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Successful diagnosis of intestinal *Mycobacterium avium* complex infection in a kidney transplant recipient using nasogastric aspirate culture: A case report

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Abstract

Intestinal *Mycobacterium avium* complex (MAC) infections are rare and can be challenging to diagnose. We describe a case of intestinal MAC infection in a kidney transplant recipient with five months of unexplained weight loss and abdominal pain who developed intestinal obstruction. Esophagoduodenoscopy (EGD) with biopsies was performed but was non-diagnostic. Intestinal MAC was diagnosed via nasogastric aspirate culture. The patient's symptoms rapidly improved after initiation of appropriate treatment, but he later succumbed to aspiration pneumonia and candidemia.

Keywords

nontuberculous mycobacteria; *Mycobacterium avium* complex; solid organ transplant; renal transplant; small bowel obstruction; gastric

Introduction

Extrapulmonary *Mycobacterium avium* complex (MAC) infections in transplant patients are uncommon,[1-3] especially among kidney transplant recipients.[4-11] Herein, we report a case of intestinal MAC in a kidney transplant patient whose diagnosis depended upon examination and culture of a nasogastric aspirate.

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Case report

A 56-year-old man who had undergone kidney transplantation for IgA nephropathy six years prior was transferred to our hospital with abdominal pain, weight loss, nausea, and vomiting of five months duration. His immunosuppressive regimen consisted of mycophenolic acid 360mg twice daily and prednisone 5mg daily. His vital signs were normal and physical exam revealed a cachectic gentleman with abdominal distension and shifting dullness. There were no other stigmata of liver disease, and the remainder of his exam was unrevealing. Laboratory studies revealed a white blood cell count of 7.1×10^9/L, hemoglobin 11.9 g/dL, platelets 87×10^9/L, sodium of 139 mmol/L, creatinine 1.7 mg/dL (at his baseline), international normalized ratio of 1.3, and normal total bilirubin, alkaline phosphatase, and transaminases. An abdominal computed tomography (CT) scan showed a partial distal small bowel obstruction (SBO) without a clear transition point and no lymphadenopathy (Fig. 1).

Prior to transfer, investigations performed at an outside facility revealed hepatic dysfunction with ascites and thrombocytopenia, negative viral hepatitis serologies, unrevealing chest x-ray, and a liver biopsy notable only for mild inflammation of the portal tracts without cirrhosis or steatosis. Two esophagogastroduodenoscopies (EGDs) were performed: the first of which showed duodenitis, gastritis, and an antral polyp. The second showed portal-hypertensive gastropathy and abnormal, diffuse nodular mucosa throughout the duodenum (Fig. 2). Histopathological exam of the duodenum revealed diffuse granulomatous duodenitis and abundant acid-fast bacilli (AFB) within macrophages (Fig. 3).

A repeat EGD was performed at our institution because previous duodenal biopsies had not been sent for AFB culture. AFB smears of duodenal tissue biopsies were negative. Seven days after his repeat EGD, AFB cultures of duodenal tissue and blood, in addition to bacterial, fungal, and AFB cultures of ascites fluid remained without growth. A naso-gastric (NG) tube was placed for management of SBO. AFB smear of gastric aspirate revealed numerous AFB. Xpert MTB/RIF (Cepheid, Sunnyvale, California) testing performed on the aspirate was negative. A tuberculin skin test and human immunodeficiency virus (HIV) antigen/antibody testing were both negative.

Empirical treatment for presumed MAC with azithromycin 500mg IV daily, ethambutol 15mg/kg by NG tube daily, and rifabutin 150mg by NG tube daily was initiated. Serum tacrolimus trough levels were monitored closely. Within days of starting treatment, the patient's symptoms improved rapidly with complete resolution of nausea, vomiting, abdominal pain, and SBO. Gastric aspirate culture grew AFB after one week, identified as MAC by 16S rRNA sequencing. Unfortunately, the patient later developed candidemia and aspiration pneumonia, which ultimately led to his death one month after presentation.

Discussion

In the absence of mandatory reporting, the true incidence of nontuberculous mycobacteria (NTM) infections is unknown but is estimated to range between 0.04 and 8 percent.[2] The most common NTM species is MAC, which encompasses *Mycobacterium avium* and *M. intracellulare*. MAC infections are categorized into pulmonary and disseminated forms.

Intestinal MAC remains an extremely rare entity among solid organ transplant (SOT) recipients, although it is more frequently encountered as an opportunistic infection in patients with advanced HIV infection.[2, 3, 12] A meta-analysis of HIV-infected patients with intestinal MAC demonstrated that multiple raised nodules was the most common macroscopic finding on EGD, although gastric and/or duodenal nodules can also be found in other conditions such as malignancies and Whipple's disease.[13, 14]

Nasogastric aspirate sampling was a critical diagnostic maneuver in achieving the definitive diagnosis in our patient. AFB smears and cultures of duodenal biopsy tissue, blood, and ascitic fluid were all negative. Only by sampling his gastric fluids did we successfully diagnose MAC, which may have involved both his duodenum and distal small bowel, based on the location of his SBO. Gastric aspiration can be performed easily in most patients, especially those with an indwelling nasogastric tube, and can serve as a useful addition to standard sampling approaches for difficult diagnoses. The technique has long been employed to obtain samples for AFB smear and culture for the diagnosis of pediatric tuberculosis, and recent evidence suggests that Xpert MTB/RIF testing is useful in gastric aspirates.[15]

The Infectious Diseases Society of America/American Thoracic Society guidelines recommend a combination therapy with a macrolide, ethambutol, and a rifamycin. SOT recipients receiving calcineurin inhibitors or sirolimus as part of their immunosuppressive regimen require close monitoring of drug levels, due to drug interactions with rifamycins and macrolides.[16] Our patient had a SBO, felt to be a complication of intestinal MAC infection. This made treatment of the underlying infection challenging, as anti-mycobacterial regimens are generally administered orally. Given his rapid clinical improvement upon starting treatment for MAC, we did not obtain serum drug levels of anti-mycobacterial agents. The duration of treatment should involve a minimum of twelve months per guideline recommendations.[2]

In conclusion, intestinal MAC is a rare opportunistic infection in transplant patients. Discovery of nodular mucosa during endoscopy, in particular, should prompt consideration of MAC and collection of a gastric aspirate when biopsy cultures are unavailable or unrevealing.

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Abbreviations (in alphabetical order)

AFB	acid-fast bacilli
CT	computed tomography
EGD	esophagoduodenoscopy
HIV	human immunodeficiency virus
MAC	intestinal Mycobacterium avium complex
NG	naso-gastric
NTM	nontuberculous mycobacteria
SBO	small bowel obstruction

SOT solid organ transplant

Highlights

- Extrapulmonary *Mycobacterium avium* complex infection are uncommon in transplant patients.
- Our patient developed intestinal *Mycobacterium avium* complex after renal transplantation.
- Nasogastric aspirate culture for *Mycobacterium* should be considered as a diagnostic maneuver in adult transplant patients with unexplained intestinal symptoms.

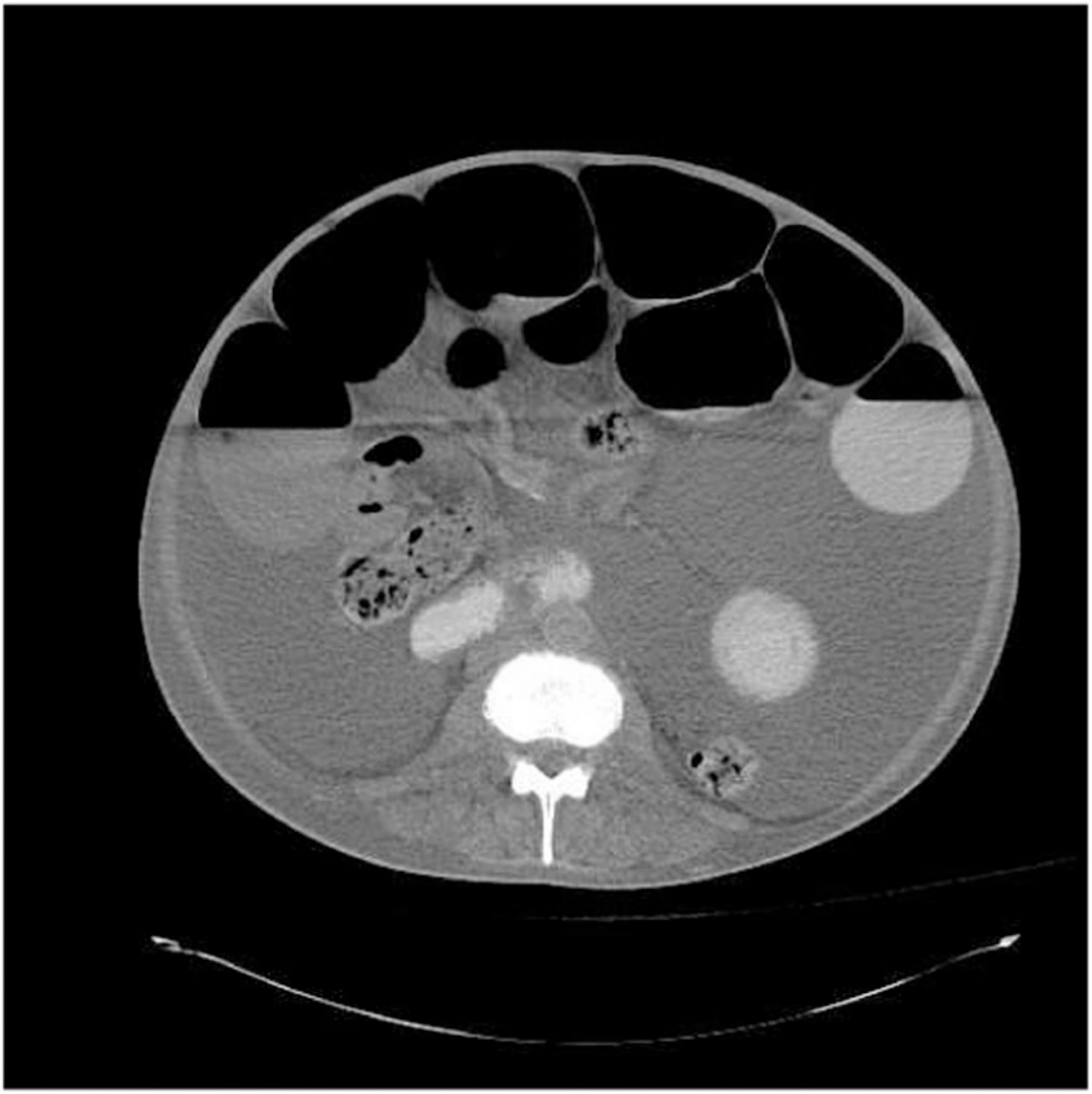

Fig. 1.

Non-contrast abdominal CT showing dilated loops of small bowel with air-fluid levels, consistent with a small bowel obstruction. The distal ileum and colon were decompressed, but a focal transition point could not be identified.

Fig. 2.
Esophagogastroduodenoscopies showing demonstrating diffusely abnormal, nodular duodenal mucosa.

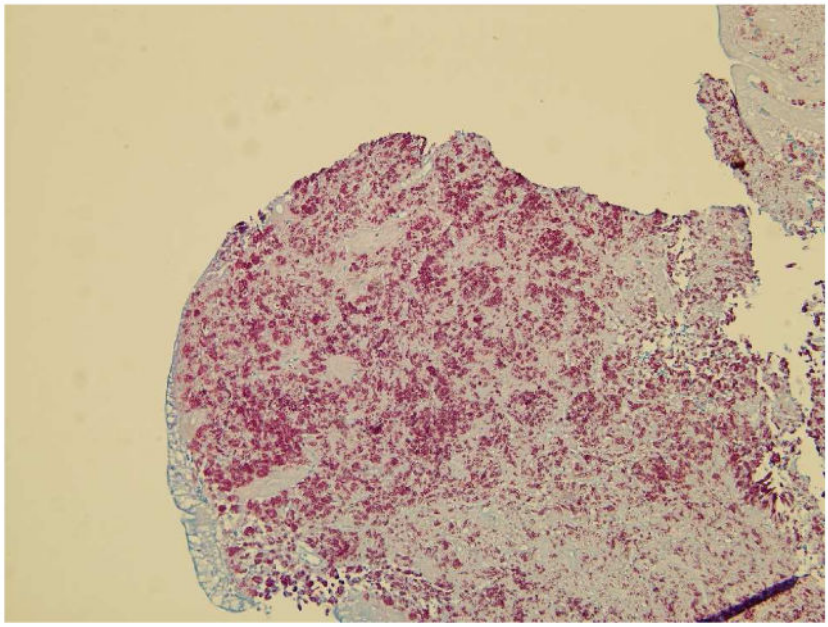

Fig. 3.
AFB stain of the patient's duodenal tissue showing numerous AFB within macrophages.