

## Case Report:

### Fungal peritonitis in CAPD patients: a report of five cases

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#### ABSTRACT

Fungal infections are a common cause of morbidity and mortality among patients on continuous ambulatory peritoneal dialysis (CAPD). We present the clinical manifestations, and management of five CAPD patients with fungal peritonitis seen during the last seven years. Microscopy and culture of the peritoneal fluid tested positive for fungus in all patients. Filamentous fungi were identified as the causative fungi among four patients and *Candida nonalbicans* was the cause in one patient. Catheter was removed and appropriate antifungal therapy was given to all the patients. Four patients recovered and one died due to ventilator associated infection. Previously treated bacterial infections, old age more than 50 years, diabetes and hypertension were recognised as the risk factors leading to fungal infection among CAPD patients.

**Key words:** Peritonitis, CAPD, Fungal peritonitis

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#### INTRODUCTION

Infections are common cause of morbidity and mortality among patients on continuous ambulatory peritoneal dialysis (CAPD). Fungal infections are found to be higher among CAPD patients as compared to the general population. A retrospective review of dialysis patients from 1992 to 1997 reported an age-adjusted incidence ratio for fungal infections of 9.8 compared with the general population.<sup>1</sup> A study<sup>2</sup> from Chennai (n = 185) reported the incidence of fungal peritonitis among CAPD patients to be 16.2% whereas another study in patients with end-stage renal disease (n=224) from Bengaluru<sup>3</sup> reported it to be 17.6 %. A study<sup>4</sup> from Hyderabad (n=303) reported the burden of fungal peritonitis to be 23.9%. In a study<sup>5</sup> from North India 28 of 261 (10.7%) patients had fungal peritonitis.<sup>5</sup>

FP is associated with higher mortality as compared to bacterial peritonitis. Mortality

rates have been reported to be ranging from 15%-50%. Yeasts have been reported as the most common cause of FP with *Candida albicans* as the predominant organism Filamentous fungi like *Aspergillus*, *Penicillium* are less commonly reported. Fungal infections can lead to several complications such as sclerosing peritonitis, adhesions with resulting bowel obstructions or stricture, invasion of the bowel wall, and abscess formation.<sup>6</sup> Here we report the clinical presentations and management of fungal infections in five CAPD patients seen by us during the last seven years.

#### CASE REPORTS

##### Case 1

A 70-year-old woman, with type 2 diabetes mellitus, nephropathy, end-stage renal disease (ESRD) also had hypertension and hypothyroidism. She was on CAPD for the last three years. This patient presented with

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**Table 1: Characteristics of fungus isolated, treatment and outcome in 5 CAPD patients with fungal peritonitis**

Case	Age (years)	Gender	Fungus isolated	KOH mount	Culture characteristics	Treatment	Outcome
Case 1	70	F	<i>Aspergillus niger</i>	Filamentous, hyaline septate hyphae seen	SDA was cottony, grayish initially which later turned black	Voriconazole	Died
Case 2	55	F	<i>Curvularia lunata</i>		Woolly, grayish/pinkish white and turned brown to black later	Voriconazole	Recovered
Case 3	72	M	Fusarium sp.	Filamentous, hyaline septate hyphae seen	Pinkish white cottony	Voriconazol	Recovered
Case 4	60	M	<i>Aspergillus niger</i>	Filamentous, hyaline septate hyphae seen	SDA was cottony, grayish initially which later turned black	Voriconazole	Recovered
Case 5	52	F	<i>Curvularia lunata</i>	Filamentous, septate dematiaceous hyphae seen	Woolly, grayish/pinkish white and turned brown to black later	Voriconazole	Recovered

KOH = potassium hydroxide; F = female; M = male; SDA = Sabouraud's dextrose agar

abdominal discomfort and decreased ultra-filtration. The peritoneal drain fluid was cloudy which revealed neutrophilic leucocytosis (150 cells mm<sup>3</sup> with 80% neutrophils and 20% lymphocytes). Culture of peritoneal dialysis fluid grew *Pseudomonas aeruginosa*. She was managed with antibiotics as per International society for peritoneal dialysis (ISPD) guidelines.<sup>7</sup> Despite the above measures the fluid continued to be cloudy and further analysis revealed the presence of fungus around tenth day. Microbiological details of the fungus are described in Table 1. The lactophenol cotton blue (LCB) mount of the culture isolate showed



**Figure 1:** Photomicrograph showing *Aspergillus niger* (Lactophenol cotton blue, × 400)

typical spherical vesicle borne on hyaline conidiophores with the phialides, metulae and conidia which were brown to black in colour (Figure 1).

The peritoneal dialysis catheter was removed and patient was treated with intravenous voriconazole administered as a loading dose 6 mg/kg body weight every 12 hours on the first day, followed by a maintenance dose of 4 mg/kg body weight as a maintenance dose intravenously every 12 hours there after. She had also required mechanical ventilator support. The patient died after seven days of antifungal therapy.

## Case 2

A 55-year-old female with ESRD of non-diabetic aetiology was on CAPD for the past one-and-half years. She presented with diffuse abdominal pain associated with fever and cloudy drain fluid. Patient had no other complaints. CAPD fluid microscopy showed neutrophilic leucocytosis (12,500 cells/mm<sup>3</sup>). Pending the microbiological results patient was treated for bacterial peritonitis. In addition to the intravenous antibiotic therapy she was also started on oral fluconazole tablet. By around

third week she developed difficulty in peritoneal drain fluid drainage with appearance of blackish particles in effluent. The microscopy and culture of the peritoneal drain fluid was positive for fungus. Details of the isolate are shown in Table 1.

The catheter was removed and the patient was shifted to maintenance haemodialysis. She was treated with voriconazole 400 mg twice-a-day (loading dose) followed by 200 mg twice-a-day for 3 weeks. She recovered completely.

### Case 3

A 72-year-old male patient with type 2 diabetes mellitus and ESRD, with hypertension was on CAPD for the past three years. He presented with cloudy dialysate, diffuse abdominal pain and tenderness. The exit site was normal and there was no tunnel tenderness. Evaluation of peritoneal drain fluid revealed total leucocyte count of 310 cells/mm<sup>3</sup> with 90% neutrophils and 10% lymphocytes. Potassium hydroxide (KOH) smear revealed hyaline branching fungal elements. Peritoneal fluid culture grew *Fusarium* sp. Details of the isolate are described in Table 1. The catheter was immediately removed. He was continued on intravenous fluconazole for 6 weeks. The colony on SDA was fast growing, pinkish orange in colour slightly cottony with reverse dark orange in colour (Figure 2). The LCB mount of the culture isolate showed septate hyaline hyphae with hyaline sickle shaped 2-3 celled macroconidia (Figure 3).

### Case 4

A 60-year-old man with ESRD on CAPD for one year was admitted for the management. On evaluation he was diagnosed to have CAPD catheter migration. CAPD catheter was removed and reinsertion of a new CAPD catheter with creation of a new exit site was done. But post-procedure he had cloudy flushing fluid. On evaluation he was diagnosed to have culture-negative CAPD related



**Figure 2:** Culture of *Fusarium* sp. on Sabouraud's dextrose agar



**Figure 3:** Photomicrograph showing *Fusarium* sp. (Lactophenol cotton blue, × 400)

peritonitis. He was treated with intravenous (I.V.) imipenem cilastatin, fluconazole for 21 days and ceftazidime and vancomycin for 14 days. He improved with the treatment. He was continued on CAPD. During the second month of management some fibrinous material was noted on the transfer set; KOH smear and fungal culture (*Aspergillus niger*) was positive. Details of the isolate are described in Table 1. Subsequently the catheter was removed and patient was shifted to haemodialysis. CAPD transfer set was replaced with a new set. He is presently on maintenance haemodialysis.

### Case 5

A 52-year-old woman patient with ESRD who had diabetes mellitus and hypertension on CAPD for one-and-half years was admitted for the fever, abdominal pain and cloudy dialysate.

Evaluation of peritoneal fluid revealed total leukocyte count of 6700 cells/mm<sup>3</sup> with normocytic normochromic picture. KOH smear and fungal culture were positive and the isolate was identified as *Curvularia lunata* details of which are described in Table 1. The catheter was removed immediately and patient was started on haemodialysis. She was treated with voriconazole. Presently she is on maintenance haemodialysis and is doing well.

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### DISCUSSION

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Peritonitis is an important entity among CAPD patients leading to several complications including repeated hospitalizations, morbidity, catheter removal, shifting to haemodialysis and significant mortality. These days peritonitis rate is decreasing in CAPD patients.<sup>8,9</sup>

Peritonitis can result from touch contaminations, catheter related problems, gastrointestinal and gynaecological problems and sepsis. Several factors influence the peritonitis rate, prognosis and the overall outcome of peritonitis such as age, race, educational status, environment, and type of dialysis system with the causative organism and its sensitivity to antimicrobials.<sup>10,11</sup>

The incidence of fungal peritonitis varies from 2%-10% with mortality ranging from 5%-53%.<sup>13,14</sup> It can lead to several complications which cause technique failure thus requiring change from CAPD to haemodialysis.<sup>2</sup> Though bacterial peritonitis in CAPD patients is said to be decreasing, the incidence of fungal peritonitis is increasing and remains a major problem with significant morbidity and mortality in these patients.<sup>12</sup>

*Candida* sp. is the most common cause of fungal peritonitis but presently *Candida albicans* which was the most common *Candida* sp. reported previously is being replaced with non-*albicans* *Candida* sp. and filamentous fungi are being increasingly reported. In a study<sup>15</sup>

*candida* sp. was the common fungus affecting 89.3% of patients with, non-*albicans* *Candida* species, responsible for 53.6% of these infections.

All of our five patients had peritonitis due to filamentous fungi. Among filamentous fungi *Aspergillus niger* and *Curvularia lunata* were the common fungi, each affecting two patients. *Curvularia lunata* is a dematiaceous fungus which has been reported from patients on CAPD. *Fusarium* sp. have been reported as colonizers on catheters without causing peritonitis.<sup>16</sup>

Age over 65 years, hypertension, history of previous bacterial peritonitis, and immunosuppression have been recognized as risk factors for fungal peritonitis.<sup>17</sup> One of our patients had a history of previously treated bacterial peritonitis which is a well known risk factor for fungal peritonitis. Fungal peritonitis has been reported in 65% of cases within one month of broad spectrum antibiotic treatment with risk increasing with passage of time.<sup>18</sup> In another study<sup>19</sup> no difference in the fungal peritonitis rate with or without antibiotic treatment was observed.

Results on age as a risk factor for development of peritonitis are controversial with reports in favour as well as against it. Age more than 70 years was found to be at high risk for peritonitis in a study,<sup>17</sup> but no difference in the peritonitis rate in different age groups was reported in another study.<sup>20</sup>

The role of diabetes mellitus in fungal peritonitis is still debatable and it is not considered as a risk factor for peritonitis by some authors<sup>21,22</sup> whereas others<sup>23</sup> reported that diabetes definitely is a risk factor for developing peritonitis in CAPD patients. In a study<sup>23</sup> (n=27) high fasting sugar was found to be a risk factor for development of peritonitis. The authors<sup>23</sup> suggested that strict sugar control is

important for prevention of peritonitis in CAPD patients.<sup>21-23</sup>

Hypertension is considered as a risk factor for peritonitis in CAPD patients; patients with hypertension have been found to be at more risk for developing peritonitis as compared to non hypertensive patients.<sup>24</sup>

Antifungal prophylaxis has proved to be effective in prevention of development of fungal peritonitis in CAPD patients. In a study<sup>25</sup> wherein the effect of antifungal prophylaxis on patient and technique outcomes was assessed, the episodes of fungal peritonitis reduced to 5% with antifungal prophylaxis from 17.6% without antifungal prophylaxis. Other authors found varying results.<sup>25,26</sup>

Use of nystatin has been suggested for prevention of candida peritonitis in patients on prolonged antibiotic therapy.<sup>25,26</sup> One of our patients (Case 2) developed fungal peritonitis despite of antifungal prophylaxis.

High mortality is a serious concern for fungal peritonitis among CAPD patients. Among our patients, one died, one recovered completely and three are under follow-up. Early catheter removal and initiation of treatment can have significant effect on mortality among CAPD fungal peritonitis patients. Our observations suggest that vigilant observation for fungal peritonitis in patients CAPD will help in early diagnosis and effective management.

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