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Endoscopic appearance of GI mycobacteriosis caused by the *Mycobacterium avium* complex in a patient with AIDS: case report and review

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Disseminated *Mycobacterium avium* complex (MAC) infection, an important AIDS-defining opportunistic infection in patients with advanced HIV infection (generally those with CD4 lymphocyte counts <50 cells/ μ L), is associated with significant morbidity and mortality, and with shortened survival.^{1,2} The incidence of disseminated MAC (DMAC) infection increased during the period 1982 to 1994, with the maturation of the AIDS epidemic,³ to an estimated cumulative incidence of 15% to 24% of patients with AIDS.⁴ With the introduction of antimicrobial prophylaxis and highly active antiretroviral therapy (HAART), the incidence of DMAC infection dramatically declined and survival improved.⁵ According to the U.S. Centers for Disease Control and Prevention, the incidence of DMAC infection decreased from 10 cases per 100 person-years in 1992 to two cases per 100 person-years in 1998.⁶ Survival increased from 40 days before the introduction of HAART to 398 days in the post-HAART era.³ Despite advances in the care of patients with AIDS and MAC infection, new or recurrent DMAC infection continues to occur in patients with limited access to care for HIV infection and in those who do not respond to antiretroviral therapy.^{3,7,8} The GI tract appears to be a common portal of entry for MAC infection in patients with AIDS. Local replication may result in the formation of local foci with subsequent dissemination via lymphatics within months.⁹ A case of AIDS with endoscopic finding of MAC infection of the duodenum is

presented. Reported cases that include an endoscopic description are reviewed, with the aim of improving early recognition of MAC infection in the GI tract.

CASE REPORT

The patient, a 42-year-old, homosexual man with HIV infection diagnosed 6 years earlier, presented with a 2-month history of epigastric pain, abdominal bloating, and intermittent fever. Two months before hospitalization, the plasma viral load had rebounded and the CD4 count was 63 cells/ μ L despite HAART.

At the time of diagnosis of HIV infection, antiretroviral and prophylactic antimicrobial therapy was begun, but the patient did not continue this treatment, because of severe GI symptoms. *Pneumocystis carinii* pneumonia (PCP) and tuberculosis developed at 4 and 5 years, respectively, after the diagnosis of HIV infection, and the patient was treated with trimethoprim-sulfamethoxazole and antituberculosis therapy. However, he was not compliant with the prescribed therapy. Eight months before presentation, non-typhoid salmonellosis and recurrent PCP developed, and blood cultures subsequently grew MAC. HAART and anti-MAC therapy (ciprofloxacin, clarithromycin, and ethambutol) were initiated.

Figure 1. **A**, Endoscopic view showing scattered white nodules and plaques in second portion of duodenum. **B**, Magnified endoscopic view.

Examination revealed mild tenderness in the right and the left upper abdominal quadrants. The CD4 lymphocyte count was 41 cells/ μ L; the plasma viral load was undetectable (<400 copies/mL by reverse transcriptase-polymerase chain reaction). Computed tomography of the abdomen disclosed extensive lymphadenopathy in the para-aortic region and the bilateral adrenal glands, and also localized wall thickening of the jejunum. A liver biopsy, performed because of marked elevation of the serum level of alkaline phosphatase (1595 U/L, [normal: 60-220 U/L]) and γ -glutamyl transferase (267 U/L, [<52 U/L]), revealed abundant acid-fast bacilli. No specific findings were noted at colonoscopy, but EGD disclosed diffuse, scattered white nodules and plaques in the second portion of the duodenum (Fig. 1). Cultures of blood and tissue obtained from biopsies of the liver and the duodenum all yielded MAC, despite maintenance therapy with ciprofloxacin, clarithromycin, and ethambutol. Although the symptoms gradually improved with continuation of anti-MAC treatment and HAART, the patient still complained of epigastric pain, abdominal bloating, and intermittent diarrhea.

The patient developed progressive dyspnea, urinary difficulty, and retention over several days, and was admitted to our hospital. The symptoms rapidly worsened on the first hospital day, with severe respiratory distress. Lactic acidosis developed, and the patient died on the day of admission, despite resuscitation.

DISCUSSION

Although opportunistic infection with MAC is common in patients with advanced HIV infection, there are few detailed endoscopic descriptions of MAC infection of the GI tract. A search of the MEDLINE database (English language publications) identified 54 reported cases of DMAC infection with involvement of the GI tract in patients with AIDS in which an endoscopic description was included.^{8,10-24} The demographic, clinical, and endoscopic features, and the outcome for the 55 cases (including the present case) are shown in Table 1. Most reported cases predate the HAART era; only 3 patients received HAART.^{8,24} The median age of the patients was 32 years (range 14 months to 50 years). The common presenting symptoms included diarrhea (93%), fever (89%), weight loss (87%), and abdominal pain (82%). GI manifestations included gastric ulceration, enterocolitis, enteric fistulas, intra-abdominal abscess, and hemorrhage.^{4,21} Anemia, neutropenia, elevated alkaline phosphatase, hepatosplenomegaly, lymphadenopathy, and pneumonia also were observed, because dissemination to multiple organ systems was present in most of the patients. In the 55 reported cases of MAC infection of the GI tract, the duodenum (76%) was the most common site, followed by the rectum (24%), the ileum (6%), the colon (4%), the esophagus (4%), the jejunum (2%), and the stomach (2%). The CD4 count at presentation was available in only 4 cases; the median CD4 count was 41 cells/ μ L (6-69 cells/ μ L).^{8,15,23,24} Most patients died soon after the diagnosis of DMAC infection, despite antimycobacterial therapy. The high mortality rate for patients with GI DMAC infection is probably explained by the fact that only 3 patients received macrolide-containing treatment regimens and HAART.

Because patients with DMAC infection are in an advanced stage of HIV infection, concurrent GI infections may be present. Multiple pathogens, such as microsporidia, *Cryptosporidium*, *Giardia*, cytomegalovirus (CMV), and *Isospora*, have been identified by EGD in the duodenum of HIV-infected patients with chronic unexplained diarrhea.²⁵ EGD findings may be nonspecific, with the exception of ulcerative lesions, which are frequent in CMV gastroduodenitis.²⁶ In our review, the most common endoscopic finding was multiple raised nodules (38%) in the involved sites. These nodules could be yellow, white, yellow-whitish, or pink. Although nodular lesions are frequent,⁹ endoscopy in patients with MAC infection of the GI tract may disclose normal findings (36%), ulcerations (11%), erythema (13%), edema (11%), friability (11%), a reduced mucosal vascular pattern (9%), erosions (4%), confluent nodules (4%),

TABLE 1. Demographic, clinical and endoscopic findings and outcome for patients with AIDS and disseminated *Mycobacterium avium* complex infection with GI-tract involvement

Reference	Age y/gender	Clinical presentation	Involved GI tract	Endoscopy/autopsy finding	Outcome
Strom et al ¹⁰	30/M	Spiking fever, diarrhea, weakness, abdominal pain secondary to a massively enlarged spleen	Small bowel	Prominent folds in the mucosa with elevated yellowish grains and nodules on the surface of the villi	Died
Gillin et al ¹¹	39/M	Diarrhea, fever, weight loss	Duodenum	Minute superficial ulcerations	Died
Caya et al ¹²	32/M	Diarrhea, weight loss, fever	Duodenum	Diffuse and raised whitish lesions, 2-4 mm in diameter	Died
Wolke et al ¹³	40/M	Abdominal pain, bloody diarrhea	Rectum and sigmoid colon	Edematous, erythematous, and friable, with multiple linear and oval erosions	Survived
Roth et al ¹⁴	30/M	Fever, diarrhea, weight loss	Duodenum	Erythematous macular mucosal lesions	Died
Schneebaum et al ¹⁵	38/M	Diarrhea, anorexia, malaise, low-grade temperature, weight loss	Terminal ileum	Strictures with considerable compromise of the intestinal lumen, mucosal ulcerations, and thickening of the bowel wall (resection specimen)	Alive
Vasquez-Iglesias et al ¹⁶	24/F	Diarrhea, weight loss, pruritis, mild asthenia, anorexia	Duodenum	Several isolated, yellow, and raised nodules of 2 × 4 mm; more numerous and confluent distally	Survived
Gray and Rabeneck ¹⁷	35 cases; mean 35.1/M	Weight loss (30/35); fever, sweat, or chills (21/35); diarrhea (17/35); abdominal pain (7/35)	Duodenum (30), esophagus (2), rectum (7)	Duodenum: normal (17), fine white nodules on the mucosa (12) Rectum: normal (3), perianal fistula (1), reduced vascular pattern (2), rectal ulcer (1) Esophagus: ulcers (2)	Died (32/35)
Connolly et al ¹⁸	4 cases; NA	Persistent diarrhea, weight loss	Rectum	Loss of vascular pattern, generalized inflammation and mucosal friability;	NA
Monsour et al ¹⁹	36/M	Fever, left upper quadrant pain, explosive diarrhea, weight loss	Duodenum	Diffuse white nodules 2-3 mm in diameter; superficial erosions	Died
	30/M	Fever, malaise, anorexia, hepatosplenomegaly, epigastric burning, melena, weakness, confusion	Duodenum	Small, white nodules with surrounding erythema	Died
Cappell and Gupta ²⁰	27/F	Watery diarrhea, fever, abdominal pain, weight loss	Stomach, small and large intestine	Diffuse ulceration	Died

(continued)

TABLE 1. (continued)

Reference	Age y/gender	Clinical presentation	Involved GI tract	Endoscopy/autopsy finding	Outcome
Cappell et al ²¹	14m/F	Abdominal pain, severe constipation, fever, hepatosplenomegaly	Duodenum	Edematous, friable, thick duodenal folds	Died
Bosch et al ²²	37/F	Fever, weight loss, severe dysphagia, abdominal pain	Duodenum	Thickening of the mucosal folds and multiple yellow-whitish nodules;	NA
Cappell and Philogene ²³	22/M	Diarrhea, pyrexia, night sweats, malaise, weight loss	Descending duodenum; rectum	Extensive coarsely granular mucosa; rectal aphtha	Died
Velasco et al ²⁴	29/M	Epigastric pain, nausea, vomiting without diarrhea or fever	Duodenum	No significant mucosal change	Alive
Cinti et al ⁸	50/M	Fever and abdominal pain	Duodenum and jejunum	Numerous raised pink nodules (1- to 2-cm diameter)	Survived
Present report	42/M	Fever, epigastralgia, abdominal distention, nausea, diarrhea	Duodenum	Diffuse and scattered white nodules and plaques	Died

NA, Not available.

stricture (2%), and aphthous erosions (2%). Thus, for definitive diagnosis in symptomatic patients, especially those without typical endoscopic findings, it is essential to obtain tissue specimens for histopathologic examination and microbiologic culture.

The introduction of effective antiretroviral therapies for HIV infection and antimicrobial prophylaxis against MAC infection have had a major impact on the incidence and the clinical course of MAC infection in patients with AIDS, but patients with new or recurrent MAC infection are still encountered in clinical practice. This may occur for several reasons: the patient may be unaware of the HIV infection; lack of access to care for HIV infection; poor compliance with treatment, including prophylaxis, for MAC infection; and poor adherence to HAART, resulting in virologic failure and suboptimal immunologic recovery.^{3,6,8} Because GI MAC infection may be the first presentation of AIDS-associated opportunistic infection, it is essential to be alert for endoscopic findings, even in the era of effective antiretroviral therapies. Early recognition of GI MAC infection by endoscopy in HIV-infected patients and initiation of anti-MAC therapy and HAART may reduce morbidity and mortality.

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Double-balloon enteroscopy for diagnosis of a Meckel's diverticulum in a patient with GI bleeding of obscure origin

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Standard EGD, colonoscopy, and radiologic imaging studies fail to demonstrate a source in about 10% of patients with GI bleeding.

Because the small bowel is only partially accessible with endoscopy, it is the site of most undiagnosed lesions.¹ Meckel's diverticulum is the most common congenital anomaly of the GI tract (approximately 2%-3% of the population). It is the result of improper closure and absorption of the omphalomesenteric duct and usually is located within 100 cm of the ileocecal valve. There is a strong male preponderance, and 60% of patients with Meckel's diverticulum come to medical attention before 10

years of age. Heterotopic gastric or pancreatic mucosa frequently is found within the diverticulum in patients with symptoms because of the anomaly. Patients with a Meckel's diverticulum that contains heterotopic gastric mucosa (30% of cases) are more likely to develop symptoms than those with a diverticulum that contains only intestinal mucosa. The most common complications are hemorrhage as a consequence of peptic ulceration, obstruction, intussusception, volvulus, and diverticulitis. Although the clinical, histopathologic, and radiologic features of the complications of Meckel's diverticulum are well known, the diagnosis may be difficult before surgery.²