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# TUBERCULOSIS ABDOMEN: A REVIEW OF IMAGING FEATURES ON COMPUTED TOMOGRAPHY SCAN

Rabia Hafeez✉, Inayatullah memon, Rubina Hafeez

Department of Radiology,  
Ghulam Muhammad Ma-  
har Medical College Hospi-  
tal, Sukkur - Pakistan

## Address for correspondence:

Rabia Hafeez  
Department of Radiology,  
Ghulam Muhammad Ma-  
har Medical College Hospi-  
tal, Sukkur - Pakistan

## E-mail:

doc\_rabi24@yahoo.com

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## ABSTRACT

**Objective:** To evaluate the various imaging patterns of involvement of tuberculosis on CT scan abdomen.

**Methodology:** In this study, Computed Tomography scans abdomen of 25 patients with abdominal tuberculosis were retrospectively reviewed to determine the spectrum and involvement of tuberculosis in the abdomen. The study was conducted at the Radiology department of, Ghulam Muhammad Mahar Medical college hospital, Sukkur, Sindh Pakistan between Jan-Jun 2021.

**Results:** Lymphadenopathy was the most common feature in the CT scan study and was present in 20 (80%) cases involving mesenteric lymph nodes. Peripheral enhancing lymph nodes with central necrosis were the most common pattern of involvement in 10 (40%) cases. Peritoneal involvement was the second most common finding in 17 (68%) cases with ascites (wet peritonitis) seen in 11 (44%) and only ascites in 3 (12%) cases. Dry peritonitis (without ascites) was seen in 3 (12%) cases. Other findings included gastrointestinal involvement in 12 (48%) cases with the illeocecal region being the commonest site of involvement in 8 (66%) cases. The liver and spleen were the solid organ involvement in 3 (12%) cases.

**Conclusion:** Our study demonstrates the various imaging manifestations of abdominal tuberculosis on CT scans. It can be considered as a diagnostic tool in the diagnosis of TB abdomen along with clinical and laboratory data.

**Keywords:** Tuberculosis; Lymphadenopathy; Peritonitis; Illeocecal Thickening; Ascites.

## INTRODUCTION

Tuberculosis remains the top infectious cause of mortality worldwide in the year 2020 and Pakistan is among the countries that account for two-thirds of total cases.<sup>1</sup> The most common site of extrapulmonary involvement of tuberculosis is the abdomen and worldwide represents about 5% of all cases of tuberculosis.<sup>2,3</sup>

Tuberculosis can involve many systems of the body and especially in the abdomen it involves the gastrointestinal tract, peritoneum, lymph nodes, and solid organs. There are many differentials like inflammatory bowel disease, malignancy or lymphoma to be considered on CT scan.<sup>4,5</sup> Various imaging modalities aid in the diagnosis of intra-abdominal tuberculosis including abdominal X-ray, Ultrasound, Barium Enema, and CT scan. But CT scan would be recommended for detection and assessment of various imaging manifestations like peritoneal, ascites, lymphadenopathy, and solid viscera involvement.<sup>6</sup>

Tuberculosis is a highly prevalent disease in devel-

oping countries like Pakistan. Because of its nonspecific and variable clinical presentation, this necessitates early diagnosis and appropriate treatment to reduce complications and mortality of this curable disease. Our study highlights the imaging features and importance of CT scans in the diagnostic workup of abdominal tuberculosis.

## METHODOLOGY

The 25 patients with clinically proven abdominal tuberculosis referred for a contrast CT scan abdomen at the radiology department of, Ghulam Muhammad Mahar Medical College Hospital Sukkur, Sindh Pakistan between Jan-June 2021 were retrospectively reviewed. There were 18 females and 7 males, with the age range of 10-45 years. Patients' clinical and laboratory data and other records were also obtained and the diagnosis was made on both clinical grounds and CT scan findings. Patients with involvement in the genitourinary system and HIV positive were excluded from the study. As cases met all criteria of clinical diagnosis of abdominal tuberculosis, CT scans were reviewed by two experienced radiologists.

## RESULTS

CT scan abdomen analysis of 25 patients revealed lymphadenopathy was the most common feature involving mesenteric lymph nodes in 20 (80%) cases, other less common sites involved were peripancreatic and Para-aortic regions. Multiple enlarged lymph nodes with central hypodensity and peripheral enhancement were noted as the most common pattern in 10 (40%) cases, with solid enhancement in 8 (32%) cases and mixed type of enhancement in 2 (8%) cases.

Peritoneal involvement was seen in 17 (68%) cases most commonly seen as a smooth enhancement of the peritoneum. It was further categorized into wet type peritonitis seen as ascites along with peritoneal and mesenteric involvement in 11 (44%) and only ascites in 3 (12%) cases. Another is dry type peritonitis seen as a peritoneal thickening, mesenteric fat stranding, and omental involvement without ascites in 3 (12%) cases. Ascites were most commonly seen as a large volume of free intraperitoneal fluid and less commonly as a loculated collection of fluid.

Gastrointestinal involvement was seen in 12 (48%) cases. Circumferential and enhancing mural thickening was seen involving the ileocecal junction, terminal ileum, and cecum as the most common site of bowel loop involvement in 8 (66%) cases, other site was jejunum and ascending colon in two cases each only.

Solid viscera involvement was seen in 3 (12%) cases only as hepatic calcified granuloma in two cases and one case showed hypodense lesion involving the spleen along with GIT involvement. No other definite viscera involvement was noted.

## DISCUSSION

Tuberculosis of the abdomen results

Table 1: Computed Tomography (CT) Scan Findings and Involvement in Tuberculosis Abdomen

Computed Tomography Scan Findings	N=25	Percentage
Lymphadenopathy	20	80%
Peritoneal Involvement	17	68%
With Ascites (wet type)	14	56%
Without Ascites (dry type)	3	12%
GIT Involvement (ileocecal)	12	48%
Solid-Organ Involvements	3	12%

through ingestion of mycobacterium bacilli, like a sequel of reactivation of pulmonary TB, hematogenous or lymphatic spread from adjacent focus. It can affect GIT, lymph nodes, peritoneum, and solid organs in the abdomen.<sup>7</sup>

The most common manifestation of tuberculosis abdomen is lymphadenopathy and is seen in 25-93% of patients.<sup>8</sup> In contrast-enhanced CT scan, there are various specific features of lymph nodes involvement described by Zhang G et al<sup>9</sup> and Pombo et al<sup>10</sup> studies. In the early stage lymph nodes appears enlarged in size show homogenous enhancement, then central caseous necrosis occurs resulting in a central hypodense non-enhancing center with peripheral rim enhancement, the most common pattern in our study. Later on, enhancement becomes homogenous and shows matted adjacent lymph nodes. Finally, they appear as non-enhancing and become calcified. In our study, mesenteric lymphadenopathy was the commonest manifestation of abdominal tuberculosis in 80% of cases as previous studies showed lymphadenopathy in 50-77% of cases reported by Yilmaz T et al<sup>11</sup> and Hultnick DH et al.<sup>12</sup> Enlargement of lymph nodes demonstrates a size range of 12-40 mm in tuberculous lymphadenitis.<sup>13</sup>

The second common manifestation of abdominal tuberculosis is the peritoneal spread of the disease accounts for 30-58% of cases.<sup>14</sup>

Three different types of peritoneal involvement seen on CT scan depends on

varying degree and stage of involvement of mesentery and omentum. The most common type is the wet type seen in 90% of cases manifested as free or loculated ascites, mostly high density (20-45HU) due to protein contents.<sup>15-17</sup> Mesenteric involvement is seen as the nodular infiltration and thickening of mesentery along with fat stranding and edema on the extent of involvement. Peritoneal involvement featured as smooth and uniform thickening of the peritoneum with few scattered nodules. The second type of peritoneal disease is fibrotic/ fixed type accounting for 60% of cases and characterized by Omental involvement seen as smudged thickening (most common type), caking and nodular.<sup>18,19</sup>

The third type is the dry plastic-type, seen in 10% of cases and characterized by multiple adhesions that causes matted bowel loops and caseous/ necrotic mesenteric lymph nodes. Peritoneal involvement was seen in 77% of patients followed by ascites in 52% of cases as observed by Sinan et al<sup>20</sup> and their results are in line with the current study which showed peritoneal involvement in 68% and ascites in 56% of cases.

The terminal ileum and cecum are the most common site of GIT involved in tuberculosis abdomen. Less common sites are ascending colon, jejunum, rectum, duodenum, and stomach.<sup>21-23</sup> On CT scan various imaging findings are manifested involving ileocecal region seen as mild wall thickening in an early stage with adjacent enlarged mesenteric lymphadenopathy. Eccentric mural thickening involving medial cecal wall and valve seen in later stages. In the advanced

stage, it shows conical and contracted cecum.<sup>24,25</sup> In our study illeocecal region was the most common site of involvement in 66% of cases compared to the study by Sinan et al<sup>20</sup> results which showed 50% cases.

Solid viscera involvement mainly involves the liver and spleen manifested as multiple or focal hypodense lesions/ abscesses on CT scan, later on, become calcified granuloma.<sup>26,27</sup> Our study showed viscera involvement in 12% of cases similar to the study by Rehman IU et al<sup>28</sup> which showed 14% of cases but without pancreatic involvement in our study.

Diagnostic imaging of intra-abdominal tuberculosis remains a challenge as it is a great mimicker of other common abdominal disorders. After the advent of multidetector CT SCAN, it offers a great advantage by recognizing the spectrum of imaging manifestations which will be helpful for both patient and clinician to facilitate timely diagnosis and management.

## CONCLUSION

Our study concluded that the various imaging manifestations of abdominal tuberculosis on CT scans. It can be considered as a diagnostic tool in the diagnosis of TB abdomen along with clinical and laboratory data.

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#### Author's Contribution

RH helped in manuscript writing, collection of data and analysis of results. IM helped in collection of data and RH helped in writing of manuscript. Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

#### Conflict of Interest

Authors declared no conflict of interest

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None

#### Data Sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.