Contamination of peritoneal dialysis fluid by filamentous fungi

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Summary

Peritonitis is a frequent complication in peritoneal dialysis. It may be caused by contamination of the dialysis tubing or by extension of the catheter exit site. Gram-positive bacteria are the most common organism, accounting for 60% of all documented cases of continuous ambulatorial peritonitis dialysis. Fungi are isolated from to 1- 15% of cases. Forty-nine out of 490 bottles containing fluid for peritoneal dialysis were randomly selected for microbiological analysis in São Paulo, Brazil. In this report the contamination of peritoneal dialysis fluid by *Chaetomium globosum* and *Chrysonilia sitophila* is reported.

Key words Contamination, Dialysis fluid, Filamentous fungi

Contaminacion de líquido de diálisis peritoneal por hongos filamentosos

La peritonitis es una complicación frecuente en pacientes sometidos a diálisis perioneal que puede ser causada por contaminación tanto de los tubos de conexiones como del sitio de salida del catéter. Los Gram positivos causan el 60% de estos episódios. Los hongos son recuperados en el 1 al 15% de los casos. Se seleccionaron aleatoriamente 49 de 490 frascos de líquido de díalisis peritoneal, cerrados y dentro de la fecha de validez para su estudio microbiológico en São Paulo, Brasil. La contaminación del líquido de díalisis peritoneal por *Chaetomium globosum* y *Chrysonilia sitophila* es el motivo de la presente comunicación.

Contaminación, Líquido de díalisis, Hongos filamentosos

Continuous ambulatory peritoneal dialysis (CAPD) is an important procedure in the management of patients with chronic renal impairment [1]. After a five-year survey, Martin (1993) reported that 51% of cases of peritonitis were associated with CAPD with a nosocomial rate of 1.7 episodes/year [2]. Gram-positive bacteria have been isolated in 60% of cases and Gram-negative in 10% to 15% . No growth has been reported in 20% of patients [3]. The occurrence of fungal isolates in peritonitis varies from 1% to 15% [4]. The most frequently isolated agents are yeasts of the genus *Candida* [3].

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Filamentous fungi have been rarely reported as agents of peritonitis. Species of *Mucor, Fusarium, Aspergillus and Penicillium* were the most common isolates [4]. Barthez *et al*. (1984) reported the first case of peritonitis caused by *Chaetomium globosum* in a patient suffering from end stage renal disease and undergoing CAPD [5]. Episodes were correlated with exogenous contamination of the dialysis circuit [6] or with the end of the catheter [1]. We have not found any previous report in the literature about the contamination of peritoneal dialysis fluid by fungi. The aim of this report is to draw attention to the occurrence of contamination by filamentous fungi of bottles containning CAPD solution.

In March 1996, macroscopic examination revealed contamination of a bottle containing CAPD solution for peritoneal dialysis (PD) (Figure 1a). Subsequently 490 bottles with PD fluid, supplied to the Service of Nephrology, Hospital São Paulo- Universidade Federal de São Paulo, Brazil were studied. Forty-nine bottles were randomly selected for microbiological analysis. To prevent contamination, handling was performed in a Hepa filtered cabinet.

From each bottle, 20 ml of fluid were collected for microbiogical processing (Figure 1b). Samples were centrifuged at 2000 rpm for 10 min. Part of the sediment was submitted to direct microscopic examination another part was streaked on Sabouraud-dextrose agar, and incu-

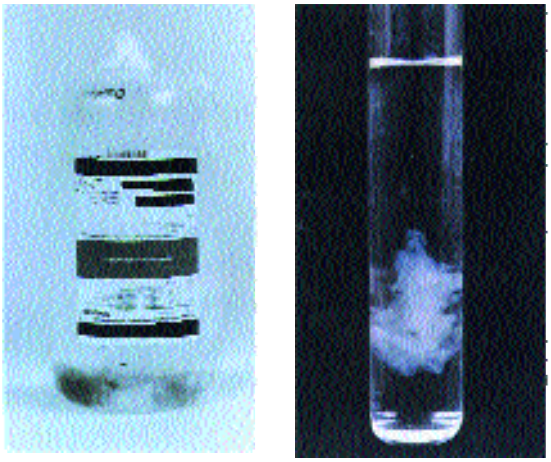

Figure 1. Peritoneal dialysis bottle (a) and tube (b) with a dark and hyaline foreing body identified as *Chaetomium globosum* and *Chrysonilia sithopila* respectively. To improve the illustration the sample was transferred to a sterile tube in b.

bated at room temperature for 15 days. Development of colonies was observed daily. Identification of fungal agents was carried out according to standard methods [7].

The presence of dematiaceous (Figure 2) and hyaline filamentous fungi were verified by microscopic preparation from two different samples (4%), respectively. Both fungi were recovered and identified as *C. globosum* and *Chrysonilia sitophila*, respectively. The same fungal species were re-isolated from the original bottles an three separate occasions. We did not observe the presence of bacteria.

Episodes of nosocomial peritonitis have been caused by contamination of tubes and extensions used for the procedure, including a Tenkhoff catheter [1]. Martin (1993) stresses that the patient's biota is an important cause of endogenous infection [2]. Peterson *et al*. [8] reported the occurrence of microorganisms with potential to grow and multiply in peritoneal dialysis fluid. Investigations of outbreaks have shown that improperly cleaned and disinfected dialysis machines have been a cause of nosocomial peritonitis. Martin (1993) emphasizes that inadequate handling of dialysis bottles may lead to infection [2].

In our study 10% of 490 bottles to be used in peritoneal dialysis were randomly examined. Two bottles

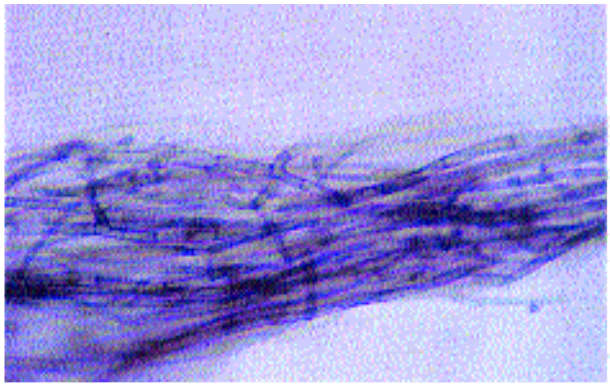

Figure 2. Direct microscopic preparation from peritoneal dialysis fluid showing a filamentous fungus with dark and regularly septate mycelium (400 x).

(4%) were found to be contaminated with filamentous fungi. All material examined belonged to the same batch which was within its validity period. *C. sitophila* and *C. globosum* were identified by their macro and micromorphological characteristics respectively.

C. sitophila is a laboratory contaminant and has been rarely reported in human beings. Theodore *et al*. (1961) reported a case of endophthalmitis caused by this fungus [9]. *C. globosum* has been described as causing onychomycoses [10], and cerebral infections [11]. The fungus has also been recovered from pleural fluid from leukemic patients [12].

Barthez *et al*. (1984) reported a case of fungal peritonitis caused by *C.globosum* in a patient with end stage renal disease undergoing CAPD [5]. The infection was associated with exogenous contamination of the dialysis catheter. Invasion of part of the mycelium into the lumen of the catheter was demostrated by electron microscopy. This fact suggested that contamination was derived from the hospital environment, although not defining the source.

The isolation of *C. globosum* and *C. sitophila* from bottles with fluid for peritoneal dialysis suggests on exogenous contamination that may cause peritonitis. We stress the importance of microbiological surveillance of such solutions as they are potential carriers of microorganisms associated with nosocomial infections.

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