

Comparison of Histopathology/FNAC and CT Scan of Cases of Abdominal Tuberculosis Coming to a Tertiary Care Hospital in India

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Abstract: Abdominal tuberculosis is a most common type of extra-pulmonary tuberculosis. So it is thought worthwhile to study the various clinical presentations of abdominal tuberculosis, its evaluation and diagnosis with the help of CT scan as diagnostic imaging modality so that early diagnosis and early initiation of anti-tuberculosis treatment can be made. Aims of the study was to evaluate the role of CT scan as a diagnostic imaging modality in diagnosis of abdomen tuberculosis and to correlate the CT scan findings with either FNAC or histopathology of the tissues. Aproximately 30 patients which fitted into our criteria were taken into the study over a period of 2 years. All investigations biochemical, radiological and FNAC/Histpathology of tissues were done and the datas were recorded and a correlation of the above parameters was done. Out of 30 patients 27(83.3%) of the cases had findings suggestive of tuberculosis through CECT scan. Thus enlarged mesenteric lymph nodes (76.6%) were the most common finding of CECT scan. (p=0.002). 7% of the cases were found positive by both CECT scan and FNAC/HPE. 25(76.6%) of the cases were found positive through FNAC/ HPE (p<0.001). Out of the 6 cases for whom surgery was done, in most of the cases ileo-caecal mass (50.0%) was removed CECT suggestive of abdominal tuberculosis is usually positive in most patients. Surgery can be avoided in most of the cases with CECT scan findings suggestive of abdominal tuberculosis.

Keywords: Abdominal tuberculosis, histopathology, CECT scan.

INTRODUCTION

Abdominal tuberculosis is the most common type of extra-pulmonary tuberculosis, comprising of tuberculosis of gastrointestinal tract, peritoneum, omentum, mesentery and its lymph nodes and other abdominal organs such as liver, spleen and pancreas. The extrapulmonary tuberculosis involves 11-16% of all patients of tuberculosis out of which 3 to 4% belong to abdominal tuberculosis [1]. Extra pulmonary tuberculosis is common amongst HIV-infected patients [2, 3].

Though potentially curable, abdominal tuberculosis continues to be a major cause of morbidity and mortality in India. The disease can mimic various other gastrointestinal disorders, particularly inflammatory bowel disease, malignancy, or other gastrointestinal infections. Because of delayed diagnosis, a high index of suspicion therefore needs to

be maintained for an early diagnosis and timely treatment.

Despite progress in prophylaxis and therapy, abdominal tuberculosis remains a rampant health problem in developing countries like India. With the emergence of AIDS and increasing use of immunosuppressants, there has also been a resurgence of tuberculosis in developed countries, particularly of abdominal tuberculosis [4, 5]. In spite of the development in diagnostic modalities, diagnosis of abdominal tuberculosis remains a challenge even to the most experienced physician.

The disease can present at any age but is seen most commonly in young adults. In children, the peritoneal and nodal form of tuberculosis is much more common than intestinal tuberculosis [6]. The modes of presentation can vary [2] from acute, acute on-chronic

or chronic, occasionally as an incidental finding on laparotomy for unrelated causes. The most common site of predilection is the ileocaecal region, attributed to the minimal digestive activity, relatively increased physiological stasis, higher rate of fluid and electrolyte absorption and more lymphoid tissue at this site [7-9]. Peritoneal involvement may occur due to spread of the bacilli from mesenteric lymph node, contiguous spread from intestinal lesion or from tubercular salpingitis in women. However, one third of the cases show abdominal lymph node and peritoneal tuberculosis without any evidence of gastrointestinal involvement [10].

Most common complication of intestinal tuberculosis is intestinal obstruction attributed to strictures or by adhesions and in India approximately 3-20% of all cases of bowel obstruction are due to the tuberculosis [8, 11, 12]. Generally, computed tomography (CT) appears to be the imaging modality of choice in the detection and assessment of abdominal TB, other than gastrointestinal TB. Barium studies remain superior for demonstrating intestinal mucosal lesions [3]. Till a few years ago, the only feature of abdominal tuberculosis reported on CT was the nonspecific appearance of high density ascites [13]. The most common findings on CT that are highly suggestive of abdominal tuberculosis are high density ascites, lymphadenopathy, bowel wall thickening, and irregular soft tissue densities in the omental area [14]. Abdominal lymphadenopathy is the commonest manifestation of tuberculosis on CT. The contrast enhancement of tuberculous lymph nodes on contrast-enhanced CT (CECT) have been described as (four patterns)-peripheral rim enhancement, non-homogenous enhancement, homogenous enhancement and homogenous non-enhancement, in that order of frequency [15].

So it is thought worthwhile to study the various clinical presentations of abdominal tuberculosis, its evaluation and diagnosis with the help of CT scan as diagnostic imaging modality so that early diagnosis and early initiation of anti-tuberculosis treatment can be made.

REVIEW OF LITERATURE

The isolation of acid fast bacilli (AFB) is the gold standard for diagnosis of pulmonary tuberculosis but may not be possible for establishing the diagnosis of various forms of abdominal tuberculosis. So far the diagnosis of abdominal tuberculosis has been made either on the histological evidence of TB in the tissue (e.g. evidence of tubercles with caseation or demonstration of AFB in a lesion) or typical operative findings suggestive of TB or animal inoculation or tissue culture yielding the growth of *M. tuberculosis*. Now with the advent of better radio-imaging procedures, new criteria for the diagnosis were suggested by Lingenfeller [16] as follows: i.e. Clinical

manifestations suggestive of tuberculosis, imaging evidence indicative of abdominal tuberculosis, histopathological or microbiological evidence of tuberculosis and/or therapeutic response to treatment.

Computed Tomography--Till a few years ago, the only feature of abdominal tuberculosis reported on CT was the nonspecific appearance of high density ascites [13]. The most common findings on CT that are highly suggestive of abdominal tuberculosis are high density ascites, lymphadenopathy, bowel wall thickening, and irregular soft tissue densities in the omental area [14]. Abdominal lymphadenopathy is the commonest manifestation of tuberculosis on CT Scan. The contrast enhancement of tuberculous lymph nodes on contrast-enhanced CT (CECT) have been described as (four patterns)-peripheral rim enhancement, non-homogenous enhancement, homogenous enhancement and homogenous non-enhancement, in that order of frequency [15]. Abdominal CT scan is better than ultrasound for detecting high density ascites, lymphadenopathy with caseation, bowel wall thickening and irregular soft tissue densities in the omental area [17]. Abdominal lymphadenopathy is the commonest manifestation of tuberculosis on CT. Contrast enhanced CT (CECT) is better than plain CT, shows four patterns of contrast enhancement, i.e. (i) peripheral enhancement, (ii) non homogenous enhancement, (iii) homogenous enhancement and (iv) homogenous non-enhancement. Though not pathognomic, the pattern of peripheral rim enhancement could be highly suggestive of tuberculosis. A similar pattern is seen in metastatic lymphadenopathy. The presence of calcification in the lymph nodes in the absence of a known primary tumor suggests tubercular lymphadenitis. Tuberculosis involves predominantly the omental, mesenteric and upper para-aortic lymph nodes; while lower para-aortic lymph nodes are commonly involved in Hodgkin's and Non-Hodgkin's lymphoma. High density ascites due to high protein and cellular contents of fluid though common in tuberculosis, but can also be seen on CT in mesothelioma and peritoneal carcinomatosis. The CT scan can differentiate between the two, i.e. smooth peritoneum with minimal thickening and marked enhancement on CECT suggest tuberculosis while nodular and irregular thickening of peritoneum suggest peritoneal malignancy. Loculated fluid collections in the presence of omental infiltration, peritoneal enhancement, transperitoneal reaction, i.e. septal, and mesenteric (macronodules >5 mm in diameter) or bowel involvement are important features of abdominal tuberculosis on CT. The most common CT finding of bowel wall [18] involvement is a mural thickening affecting the ileocaecal region either limited to terminal ileum, caecum or both the regions. The other CT findings reported to be highly suggestive of abdominal tuberculosis are irregular soft tissue densities in omental area, low density masses and a disorganized appearance of soft tissue densities, fluid and bowel

forming an ill-defined mass. Conventional histological and microbiological methods are often inadequate for the diagnosis of abdominal tuberculosis as it is a paucibacillary disease. A number of serological tests based on the detection of antibody to a variety of mycobacterial antigens developed but all of them have a low predictive value. Polymerase chain reaction (PCR) assay for detection of *M. tuberculosis* in endoscopic biopsy specimens has shown promising results [19].

Soft Tissue Biopsy and Culture -- Invasive diagnostic procedures are indicated with suspected abdominal tuberculosis. In addition to specimens of involved sites (lymph node, intestine, peritoneum, liver biopsy), bone marrow aspiration for culture may be useful and have a good diagnostic yield in disseminated (miliary) tuberculosis particularly in HIV infected patient

Aims and Objectives

- To identify various clinical presentations of patients admitted in a tertiary care centre in India with features suggestive of abdominal tuberculosis.
- To evaluate such cases with various diagnostic modalities including imaging.
- To evaluate the role of CT scan as a diagnostic imaging modality in diagnosis of abdominal tuberculosis.
- To correlate the CT scan findings with either FNAC findings or histopathology of the tissues obtained.
- To determine whether operative interventions can be avoided except in emergency cases.

MATERIALS AND METHODS

Study area

Department of General Surgery, Medical College Kolkata

Study population

Patients of any age or sex coming to Medical College with clinical presentations of abdominal tuberculosis (OPD or admitted patients)

Study period

January 2016 to January 2018

Sample size

Approximately 30 cases fitting with our criteria

Sample design

Non randomised observational study design with correlation established using standard statistical methods.

Inclusion criteria

All patients with various clinical features suggestive of abdominal tuberculosis

Exclusion criteria

- Patients coming with complications of abdominal tuberculosis requiring immediate exploratory laparotomy but without any preoperative imaging including CT-Scan.
- Patients already diagnosed case of abdominal tuberculosis primarily or secondary to chest tuberculosis undergoing anti-tubercular therapy.
- Patient with past history of anti-tubercular therapy.
- Patient with other concurrent malignant diseases of abdomen.
- Patient with past history of other inflammatory diseases of gut (Crohn's disease) or peritoneum (e.g. peritonitis from other causes)

Parameters studied

Complete hemogram with ESR, blood sugar, urea, creatinine level, serum albumin, serum ADA level. Ascitic fluid for cell type, cell count, AFB and ADA level in patients having ascites will be performed. First line investigations Sputum for AFB, Mantoux test, Chest X ray (PA view), X ray abdomen (Erect) was performed. USG study of whole abdomen Contrast enhanced CT scan of the abdomen and Barium meal follow through and barium enema was done next as required. FNAC or Histopathology and AFB examination, of the sites involved was then done.

Study techniques

Those patients coming with various clinical presentations of abdominal tuberculosis will be identified. The patients will be further investigated (as described above). Patients with primary tuberculosis will undergo sputum for AFB.

Patients with ascites will have ascitic fluid analysis. Patients undergoing operation for obstruction or lump will undergo either resection or anastomosis or bypass surgery with biopsy from involved sites. Patients not operated will undergo FNAC if possible. Thorough statistical analysis of all data will be done.

RESULTS AND ANALYSIS

In this study, 30 patients fulfilling the selection criteria of this study were examined.

Age- The mean age of the study population was 28.00 ± 4.66 years (S.D). The range was from 19 years to 38 years. The median age was 28 years. Maximum no. of cases i.e. 22 cases (73.3%) were in the age group of 20 – 30 years. Amongst rest of 8 cases (26.8%), 7 cases (23.3%) were in age group 31-40 years and 1 case (3.4%) was in age group < 20 years.

Sex-In our study, number of affected females were 21 (70%) and affected males were 9 (30 %) b). Ratio of male and female was 1.0: 2.3 c

Age and sex distribution - The mean age of males was 27.22±4.29 years with range 21 – 35 years and the median age was 25 years. The mean age of females was 28.33±4.87 years with range 19 – 38 years and the median age was 28 years. So males and females presented with abdominal tuberculosis at more or less same age.

Religion -In our study, 20 patients were Hindu (66.7 %) and 10 patients were Muslim (33.3 %).

Occupation: In our study, most of the patients were homemaker (43.3 %).

Socioeconomic-status: In our study, maximum patients were from middle and low socioeconomic status (76.7 %).

Clinical features: Of the total 30 patients 5 patients had pain abdomen, decreased appetite and weight loss (16.7 %) which was the most common symptom followed by pain abdomen and decreased appetite (10.0 %) which was found in 3 patients. Overall , in our study 26 patients had pain abdomen (86.7 %) which was the most common symptom followed by decreased appetite (76.7 %) in 23 patients and weight loss (63.3 %) in 19 patients.

Blood investigations-In our study, most of the patients had hemoglobin levels between 10.0 – 11.0 gm percent (70 %). The mean level was 11.00±0.87 gm% with range 10 – 13.4 gm% and the median was 11 gm%. Also, in our study most of the patients had level of ESR between 50 -90 mm/hour (40%).The mean level of ESR was 41.20±19.91 mm/hour with range 10 – 90 mm/hour and the median was 35 mm/hour..

Mantoux Test-Mantoux test represents a dermal response to tuberculin antigen-antibody reaction reflecting the immune response of the individual. Although a weak serological test with low specificity and negative predictive value, it is commonly used as a screening test in developing countries like India. In our study, Mantoux test was positive in 33.3% of the patients who underwent the test.

Contrast Enhanced CT SCAN- (Table:1)In our study most of the patients had CECT scan findings of omental thickening, bowel thickening and enlarged mesenteric lymph nodes (13.3 %) followed by thickened bowel and enlarged mesenteric lymph nodes (10.0 %).Overall, in our study most common CECT scan finding was enlarged mesenteric lymph nodes (76.6 %) (Figure – 1,2) found in 23 patients followed by thickened bowel (Figure 3) (53.3 %) and enlarged omental lymph nodes (33.3 %).

FNAC/Histopathology-Histopathological evaluation remains the gold standard for diagnosis.In our study histopathology was positive for abdominal tuberculosis in 76.6 % cases with epithelioid granulomas present in all cases (Figure-4).

Surgery performed - (Table-2) In our study 20 % cases underwent surgery out of which maximum patients were found to have ileocaecal mass (50 %).

STATISTICAL ANALYSIS

- Association between CECT Scan findings and FNAC/Histopathology- (Table-3) In our study, CECT scan findings suggestive of abdominal tuberculosis were found to be positive by FNAC/ histopathology in 20 cases (66.7 %) while CECT scan findings not suggestive of abdominal tuberculosis were found to be negative by FNAC/ histopathology in 2 cases (6.7 %).Using chi-square test the association between findings of CECT scan and findings of FNAC/Histopathology was not significant as p value is 0.176 .
- Association between Mantoux test findings and FNAC/Histopathology (Table 4)-In our study, 26.7 % of the cases were found positive by both Mantoux test and FNAC/ HPE while 16.7 % of the cases were found negative by both Mantoux test and FNAC/ HPE.Using chi- square test the association between findings of Mantoux test and findings of FNAC/Histopathology was not significant as p value- 0.760, degree of freedom-1 with chi square value of 0.093.
- Association between CT Scan and Surgery- (Table-5) In our study, 84 % of the cases with findings suggestive of abdominal tuberculosis didn't need surgery and were managed with antitubercular therapy, while 16% of the cases with findings suggestive of abdominal tuberculosis underwent surgery.

Table-1: CT scan abdomen findings

CECT scan findings	Number	%
Enlarged mesenteric lymph nodes	23	76.6%
Thickened bowel	16	53.3%
Enlarged omentallymph nodes	10	33.3%
Ileocaecal lump	9	30.0%
Thickened omentum	8	26.7%
Dilated bowel loops	6	16.7%
Ascites	3	10.0%
Total	30	100.0%

Table-2: Type of Surgery performed

Type of surgery performed	Number	%
Duodenal stricture	1	16.7%
Hernia (accidentally diagnosed)	1	16.7%
Ileal perforation	1	16.7%
Ileocaecal mass	3	50.0%
Total	6*	100.0%

Table-3: Correlation between CECT and FNAC/HPE

Findings of CECT	Findings of FNAC/HPE		TOTAL
	Positive	Negative	
Suggestive of case positivity	20(66.7%)	5 (16.6%)	25(83.3%)
Not suggestive of case positivity	3(10.0%)	2 (6.7%)	5(16.7%)
TOTAL	23(76.7%)	7 (23.3%)	30 (100.0%)

Table-4: Association between findings of Mantoux test and FNAC/HPE

Findings of Mantoux Test	Findings of FNAC/HPE		TOTAL
	Positive	Negative	
Positive (> 15 mm)	8(26.7%)	2 (6.7%)	10(33.3%)
Negative (< 5 mm)	15(50.0%)	5 (16.7%)	5(16.7%)
TOTAL	23(76.7%)	7 (23.3%)	30 (100.0%)

Table-5: Association between CECT scan findings and surgery

Findings of CECT	SURGERY		TOTAL
	Done	Not done	
Suggestive of case positivity	4 (16 %)	21(84%)	25(83.3%)
Not suggestive of case positivity	2(40%)	3(60%)	5(16.7%)
TOTAL	6(20%)	24(80%)	30 (100.0%)

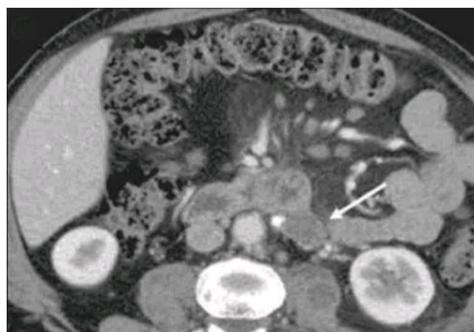


Fig-1: Showing peripheral rim enhancement of lymph nodes

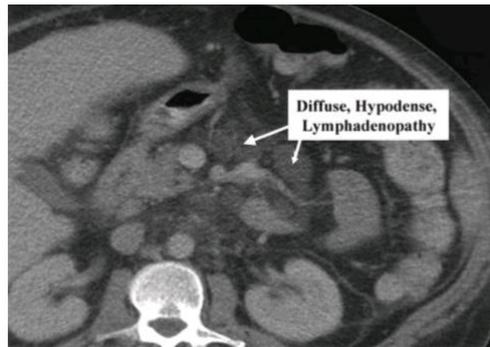


Fig-2: Showing diffuse hypodense lymphadenopathy



Fig-3: Showing thickened bowel wall

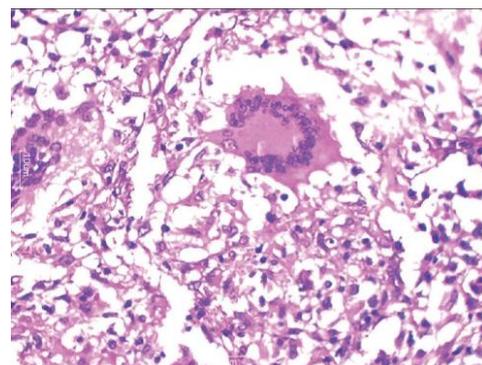


Fig-4: Showing granuloma on FNAC

DISCUSSION

In a study conducted by Sharma MP *et al.* [20], most affected patients were between 21-45 years of age. Our study also showed maximum number of cases (n=22) in the age group of 20 – 30 years (73.3%). This finding of involvement of slight younger population was also seen in many other studies [21, 22]. Our study showed a female predominance than males with abdominal tuberculosis and similar results were seen in a study conducted by Kapoor VK *et al.* [23]. According to 2011 Census in India, the distribution of population by religion is 79.8 % Hindus and 14.2 % Muslims hence the religion distribution in our study was similar to general distribution in the population and is not specific to abdominal tuberculosis. Our patients were mostly from lower socioeconomic status which was in accordance to the study done by Ashutoshet *al.* [24] which showed the disease to be more prevalent amongst the low socioeconomic status. Pain abdomen (86.7 %) decreased appetite (76.7%) weight loss

(63.3%) was the symptoms in order of occurrence. These results were found to be similar to the study done by Rajput MJ *et al.* [22] and Sharma MP *et al.* [20]. In a study by Sharma MP *et al.* [20] fever was recorded in half of the patients while in present study 30 % presented with fever.

The mean level was 11.00 ± 0.87 gm% was found in our study but our results were not reflected in the study by Basuet *al.* [24] where the mean value of hemoglobin was 8.00 g% and a study from Pakistan by Abroet *al.* that revealed 81% anemic patients [25]. The mean level of ESR was 41.20 ± 19.91 mm/hour with range 10–90 mm/hour and the median was 35 mm/hour. This is in accordance to study done by Muhammad *et al.* [26] which showed elevated ESR levels in 77 % cases. In our study, Mantoux test was positive in 33.3% of the patients who underwent the test. This was similar to studies done by Ahmed *et al.* [27] and Wells AD *et al.* [28].

Out of 30 patients 27(83.3%) of the cases had findings suggestive of tuberculosis through CECT scan. In overall 23(76.6%), 16(53.3%), 10(33.3%), 9(30.0%) 8(26.7%), 6(16.7%) and 3(10.0%) of the patients had enlarged mesenteric lymph nodes, thickened bowel, enlarged omental lymph nodes, ileocaecal lump, thickened omentum, dilated bowel loops and ascites respectively. Thus enlarged mesenteric lymph nodes (76.6%) were the most common finding of CECT scan. ($p=0.002$). These results were in accordance to the studies done by Hulnick DH *et al.* [29] and Yilmaz T *et al.* [30] which showed lymphadenopathy in 50-77% of cases. Similar study by Satish K Bhargava *et al.* [31] showed mesenteric lymphadenopathy in 59 %, mesenteric thickening in 55 % and thickened bowel in 40 % cases.

7% of the cases were found positive by both CECT scan and FNAC/HPE. However, 6.7% of the cases were found negative by both CECT scan and FNAC/HPE. 25(76.6%) of the cases were found positive through FNAC/ HPE ($p<0.001$). In a study done by Alakananda *et al.* [31] epithelioid cell granulomas were seen in 91.7% cases in the submucosa and serosa, with caseation in 54.5% of them. 26.7% of the cases were found positive by both Mantoux test and FNAC/HPE. However, 16.7% of the cases were found negative by both Mantoux test and FNAC/HPE.

In 6(20.0%) of the cases surgery were done. However 24 (80%) of the cases didn't underwent surgery. Out of the 6 cases for which surgery was done, in most of the cases, ileocaecal mass (50.0%) was removed. This is in accordance to study done by Arif AU *et al.* [33] which found ileocaecal region as the most frequent involved site in cases of abdominal tuberculosis which required surgery [25]. 84% of the cases had CECT scan findings suggestive of abdominal tuberculosis didn't undergo surgery while 16% of the cases underwent surgery with CECT scan findings suggestive of abdominal tuberculosis

CONCLUSIONS

- Contrast Enhanced CT Scan suggestive of abdominal tuberculosis is usually positive in most patients.
- Most common finding on CT Scan findings is enlarged mesenteric lymph nodes. The appearance of lymph nodes on CT scan mainly helps in diagnosis.
- The association of CECT scan findings with FNAC/ Histopathology findings is not significant.
- Treatment of patients with anti-tubercular drugs can be started with CT scan report followed by serial radiological monitoring.
- Most common finding on CT scan is ileocaecal mass (50%).

- Surgery can be avoided in most of the cases with CECT scan findings suggestive of abdominal tuberculosis.

Ethical Clearance

Clearance taken from institutional ethical committee

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