicol, cotrimoxazole, erythromycin and oxacillin, but resist to penicillin.

Discussion

The major complication that causes morbidity in CAPD patients is peritonitis. Sixty percent of patients on CAPD developed at least one episode of peritonitis during the first year of dialysis⁽⁷⁾. Most episodes of peritonitis are caused by the touching contamination of the dialysis tubing, the extension of the catheter exit site or the tunnel infection. Vas⁽⁸⁾ demonstrated microorganisms from CAPD patients with peritonitis as summarized in Table 1 which corresponds to our findings.

The coagulase negative *Staphylococcus* is the predominant organism isolated, about 35-43% of peritonitis^(9,10). The adherent organisms on the silicone rubber Tenckhoff catheter has been identified as one factor of the pathogenesis and the persistence of the infections⁽¹¹⁾. The gram negative bacteria are responsible for 15-20% of peritonitis whereas only 4-5% of this pathology are positive for anaerobic bacteria⁽⁸⁾. The fungal infection is recognised as an etiologic factor in 5-7% of peritonitis during CAPD. Yeast cells are the common fungal organisms and the most are found as the skin or the bowel floras^(8,12). The early identification and treatment of peritonitis are essential to ensure the success of the CAPD program⁽⁷⁾. The peritoneal effluent samples collected in this study are from CAPD patients whether they have peritonitis or not. The culture of these samples will help make an early detection of peritonitis in these patients.

The antimicrobial susceptibility of the isolated bacteria from infected peritoneal effluents of CAPD patients is different from place to place. Gruer *et al*⁽¹³⁾ reported the multiple antibiotic resistance of coagulase negative staphylococci from CAPD peritonitis. Of 13 antibiotics tested, vancomycin was active against all strains and most strains were also sensitive to rifampicin, netilmicin and cefamandole. McAllister *et al*⁽¹⁴⁾ reported the susceptibility patterns of coagulase negative staphylococci. They showed 100% sensitivity to vancomycin, rifampicin and netilmicin, 63% to gentamicin, 48% to cotrimoxazole and 52% to erythromycin. In this study most strains of coagulase negative staphylococci were highly susceptible to cephalothin (89%) and less sensitive to gentamicin (33%).

Table 1 Microorganisms isolated from CAPD patients with peritonitis by Vas SI. Kidney International 1983; 23:83-92.

Organisms	Percentage of total organisms isolated
<i>Staphylococcus epidermidis</i>	38.2
<i>S. aureus</i>	14.6
<i>Streptococcus viridans</i>	12.1
<i>Enterococcus</i>	3.0
<i>Streptococcus sp.</i>	2.0
<i>Escherichia coli</i>	5.0
<i>Klebsiella Enterobacter</i>	3.5
<i>Proteus sp.</i>	2.0
<i>Citrobacter</i>	1.0
<i>Pseudomonas sp.</i>	4.0
<i>Acinetobacter</i>	2.5
<i>Flavobacterium</i>	0.5
<i>Bacteroides sp.</i>	3.0
<i>Fusobacterium</i>	0.5
<i>Clostridium sp.</i>	1.0
<i>Propionibacterium</i>	1.0
Yeast/fungus	3.5
Other	2.5

Table 2 Microorganisms isolated from infected peritoneal effluent samples of CAPD patients in Srinagarind Hospital

Microorganisms	No. of isolates
Bacteria	
<i>Enterobacter sp.</i>	3
<i>Pseudomonas aeruginosa</i>	2
<i>Acinetobacter calcoaceticus</i> <i>var anitratus</i>	2
<i>Klebsiella pneumoniae</i>	2
<i>Pseudomonas sp.</i>	1
<i>Escherichia coli</i>	1
<i>Providencia rettgeri</i>	1
<i>Flavobacterium odoratum</i>	1
<i>Moraxella phenylpyruvica</i>	1
<i>Acinetobacter hemolyticus</i>	1
<i>Bacteroides sp.</i>	2
Staphylococcus coagulase negative	9
Staphylococcus coagulase positive	2
Streptococcus group D enterococci	4
Streptococcus not group D	3
Fungus	
<i>Acremonium sp.</i>	1
<i>Cladosporium sp.</i>	1
<i>Candida rugosa</i>	2
<i>Trichosporon inkin.</i>	4
Yeast cells	3
Total	46

Table 3 Antimicrobial susceptibility test of microorganisms isolated from infected peritoneal effluent samples of CAPD patients in Srinagarind Hospital

Bacterial isolates	Antimicrobial agents used																
	No. tested	Aminikacin	Ampicillin	Cephaloridin	Chloramphenicol	Gentamicin	Kanamycin	Carbenicillin	Erythromycin	Lincomycin	Oxacillin	Penicillin	Tetracycline	Augmentin	Imipenem	Ciprofloxacin	Cefuroxime
<i>Enterobacter sp.</i>	3	33*	0	0	33	33	33							0	100	100	0
<i>Staphylococcus coagulase negative</i>	9			89	62	25	22	43	44	83	50	28	17				
<i>Streptococcus Group D enterococci</i>	3		75	25	0	0	0	0	0			100	0				
<i>Streptococcus not Group D</i>	3		100	100	100	100	100	0	100			66	66				

* percent sensitive

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