

Zygomycetes peritonitis in ambulatory peritoneal dialysis: Case report and review of literature

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ABSTRACT

We present a case of CAPD peritonitis caused by zygomycetes infection. A 46-year-old male patient presented with refractory peritonitis requiring catheter removal. He had persistence of fever and an ultrasonography abdomen done revealed loculated collections. An initial pigtail drainage followed by open laparotomy was performed. Intra-operative peritoneal and omental biopsy revealed large areas of necrosis with broad aseptate fungal hyphae consistent with zygomycosis. He was managed with 3 gm of intravenous amphotericin and is doing well at 6 months of follow-up.

Key words: Continuous ambulatory peritoneal diagnosis, laparotomy, peritonitis, zygomycetes

Introduction

Ambulatory peritoneal dialysis is the preferred form of dialysis in countries where the facility of maintenance hemodialysis is limited.^[1] Infections in the form of peritonitis, exit site infections and tunnel infections are the most common problems with peritoneal dialysis.^[2] Although Gram-positive bacilli are the most common cause of peritonitis, they can also be caused by Gram-negative bacilli, while fungi accounts for about 5-10% cases of peritonitis.^[2,3] Peritonitis secondary to zygomycosis has been reported only as case reports and till date about 16 cases have been reported in the world literature.^[4] We report a case of peritonitis secondary to zygomycetes infection, which was managed successfully with the help of surgery and amphotericin B. Earlier, two cases of zygomycetes associated peritoneal dialysis infection have been reported from India;^[5,6] however, both of them succumbed, making our case probably the first from India to have survived this infection.

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Case Report

A 46-year-old male with end stage renal disease secondary to IgA nephropathy had been started on continuous ambulatory peritoneal dialysis (CAPD) 6 years back. He was using the Twin Bag system (Baxter HealthCare, McGaw Park, Illinois, USA), and was doing 4 exchanges/day. 3 years after starting on CAPD, he developed an episode of bacterial peritonitis, which was managed successfully with antibiotics. Currently, he presented with 3 days history of severe abdominal pain with high grade fever and turbid effluent. He was started on intravenous (i.v.) meropenem and vancomycin which he received for 48 h before presenting to us. At presentation, he was febrile but hemodynamically stable. The abdomen was diffusely tender; however, the exit site was healthy. His CAPD fluid analysis showed 1050 cells with 75% polymorphs while the fluid culture was sterile. He was continued on same i.v. antibiotics with no response. Repeat CAPD effluent bacterial and fungal cultures, acid fast staining and mycobacterial culture (collected later) were sterile. After 72 h, due to non-response, his CAPD catheter was removed and he was continued on i.v. antibiotics.

Despite these measures, he continued to have high grade fever. At the end of 1 week, an ultrasound (USG) abdomen was done which revealed loculated ascites. A USG guided ascitic tap drained thick pus, following which a pigtail catheter was inserted in the largest of loculi, which failed to drain the collection. Due to persistence of fever and loculated pus collections, he underwent open laparotomy.

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Intra-operatively, multiple loculated fluid collections with dense adhesions between bowel loops and peritoneum were noted [Figure 1a]. The loculi were broken and about 500 ml of pus was drained. The peritoneal and omental biopsy taken intra-operatively revealed large areas of necrosis along with broad aseptate fungal hyphae consistent with zygomycosis [Figure 1b]. The patient was started on 75 mg/day of i.v. conventional amphotericin B. After 48 h, he started showing response and became afebrile. He received a total of 3 g amphotericin B and was doing fine at 6 months follow-up.

Discussion

Fungal peritonitis, accounts for about 5-10% of CAPD peritonitis across different series.^[2,3] About 80-90% of the episodes are caused by *Candida* species, while among the filamentous fungi, *Aspergillus* is the most common.^[7] Fungal peritonitis poses a real problem to the nephrologists and mycologists with its relatively high mortality rate (5-15%) and significantly high permanent CAPD discontinuation rate (about 40% patients shifted to hemodialysis).^[2,3] Infection by Zygomycetes group is extremely rare and till date about 16 cases have been described [Table 1]. Risk factors include previous antibiotic use, uncontrolled diabetes mellitus and desferrioxamine therapy. Since our patient was on i.v.

antibiotics for about 1 week only, we don't think that this may be a predisposing factor for development of fungal peritonitis in our case. Due to the same reason, our patient did not receive any antifungal prophylaxis.

The clinical presentation of these patients is not different from an episode of usual bacterial peritonitis with pain abdomen, fever and cloudy effluent, however, these patients fails to improve after adequate empirical antibiotic therapy for suspected bacterial peritonitis. The diagnosis is most cases was made by culturing the organism from the CAPD effluent, however, only in few cases a tissue invasion was documented. In our case, direct tissue invasion was documented and the large

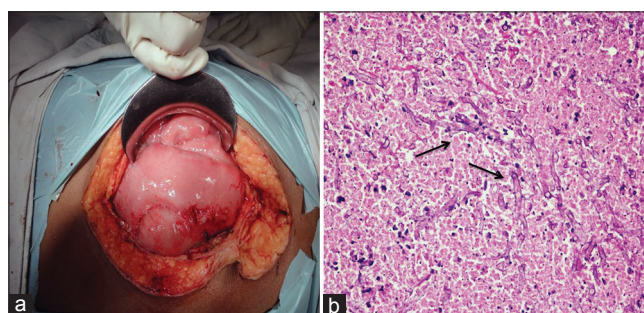


Figure 1: (a) Intra-operative photograph showing dense adhesions between bowel loops and peritoneum. (b) Peritoneal biopsy showing necrosis and broad aseptate hyphae (arrow)

Table 1: Clinical profile and outcome of published cases of zygomycetes peritonitis

Author	Sex	Predisposing condition	Organism	Therapy	Catheter removal	Outcome
Khanna <i>et al.</i> , 1980 ^[8]	M	DM	Mucor	NA	Yes	Alive
Nakamura <i>et al.</i> , 1989 ^[9]	M	Bacterial peritonitis	Rhizopus from post-mortem cx	Amphotericin B	NA	Death 5 days
Polo <i>et al.</i> , 1989 ^[10]	M	Bath in farm cistern	Rhizopus from PD fluid	Amphotericin B	Yes	Death 20 days
Branton <i>et al.</i> , 1991 ^[11]	M	DM, bacterial peritonitis	Rhizopus from PD fluid	Amphotericin B	Yes	Death after 1 month
Fergie <i>et al.</i> , 1992 ^[12]	F	Acute PD, cardiac sx	Mucor from PD fluid	Amphotericin B	Yes	Death after 20 days
Adam <i>et al.</i> , 1994 ^[13]	M	SLE	Mucor	Amphotericin B	Yes	Alive
Mariano <i>et al.</i> , 1996 ^[14]	M	Bacterial peritonitis	Fungus from PD fluid	Amphotericin B	Yes	Death after 45 days
Khan and Chugh 2000 ^[15]	M	NA	Absidia corymbifera PD fluid	NA	NA	NA
Del Rio Perez <i>et al.</i> , 2001 ^[16]	M	NA	Zygomycetes from PD fluid	Amphotericin B, flucytosine	NA	Death 2 years later, MI
Nannini <i>et al.</i> , 2003 ^[17]	M	Bacterial peritonitis	Mucor from PD fluid	Liposomal amphotericin B	Yes	Alive after 5 months
Serna <i>et al.</i> , 2003 ^[18]	M	Bacterial peritonitis	Zygomycetes from PD fluid	Liposomal amphotericin B	Yes	Alive after 5 months
Monecke <i>et al.</i> , 2006 ^[19]	M	Perforated colon	Rhizopus from peritoneal	Amphotericin B	NA	Death 47 days
Pimentel <i>et al.</i> , 2006 ^[20]	M	DM	Cunninghamella	Voriconazole	Yes	Alive after 6 months
Nayak <i>et al.</i> , 2007 ^[5]	F	Bacterial peritonitis	Rhizopus from PD fluid	Liposomal amphotericin B	Yes	Death 8 months from cardiac cause
Ram <i>et al.</i> , 2007 ^[6]	F	Exit site infection	Zygomycetes from catheter tip	Amphotericin B	Yes	Treatment refused 3 weeks
Sedlacek <i>et al.</i> , 2008 ^[4]	F	Bacterial peritonitis, pet	Mucor sp. from PD fluid	Liposomal amphotericin B, posaconazole	Yes	Alive at 2 years

DM: Diabetes mellitus, PD: Peritoneal dialysis, SLE: Systemic lupus erythematosus, MI: Myocardial infraction

amount of tissue necrosis noted was consistent with the capacity for vascular invasion of this fungus.

In all the other previous cases, amphotericin B, either conventional or liposomal was used as an initial treatment with duration of therapy of 12 weeks [Table 1]. There is now some evidence that in amphotericin resistant cases, posaconazole is an effective drug and at least 60% of the amphotericin resistant cases can be salvaged by posaconazole therapy.^[21] Whatever be the antifungal therapy, the role of source removal in the successful management of these patients cannot be overemphasized. In our case also, quick removal of the CAPD catheter as well as laparotomy and drainage of the intra-abdominal abscesses were helpful in the successful outcome.

The outcome of zygomycetes peritonitis is very dismal, with 11 of the 16 cases succumbing to the infection, while none of the surviving patient was able to go back on peritoneal dialysis. Our case is probably first from India documenting a successful outcome with the help of surgery and conventional amphotericin B.

Thus, a high index of suspicion in non-resolving peritonitis is required for diagnosing zygomyceteal peritonitis. If culture negative peritonitis gets complicated, we may need to suspect other unusual causes of peritonitis like an invasive fungal infection or mycobacterial infection. Early documentation of fungi with the help of peritoneal dialysis effluent culture or peritoneal biopsy, rapid institution of antifungal therapy and a low threshold for surgery are key parameters for a successful outcome of these patients.

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