

## CT Findings in Abdominal Actinomycosis<sup>1</sup>

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Abdominal actinomycosis is a chronic, progressive, suppurative disease with a favorable response to intravenous treatment with penicillin. In many instances, however, its clinical and radiological findings may overlap with those of other inflammatory and neoplastic conditions, and the familiarity with the various radiological features can thus avoid diagnostic delays. The purpose of this paper is to describe and discuss the CT findings of abdominal actinomycosis.

**Index words :** Actinomycosis  
Abdomen, infection  
Abdomen, CT

Abdominal actinomycosis is a chronic, progressive, suppurative disease with clinical and radiological findings that overlap with those of other inflammatory and neoplastic conditions. Although there have been a num-

ber of radiological reports of abdominal actinomycosis, it is still difficult to diagnose radiologically. Computed tomography (CT) is, however, an important imaging modality for determining the anatomical location and

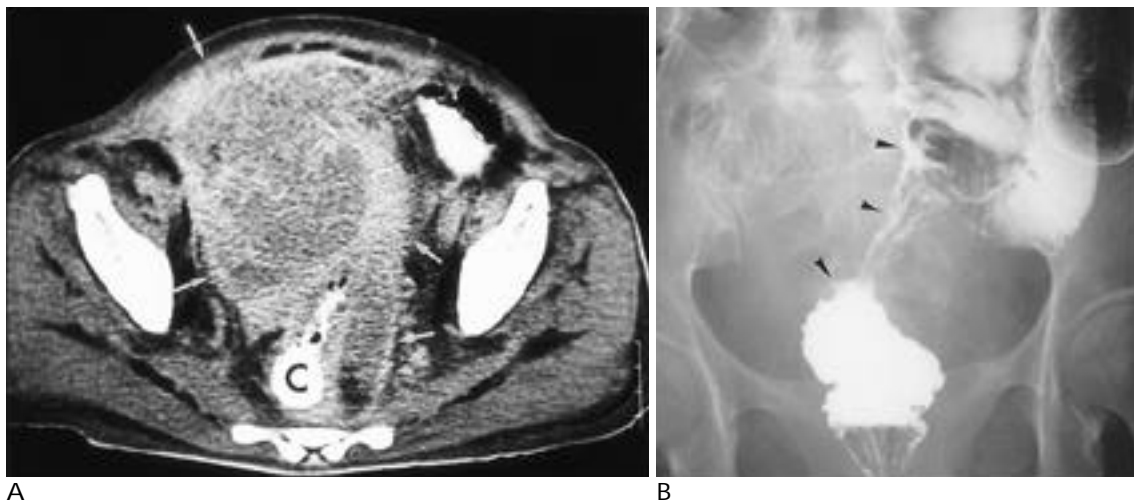


Fig. 1. Pelvic actinomycosis in a 67-year-old woman.

A. Contrast enhanced CT scan reveals multiloculated fluid collections (arrows) with enhanced walls and thickened wall of sigmoid colon (C).

B. Barium enema reveals luminal narrowing of rectosigmoid colon (arrowheads) with thickened folds.

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extent of this disease, as well as for monitoring the effectiveness of treatment (1,2). The purpose of this paper is to describe and discuss the CT findings of abdominal actinomycosis.

### Pathogenesis and clinical findings

Abdominal actinomycosis has been associated with abdominal surgery (such as appendectomy), bowel perforation, or trauma (2,3). In addition, the presence of a

long-standing intrauterine device (IUD) is a reported risk factor in young women (4). Although the pathogenesis of abdominal actinomycosis is not well understood, the appendix is the most commonly involved intra-abdominal organ, while the other organs such as colon, stomach, liver, gallbladder, pancreas, small bowel, pelvis, and abdominal wall may also be involved (5). Pathologically, actinomycosis is a chronic, progressive, suppurative disease characterized by the formation of multiple abscesses, draining sinuses, abundant granula-

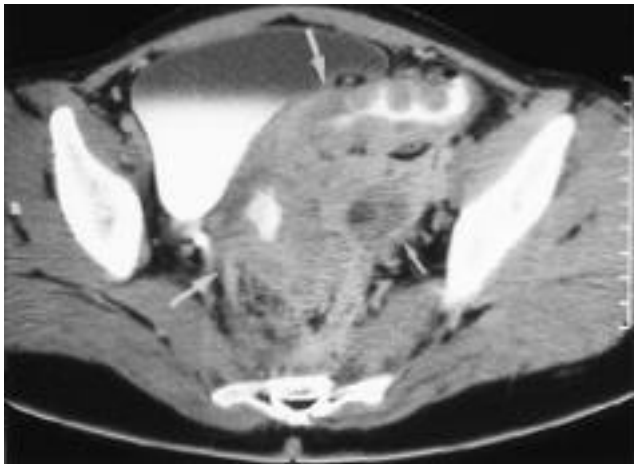
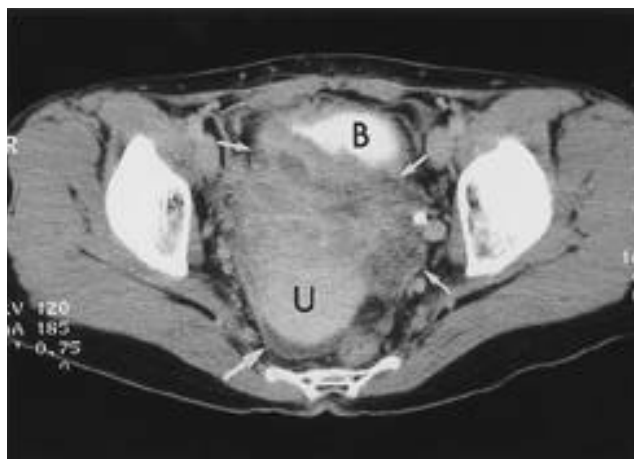


Fig. 2. Pelvic actinomycosis in a 43-year-old woman. Contrast enhanced CT scan reveals a low attenuation mass (short arrow) and thickened wall of sigmoid colon (large arrows) with surrounding infiltration.



Fig. 3. Pelvic actinomycosis in a 32-year-old woman. Contrast-enhanced CT scan reveals a low attenuation mass (short arrows) with thick wall and no clear margin between mass, rectum and uterus (U). Note thickened wall of the rectum (large arrow).



A

Fig. 4. Pelvic actinomycosis in a 39-year-old woman. A. Contrast-enhanced CT scan reveals an irregular shape of low attenuation lesion (short arrows) with thickened urinary bladder wall (B) and indistinct margin of the uterus (U). Note small amount of ascites (long arrow). B. Intravenous urogram reveals irregular margin of the urinary bladder wall.



B

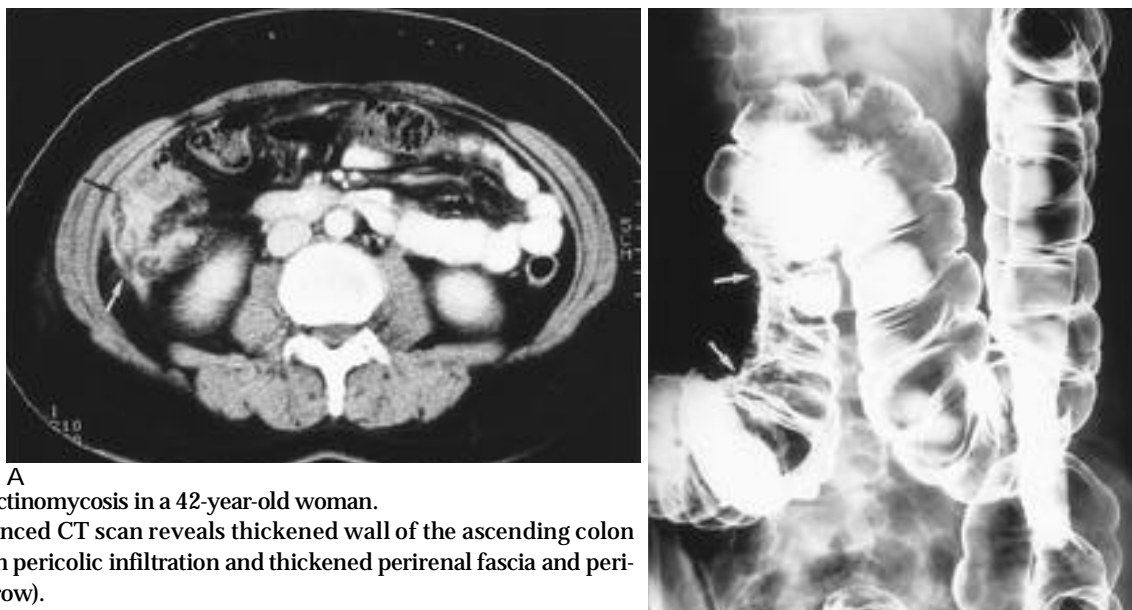


Fig. 5. Intestinal actinomycosis in a 42-year-old woman.

A. Contrast-enhanced CT scan reveals thickened wall of the ascending colon (black arrow) with pericolic infiltration and thickened perirenal fascia and peritoneum (white arrow).

B. Barium enema reveals extrinsic mass effect on the ascending colon and cecum with prominent transverse ridge, mucosal nodularity and tethering in the ascending colon (arrows).

tion and dense fibrous tissue (5). In humans, *Actinomyces israelii* is the most common cause of the disease (1). The organism produces a proteolytic enzyme that is responsible for spreading disease across the different tissue planes or boundaries (2). Human actinomycosis commonly occurs in three distinct forms which may occasionally overlap; most clinical disease is cervicofacial (55%), with only 20% occurring in the abdominal form, while 15% is characterized as the thoracic form (6). The clinical features of abdominal actinomycosis are variable and nonspecific, though a chronic, localized inflammatory process with fever and leucocytosis has been reported (1,5).

Because of the resemblance to other diseases such as appendicitis, diverticulitis, carcinoma of the colon, Crohn's disease, ulcerative colitis, and tubo-ovarian abscess, the diagnosis of abdominal actinomycosis is difficult (7). A definite diagnosis is generally based on histologic identification of the actinomycotic granule or culture of the *Actinomyces* species, or both (1,7). The response to treatment with high dose of penicillin is favorable, and to minimize morbidity of the disease and prevent unnecessary surgery, early diagnosis is thus important (1).

### Pelvic actinomycosis

CT of pelvic actinomycosis reveals an ill-defined, inhomogeneous pelvic mass or multiloculated fluid collection with an enhanced thick wall (2,3) (Figs. 1-4). The



Fig. 6. Intestinal actinomycosis in a 44-year-old woman. Contrast-enhanced CT scan reveals thickened bowel wall with surrounding infiltration (arrows).

mass or fluid can spread infiltratively toward adjacent mesenteric fat (4). Other common findings include hydronephrosis, hydroureter, or displacement and thickening of the wall of the rectosigmoid colon (1-3). Barium enema reveals a narrowing of the rectosigmoid colon, with spiculation and irregularity of the mucosal margin (1,3). In as much as the organism in actinomycosis usually does not spread via lymphatic or hematogenous routes, regional lymphadenopathy is not a common finding (6).

### Intestinal actinomycosis

In cases of intestinal actinomycosis, the ileocecal area (including the appendix) is the most commonly involved site (5). A CT scan reveals bowel wall thickening with perienteric infiltration and peritoneal thickening (Figs. 5 and 6). Barium examination of the colon and small intestine indicates mural invasion and mass effect with tapered narrowing of the lumen and intact or thickened mucosal folds (1).

### Actinomycosis of the greater omentum

In cases in which the greater omentum is the principal site of the lesion, there is frequent involvement of the transverse colon, small intestine, and abdominal wall (1). It has been theorized that aspiration of oral *Actinomyces* from a patient's carious teeth leads to right lower lobe pneumonic involvement, resulting in a lung abscess. This then erodes the diaphragm, leading to a suprahepatic collection of pus (6). CT demonstrates poorly defined, infiltrative masses with inhomogeneous contrast enhancement in the greater omentum and thickening of the adjacent bowel loop (8) (Figs. 7 and 8).

### Hepatic actinomycosis

Hepatic actinomycosis is rare and has been reported in 15% of cases involving the abdomen (3). The liver is

probably affected secondarily from a primary infection elsewhere in the abdomen, usually the ileocecal area, which spreads to the liver contiguously or via the portal vein (2). The reported CT findings of hepatic actinomycosis include multiloculated abscesses or solid masses with focal areas of diminished attenuation(1). Multiloculated abscesses usually have thickened walls or septa between the loculations, and after administration of IV contrast material, there is enhancement of the septa, peripheral walls, or solid portion (1, 7) (Fig. 9). The walls or solid components of the mass consisted of granulation tissue



Fig. 8. Actinomycosis of the greater omentum in a 49-year-old woman. Contrast-enhanced CT scan shows an inhomogeneous mass (short arrows) with peripheral enhancement. Note extension of the lesion to anterior abdominal wall (long arrows) and adjacent small bowel loop.



Fig. 7. Actinomycosis of the greater omentum in a 41-year-old woman.

A. Contrast-enhanced CT scan reveals an inhomogeneous mass (asterisk) with extension to the peritoneum (arrows). Note intrauterine contraceptive device.

B. Small-bowel examination reveals luminal narrowing of the distal ileum (long arrows) and mass effect on medial aspect of the cecum (short arrows).



Fig. 9. Hepatic actinomycosis in a 34-year-old man. Contrast-enhanced CT scan reveals multiple abscesses (asterisks) with thickened walls. Note dense enhancement (arrowheads) in the wall of abscess and in the surrounding hepatic parenchyma.

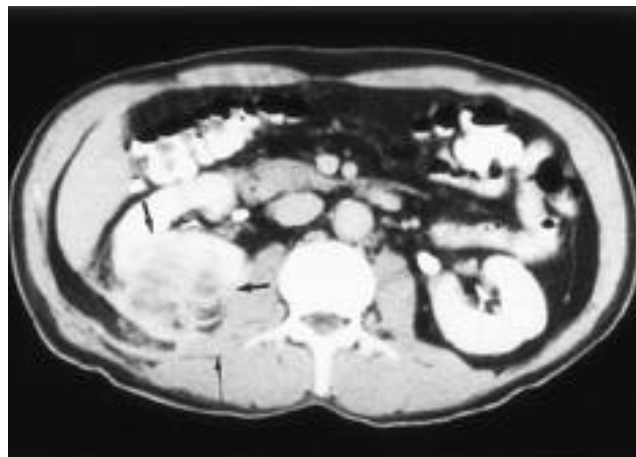


Fig. 10. Renal actinomycosis in a 58-year-old man. Contrast-enhanced CT scan demonstrates an inhomogeneously enhanced mass (short arrows) with infiltrative extension to adjacent quadratus lumborum muscle (long arrow).

with varying degrees of inflammation. Hepatic parenchyma surrounding an abscess is often densely enhanced, probably due to regional inflammation (1). As a result of proteolytic enzymes produced by Actinomyces, there is frequent extension of the abdominal wall (2).

#### Renal actinomycosis

The CT appearance of renal actinomycosis is solid masses or multiloculated, infiltrating masses in the renal parenchyma. There is heterogeneous contrast enhancement of the solid masses and marked enhancement of the walls and septa outlining the separate loculations (1,7) (Fig. 10). The renal parenchymal lesion extends infiltratively to the perirenal space, pararenal space, and posterior abdominal wall (1).

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