Cryptococcosis is a ubiquitous encapsulated yeast that predominately causes significant infections in immunocompromised individuals, with 80–90% of all cases occurring in those with human immunodeficiency virus (HIV) infection. The most common sites of infection are the central nervous system and lungs. Disseminated disease is uncommon and when present almost always occurs in HIV-infected patients. Cryptococcal peritonitis is considered a rare manifestation of disseminated cryptococcosis. Here, we present a case of disseminated cryptococcosis with manifestation in the form of peritonitis exclusively.

**Case Presentation**

A 43-year-old immunocompromised male (CD4 count of 46 cells mm$^{-3}$) presented with a history of distention of abdomen for 1 month. It was insidious in onset, gradually progressive associated with history of on and off, nonbiliary non-projectile vomiting, and history of breathlessness on exertion, with generalized malaise. The patient was clinically diagnosed as tubercular abdomen and was started on direct observed treatment strategy for tuberculosis Category II. Patient also gave a positive history of pulmonary tuberculosis 20 years back.

On clinical examination—abdomen was distended, flanks were full and shifting dullness was present, no dilated veins were seen. Hepatosplenomegaly was absent.

Clinical diagnosis of abdominal tuberculosis along with peritonitis was kept.

**Investigation:** Laboratory studies were unremarkable, with no leukocytosis.

USG abdomen revealed multiple abdominal lymph nodes along with free fluid.

Ascitic fluid cytology: the peritoneal fluid was bloody and the cytological smears revealed reactive mesothelial cells, macrophages, few lymphocytes, and fungal yeasts. The fungi had thick sharply demarcated transparent capsule, supporting the diagnosis of *Cryptococcus* species (Fig. 1).

**Discussion**

This case report presents one of the rare manifestation of *C. neoformans* infection, i.e., peritonitis in immunocompromised patient. The menace of cryptococcosis has assumed global proportions over the years. The tropical climate of the Indian subcontinent offers a suitable environment for *C. neoformans*, and the onslaught of the acquired immune deficiency syndrome (AIDS) pandemic...
since the early 1990s has substantially influenced the situation. Coupled with that are the advances in laboratory diagnostic techniques that have made accurate diagnosis increasingly available. These factors together have led to a sharp increase in the number of reported cases of cryptococcosis.

*C. neoformans* has two variant forms: *C. neoformans* var *neoformans* and *C. neoformans* var *gatti*. *C. neoformans* var *neoformans* is distributed worldwide and responsible for most infections in humans. *C. neoformans* var *gatti* mainly causes infection in immunocompetent hosts and has restricted geographical distribution. In addition to HIV infection, immunosuppressive medications, solid-organ transplantation, chronic organ failure (renal and liver), hematologic malignancy, chronic lung disease, and rheumatologic disorders can also predispose individuals to this infection. The usual manifestations are pulmonary, but meningitis, septicaemia ocular and gastrointestinal manifestations have also been reported.

Although, the gastrointestinal tract (GIT) has been proposed as a potential site for disseminated cryptococcal infection. It is one of its rare presentations.

Abdominal pain, increased abdominal girth, fever, and dyspnea are typical complaints of patients with cryptococcal peritonitis. In patients with cryptococcal peritonitis, diagnosis can often be delayed due to lack of specific signs and symptoms and low clinical suspicion among healthcare providers. The proposed mechanisms underlying the pathogenesis of cryptococcal peritonitis include direct percutaneous inoculation of contaminating organisms during repeated paracentesis for management of ascites, hematogenous spread from a pulmonary site, and hematogenous spread from the alimentary tract facilitated by upper GI bleeding.

Various studies have described cryptococcal infection in association with liver diseases (mainly alcoholic liver disease, cirrhosis, or hepatitis B and C infection), the summarized tabulated format has been given by Saif and Raj. We are hereby presenting the tabulated summary of all the case series in which gastrointestinal manifestations of cryptococcal infections occurred in association with AIDS as shown in Table I. Stiefel et al. reported *Cryptococcus* in ascitic fluid along with specimens such as blood, feces, and sputum. Bonacini et al., Washington et al., and Saha et al. obtained *Cryptococcus* in the biopsy of the GIT organs with negative ascitic fluid cytology. Saha et al. and Sungkanuparph et al. also reported reduced CD4 cell count in blood.

Cryptococcal organisms are diagnosed on cytology on the basis of their characteristic morphological appearance—yeast-like encapsulated organisms with mucicarmine/PAS positive capsule, which can be highlighted by

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**Table I. Cryptococcal GIT Manifestations in Association With AIDS**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Author and year</th>
<th>No. of cases</th>
<th>Clinical diagnosis</th>
<th>Ascitic fluid profile</th>
<th>Other culture specimens</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bonacini et al., 1990</td>
<td>3</td>
<td>AIDS with GIT involvement</td>
<td>Ascitic fluid culture—negative</td>
<td>Stomach, colon, liver, pancreas biopsy—positive for <em>Cryptococcus</em></td>
</tr>
<tr>
<td>2</td>
<td>Washington et al., 1992</td>
<td>1</td>
<td>AIDS with candidal oesophagitis and gastric nodule</td>
<td>Ascitic fluid culture—negative</td>
<td>Gastric nodule biopsy—positive for <em>Cryptococcus</em></td>
</tr>
<tr>
<td>3</td>
<td>Stiefel et al., 1999</td>
<td>1</td>
<td>Cirrhosis, Hepatitis C, and AIDS</td>
<td>Ascitic fluid profile: WBC-200/μ and protein 15.2 g/L, <em>Cryptococcus</em> seen</td>
<td>Blood, Feces, sputum—positive for <em>Cryptococcus</em></td>
</tr>
<tr>
<td>4</td>
<td>Sungkanuparph et al., 2002</td>
<td>1</td>
<td>Alcoholic cirrhosis; AIDS</td>
<td>Ascitic fluid profile: WBC-200/μ and protein 1.7 g/L, <em>Cryptococcus</em> seen</td>
<td>Blood—positive for <em>Cryptococcus</em> CD4 cell count 75/cumm</td>
</tr>
<tr>
<td>5</td>
<td>Saha et al., 2008</td>
<td>1</td>
<td>Jejunal perforation</td>
<td>Ascitic fluid culture—negative</td>
<td>Jejunal edge biopsy—positive for <em>Cryptococcus</em> and ELISA—HIV 1, CD4 count—200 cells cumm</td>
</tr>
</tbody>
</table>
use of India ink stain. Species determination requires culture.9,10,13

With the help of a simple, inexpensive and noninvasive test like ascitic fluid cytology, we were able to diagnose cryptococcal organisms in ascitic fluid of an immunocompromised patient. Although cryptococcal peritonitis is an unusual manifestation of AIDS, possibility of this should be kept in mind, especially in a patient with low CD4 counts presenting with abdominal symptoms.

Conclusions

In summary, disseminated cryptococcosis, particularly with peritonitis, is an uncommon manifestation of \textit{C. neoformans} infection in HIV positive patients. Although the gold standard for confirming the diagnosis is culture, but this usually takes days and sometimes weeks where patients may succumb to disseminated cryptococcosis. The cytological identification is simple, fast, and cost effective. Diagnosis of cryptococcal peritonitis can be delayed if cytological examination is not utilized.

References
