

***Chaetomium* peritonitis in an immunocompetent patient simulating tuberculous peritonitis: A case report and review of the literature**

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ABSTRACT

Chaetomium species are rare causes of infections in immunocompetent patients. These include classic allergy symptoms such as wheezing, runny eyes, and coughing, onychomycosis and sinusitis. *Chaetomium* species on the other hand can cause serious and fatal infections in immunocompromised patients and intravenous drug users. These include empyema, pneumonia, and fatal disseminated cerebral disease. A 17-year-old girl presented with weight loss, abdominal distension and pain. Initial clinical, radiological and laparoscopy features were suggestive of tuberculous peritonitis, and was managed accordingly, with some evidence of improvement. However, fungal culture eventually confirmed the diagnosis of *Chaetomium* peritonitis. This report describes the first case of *Chaetomium* peritonitis infection simulating tuberculous peritonitis in an immunocompetent patient.

Keywords: *Chaetomium* species, peritonitis, tuberculous peritonitis, immunocompromised patients.

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INTRODUCTION

Chaetomium is a genus of fungi in the *Chaetomiaceae* family. It is a dematiaceous filamentous fungus normally found in soil, air, and plant debris. It is a very rare human pathogen that causes classic allergy symptoms such as wheezing, runny eyes, and coughing, onychomycosis and sinusitis in immunocompetent patients. *Chaetomium* on the other hand is a well known cause of serious infections in immunocompromised patients and fatal in the majority of them (Anandi et al., 1989; Al-Aidaros et al., 2007; Barron et al., 2003; Yeghen et al., 1996). These include empyema, pneumonia, and fatal disseminated cerebral disease. This is a case report of *Chaetomium* peritonitis infection simulating tuberculous peritonitis in an immunocompetent patient. The literature on the subject is also reviewed.

CASE REPORT

A 17-year-old girl was admitted to our hospital complaining

of weight loss, abdominal distension and pain. She was well until approximately 6 months prior to her presentation when she started to complain of abdominal distension. This increased gradually and about 4 months later she started to have upper abdominal pain, altered bowel habit, anorexia and weight loss. She lost about 6 kg of her weight during this time. There was no history of fever or night sweat. She was single with no history of previous gynecological problems or abortions and not on any medications.

On examination, she was thin built, afebrile with normal vital signs. Her lungs were clear and cardiac evaluation was normal. Abdominal examination revealed ascites with no organomegaly and right and left upper quadrants tenderness. Laboratory studies revealed a white blood cell count (WBC) of 2500/mm³, a C-reactive protein level of 30.8 mg/L and an erythrocyte sedimentation rate of 20 mm/h. Her liver and renal functions were normal. Abdominal paracentesis revealed straw colored ascitic fluid containing leukocytes 425/μl with 86% lymphocytes



Figure 1. Computed Tomography (CT) scan of the abdomen showing thickened omentum “Omental caking”.

and 2% polymorphonuclear neutrophils. Gram stain and acid-fast bacilli stains and polymerase chain reaction (PCR) for acid-fast bacilli were negative. Her immunological profile (IgM, IgG, IgE, IgA, lymphocytes subsets and lymphocytes plastogenesis) was normal and HIV test was negative. Computed tomography scan of the abdomen revealed ascites, thickened omentum “omental caking”, and multiple mesenteric lymph nodes enlargement (Figure 1).

Based on radiological appearance, tuberculous peritonitis was suspected and the patient underwent laparoscopic peritoneal biopsy. This revealed fibrofatty tissue infiltrated with chronic inflammatory cells and non-caseating granuloma containing multinucleated giant cells. Ziehl-Neelsen stain for acid-fast bacilli was negative and Gomori methenamine silver (GMS) stain for fungi was also negative.

The patient was treated empirically with anti-tuberculous medications awaiting the final acid-fast bacilli and fungal cultures. On follow-up one month later in the clinic, the patient did show clinical evidence of improvement and weight gain. The fungal culture (carbon source media) from the ascitic fluid taken at the time of paracentesis and laparoscopy both however grew a dematiaceous fungus (*Chaetomium* sp.) (Figures 2 and 3). *Chaetomium* was not classified further as DNA sequencing is not available at our hospital. So, the anti-tuberculous medications were discontinued and the patient was started on Voriconazole 400 mg PO twice

daily for one day and then 200 mg PO twice daily thereafter. During the follow up visits to our clinic, the patient started to improve gradually with no more ascites, abdominal pain or anorexia. Her weight increased from 42 to 48 kg during three months period. The C-reactive protein level decreased from 30.8 to 1.9 mg/L and erythrocyte sedimentation rate decreased from 20 to 8 mm/h. She continued treatment for one year and on follow-up at the end of treatment she was well, gaining weight with no complaints. A follow-up abdominal CT-scan at the end of treatment was normal (Figure 4).

DISCUSSION

In humans, the majority of fungal infections are caused by species such as *Candida* and *Aspergillus*. Other rare opportunistic fungal infections are emerging and on the rise. The risk factors for such infections are several and include prolonged use of antibiotics, chemotherapy, immunosuppression secondary to hematopoietic stem cell or solid organ transplantation, neutropenia, the presence of indwelling intravascular catheters, hemodialysis, or previous fungal colonization (Hattori et al., 2000; Abbott et al., 1995).

One of the rare fungal infections is that caused by *Chaetomium* species. *Chaetomium* is a genus of fungi in the Chaetomiaceae family. It is a dematiaceous (dark-walled) mold normally found in soil, air, dung, bird

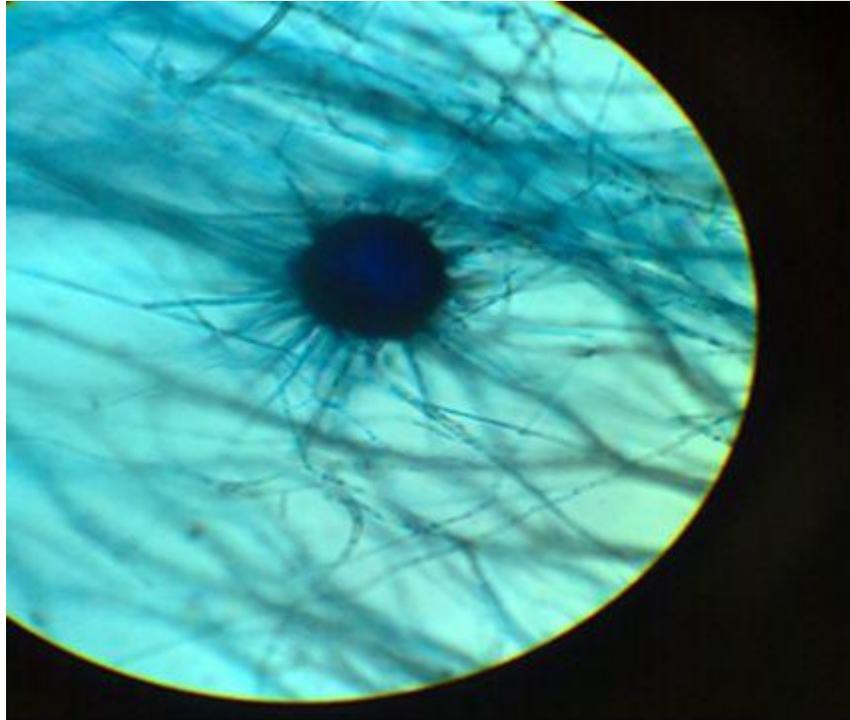


Figure 2. Microscopic picture showing the filamentous fungus with hair-like, black appendages (setae) on the surface.

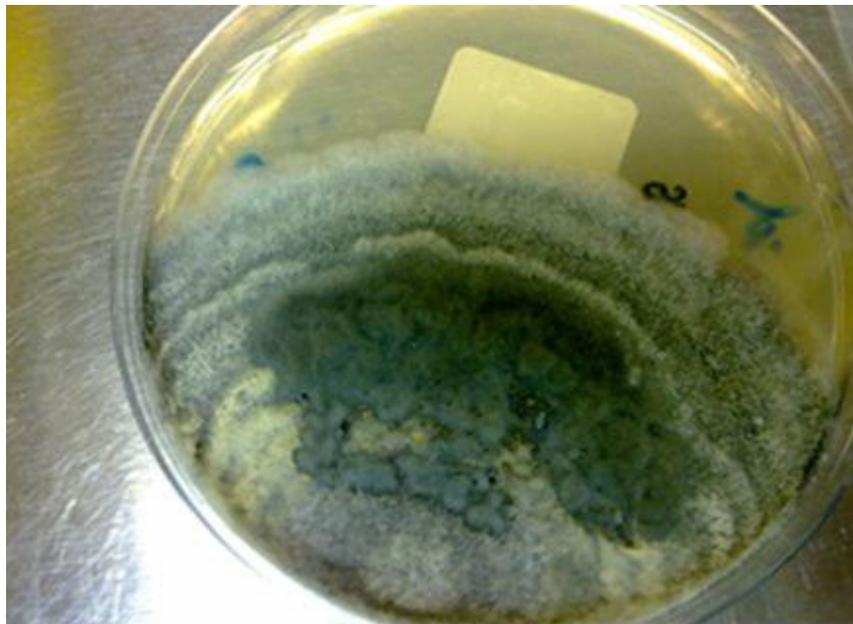


Figure 3. Plate with mature *Chaetomium* colonies.

feathers, seeds, and plant debris. The genus *Chaetomium* includes about 80 species. It is highly cellulolytic that causes the hydrolysis of cellulose and frequently emits a musty odor. In addition to being a

contaminant, *Chaetomium* species are also encountered as causative agents of infections in humans. Several reports have been published implicating *Chaetomium globosum* as the most common species causing infections



Figure 4. Abdominal CT-scan following treatment.

in humans (Guarro et al., 1995). These include cutaneous phaeohyphomycosis, severe allergic complications including sneezing, runny nose, redness and swelling, onychomycosis and sinusitis in immunocompetent patients (Yeghen et al., 1996; Aru et al., 1997; Febré et al., 1999). On the other hand, *Chaetomium* species have been reported as a cause of severe and serious infections including empyema, pneumonia, and fatal disseminated cerebral infection in patients with hematologic malignancies and/or immunosuppression secondary to bone marrow or solid organ transplantation and intravenous drug addicts (Anandi et al., 1989; Al-Aidaros et al., 2007; Barron et al., 2003; Kontoyiannis, 2012; Yu et al., 2006; Thomas et al., 1999; Salvaggio and Pappas, 2003). The mortality rate among immunocompromised patients is considerably greater than that among immunocompetent patients. The increasing number of immunosuppressed patients requires a careful evaluation and microbiologic investigation for uncommon fungal infections and physicians caring for these patients should be aware of such a complication.

Fungal pathogens on the other hand are uncommon cause of primary peritonitis. Secondary peritonitis results

from gross contamination of the peritoneal cavity as a result of gastrointestinal perforations or in patients undergoing peritoneal dialysis. Regardless of the clinical circumstances, most cases of fungal peritonitis are caused by *Candida* species; however, other yeasts and filamentous fungi have been uncommonly reported (Muskett et al., 2011; Guppy et al., 1998). Treatment of secondary peritonitis consists of appropriate surgical intervention and systemic antifungal therapy. The presentation in our patient is unusual from several aspects. Our patient was a young healthy girl that was immunocompetent and with no underlying disease who presented with severe *Chaetomium* infection in the form of peritonitis that was clinically, radiologically and laparoscopically indistinguishable from abdominal tuberculosis to the extent that she was treated empirically with anti-tuberculous drugs. Surprisingly, she also responded partially to these drugs. This case is the first of an immunocompetent patient who presented with peritonitis that was caused by *Chaetomium*. In our patient, there are several points against this being a contaminant. *Chaetomium* was cultured from the peritoneal fluid on two occasions, one at the time of paracentesis and the other at the time of laparoscopy.

The acid-fast bacilli stain, culture and polymerase chain reaction were negative. Add to this, the excellent clinical and radiological response to Voriconazole. The method of transmission of *Chaetomium* is either from direct contact or airborne. In our patient, the source of infection was not exactly known. Our patient was symptomatic, and *Chaetomium* was isolated from the ascetic fluid on two occasions, and responded well to treatment.

The appropriate treatment for *Chaetomium* infections is not well established and *in vitro* susceptibility studies for *Chaetomium* species has revealed resistance to flucytosine and fluconazole. Although ITC, ketoconazole, and miconazole demonstrated inhibitory activity, none of these agents, including AMB, demonstrated fungicidal activity (Guarro et al., 1995). Most patients with reported invasive *Chaetomium* disease were treated with either conventional or lipid-based AMB empirically during their treatment course. Our patient was successfully treated with Voriconazole. This case calls for a careful microbiologic investigation for uncommon fungal infections both in immunocompromised and immunocompetent patients. *Chaetomium* species are potential pathogens in both immunocompromised and immunocompetent individuals.

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