

## Imaging Findings of Acute Abdomen with Intraperitoneal Tuberculosis<sup>1</sup>

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Acute abdomen caused by abdominal tuberculosis is a rare manifestation, and includes bleeding of a gastric or ileal ulcer, obstruction of the small bowel by an adhesive band, perforation of the ileum, ileocolic intussusception and fistula, and mesenteric abscesses caused by necrotic lymph nodes. The clinical and radiologic features of these complicated tuberculosis may mimic other acute abdominal diseases. Although not definitive, careful evaluation of the radiologic findings of the bowel wall, mesenteric fat infiltration, and lymph node enlargement may provide useful diagnostic clues to the presence of acute abdomen due to tuberculosis.

**Index words :** Abdomen, acute conditions  
Tuberculosis, gastrointestinal

Due to untreated tuberculosis, an increase in the number of patients with acquired immunodeficiency syndrome (AIDS), drug abuse, immunosuppression, and the development of drug resistant mycobacteria, the incidence of abdominal tuberculosis is not declining. The pathogenesis of abdominal tuberculosis is often thought to be from the ingestion of bacilli in infected sputum or contaminated food, or hematogenous spread from a primary pulmonary lesion (1, 2). Although abdominal tuberculosis usually involves a chronic process of nonspecific clinical manifestations including fever, weight loss, abdominal pain, discomfort or mass, acute abdomen can develop through localized foci of recent or remote tuberculous infection. Because of the lack of specific clinical manifestations and radiologic findings, the diagnosis of acute abdomen due to tuberculosis is not easy. This pictorial review presents surgically confirmed intraperitoneal tuberculosis giving rise to clinically significant acute abdomen; the radiologic findings which can

help diagnose tuberculous lesions are described.



**Fig. 1.** 24-year-old woman with severe epigastric pain. Barium study of stomach shows lobulated polypoid mass (open arrows) with central ulcer (arrow) in gastric antrum. At surgery, gastric mass was pathologically confirmed as gastric tuberculosis.

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### Bleeding of Gastric Ulcer

Because of a paucity of lymphoid tissue, gastric tuberculosis is rare, presenting as ulcerative or hypertrophic fibrotic encasement and commonly involving the lesser curvature of the antrum and prepylorus (3, 4). The usual manifestations of gastric tuberculosis include ulcers, gastric outlet obstruction, or a gastric mass (5). An ulcerative lesion is the most frequent of these: it is usually irregular and surrounded by inflamed and necrotic tissue, and similar in endoscopic appearance to a malignant ulcer (3). In our case, there was severe abdominal pain and upper gastric bleeding, and barium study revealed that in the gastric antrum, a nodular ulcerative mass resembling a submucosal tumor of the stomach was present (Fig. 1). The second most common type of gastric tuberculosis is hypertrophic infiltrative form. The linitis plastica pattern may resemble scirrhous carcinoma, sarcoidosis, syphilis, lymphoma, prior ingestion of a caustic agent, or radiation injury (5).

### Jejunal Obstruction with Adhesive Band

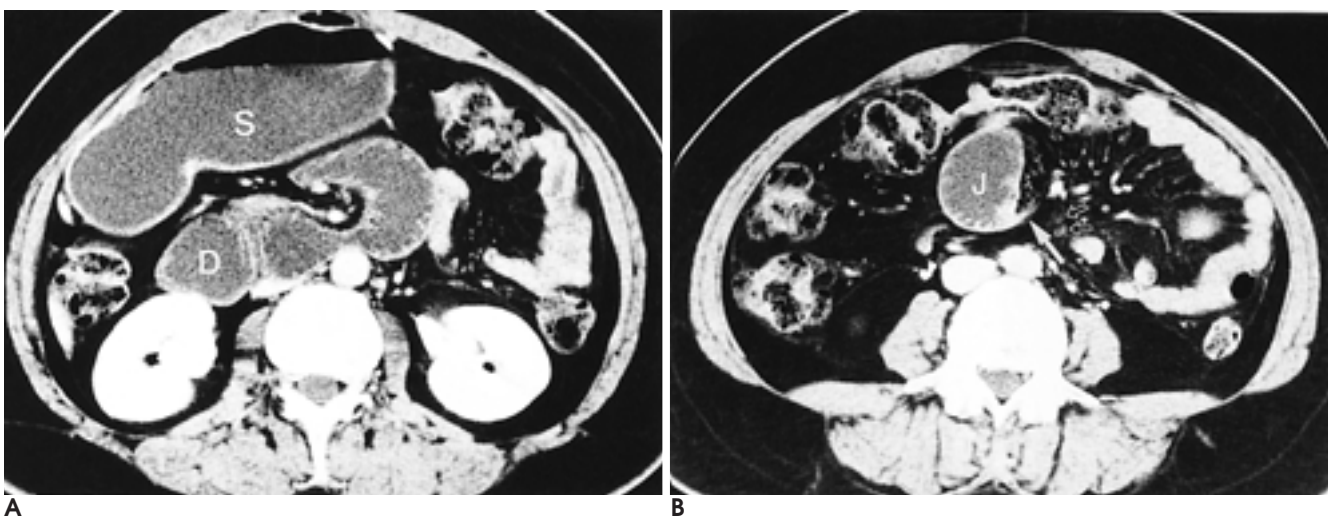
Dry type tuberculous peritonitis is characterized by the presence of a caseous nodule, fibrous peritoneal reaction, and obstruction of the small bowel caused by an adhesive band (1). CT demonstrates the presence of such obstruction with abrupt narrowing of the proximal

jejunum, multiple small lymph nodes, increased vascularity and thickened strands within the mesentery (Fig. 2). These findings are highly suggestive but not pathognomonic of tuberculosis, and are also detected in carcinomatosis, lymphoma, inflammatory lesions such as pancreatitis, Crohn's disease, diverticulitis, paniculitis, and mesenteric vascular disease.

### Bleeding and Perforation of Ileal Ulcer

The ileocecal region is the most commonly involved site of gastrointestinal tuberculosis, a fact probably related to the abundance of lymphatics and lymphoid tissue in this area (6). The intestinal mucosa responds with an inflammatory exudate that may progress to an area of ulceration, and though rare, acute bleeding may develop. The radiologic findings of small bowel tuberculosis include symmetric annular napkin-ring stenosis caused by an ulcer, shortening and retraction (Fig. 3).

An unusual complication of tuberculous ileal ulcer is penetrating to the peritoneal cavity, or adjacent small bowel or colon. When the ileum is perforated, CT reveals the presence of free air, ascites, irregular fat infiltration of the omentum and mesentery, and associated mesenteric lymph node enlargement (Fig. 4). In tuberculosis, however, a CT finding of bowel perforation can not be distinguished from peritonitis secondary to acute appendicitis, diverticulitis, or other inflammatory diseases.



**Fig. 2.** 40-year-old woman with vomiting and abdominal distension.

**A.** CT scan shows distended stomach (S) and duodenum (D).

**B.** CT scan demonstrates abrupt transitional zone (arrow) of dilated proximal jejunum (J), and mesenteric lymph nodes (open arrows). At surgery, fibrous band and multiple whitish lymph nodes were detected and tuberculous lymphadenitis was confirmed.

### Ileocolic Intussusception

The causes of tuberculous intussusception are an ileal lesion and mesenteric lymph nodes. Mesenteric lymph nodes may be clustered or matted together, adhering to the ileum, the lesion can be cause of a leading point of intussusception. CT demonstrates the outer intussusciption and inner intussusceptum containing mesenteric fat and lymph nodes (Fig. 5). Because mesenteric lymph nodes are frequently associated with primary or metastatic malignant neoplasms, Whipple's disease or

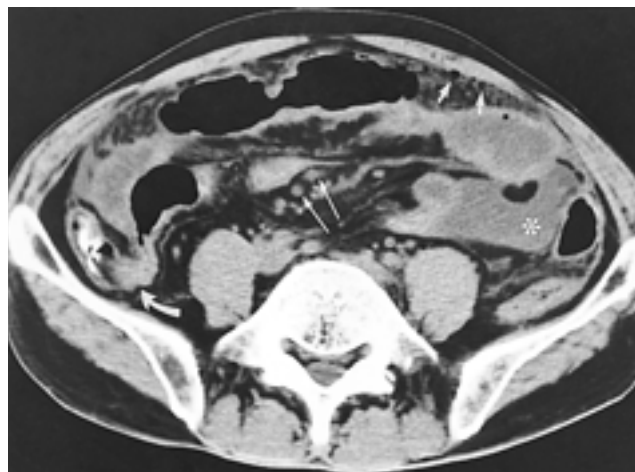


**Fig. 3.** 24-year-old man with abdominal pain, and massive hematochezia. Barium study of small bowel shows multiple ileal ulcers (arrows). Segmental resection of ileum was performed. Bleeding focus was confirmed as multiple ulcers induced by tuberculous enteritis.

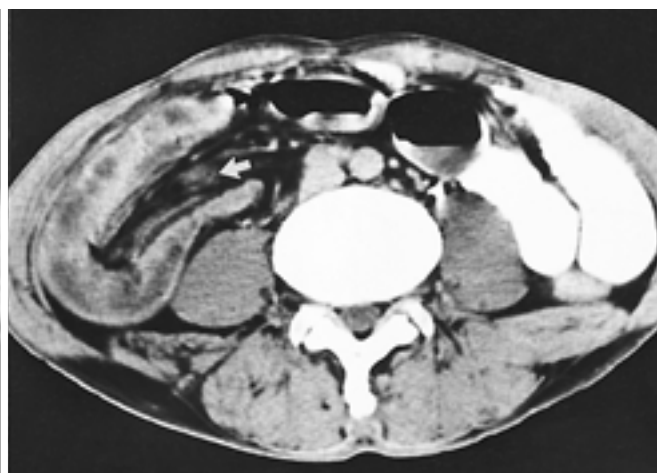
lymphoma (6), the preoperative diagnosis of the intussusception caused by tuberculous lymphadenitis is, however, impossible,

### Ileocolic Fistula

In abdominal tuberculosis, a colonic fistula is very rare, a fistula or sinus tract can develop between the



**Fig. 4.** 48-year-old man with abdominal pain and severe tenderness. CT scan shows intraperitoneal free air (small arrows), mesenteric lymph nodes (long arrows), focal thickening of terminal ileum (curved arrow), and loculated peritoneal fluid collection (asterisk). Laparotomy demonstrated the ileal perforation with ulcer at 100 cm proximal to the ileocecal valve, and multiple segmental narrowing and dilatation of small bowel loops. Pathologic examination confirmed the penetrating ulcer with tuberculous enteritis and mesenteric lymphadenitis.



**Fig. 5.** 62-year-old man with nausea, vomiting and right lower abdominal pain. **A.** CT scan shows target like intussusception (arrow) with low attenuated mesenteric fat and hyperattenuated intussusceptum. **B.** CT scan (more caudal than A) demonstrates the longitudinal contour of intussusception including enlarged mesenteric lymph node (arrow). At surgery, leading point of intussusception was confirmed as ileal tuberculosis and mesenteric lymph node.

colon and the abdominal wall, the colon, pancreas, ileum and duodenum, the most common site is the sigmoid colon (7). A fistula or sinus tract results from a mucosal ulcer or severe caseous necrosis occurring in mesenteric lymphadenitis (8). The patient complains of abdominal pain, bloody stool and diarrhea; barium study shows that the sigmoid colon has a cobble stone appearance and a fistula to the ileum (Fig. 6A). These le-

sions closely mimic Crohn 's colitis. CT reveals an irregular heterogeneous pelvic mass adhering to adjacent small bowel and mesentery (Fig. 6B).

### Mesenteric Abscess

Mesenteric abscess with tuberculosis is believed to be the result of rupture of necrotic lymph nodes, and due



**Fig. 6.** 21-year-old man with diarrhea, low abdominal pain and guarding.  
**A.** Barium study shows cobble stone appearance of sigmoid colon (S) with segmental narrowing (arrowheads). R: rectum. Ileocolic fistula filled with barium (curved arrows) is demonstrated between sigmoid colon to the terminal ileum (arrows) and distal ileum (I).  
**B.** CT scan shows a irregular heterogeneous pelvic mass consisted of small bowel loops (arrows). At surgery, severe bowel adhesion and ileocolic fistula with tuberculous enteritis were found.



**Fig. 7.** 28-year-old woman with right low abdominal pain. CT scan shows low attenuated abscess (black arrows) with small calcification (small open arrow), mesenteric lymph node (white arrow) and massive fat infiltration of mesentery (large open arrows). Laparotomy demonstrated the tuberculous abscess with caseous necrosis, multiple mesenteric lymph node enlargement, and severe mesenteric adhesion.



**Fig. 8.** 33-year-old man with right upper quadrant pain and severe tenderness. CT scan shows heterogeneously enhancing mass with peripheral enhancement (large arrow) and regional lymph node enlargement (small curved arrows). The mass was confirmed as well encapsulated abscess contained caseous materials.

to similar clinical and radiological findings, is often mistaken for periappendiceal inflammation or diverticulitis. Tuberculosis commonly involves the mesentery, omentum, and peripancreatic lymph nodes, showing a variety of enhancing patterns on CT, even within the same nodal group, and possibly related to the stage of pathological process (9). The lymph node exhibits an enhancing rim, due to the presence of a highly vascular inflammatory capsule and perinodal reaction surrounding an area of central caseating necrosis or liquefaction (2, 9). CT scanning clearly demonstrates the nodular lesions with a peripheral enhancing rim and low attenuated center, punctuate calcifications and mesenteric fat infiltration (Fig. 7). The associated mesenteric findings are helpful for the diagnosis of tuberculosis, but in our case, a tuberculous abscess appeared as a single mass at the mesenteric root with no associated peritoneal lesion (Fig. 8). It is not easy to differentiate between a single tuberculous abscess and mesenchymal mesenteric mass.

### Conclusion

Tuberculous complications may mimic the radiologic findings of other causes of acute abdomen. The imaging features that suggest the correct diagnosis are nodular mucosal change, the presence of an ulcer, ileocecal thickening, mesenteric fat infiltration and lymphadenitis. The absence of the bowel-related or mesenteric manifes-

tations dose not exclude the possibility of a tuberculous lesion, however, and by means of appropriate clinical correlation, radiologists should consider the possibility of acute abdomen with tuberculosis.

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