



# “DIAGNOSTIC WORKUP OF ABDOMINAL TUBERCULOSIS”

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## Abstract

**Introduction:** Tuberculosis is an infectious disease that has plagued mankind since Neolithic times (8000 BC). Almost all cases of tuberculosis are caused by Mycobacterium tuberculosis. The key to the diagnosis of TB remains a high index of suspicion. A definitive diagnosis of abdominal tuberculosis is not always possible with non-invasive imaging tests including contrast radiology, CT scan, MRI and abdominal ultrasonography. Laparoscopy with tissue biopsy is seen to be having an added advantage in diagnosis.

**Methods:** Our study was a prospective study conducted in the department of General Surgery, Govt. Medical College Jammu from 1<sup>st</sup> November 2017 to 31<sup>st</sup> October 2019. All patients suspected of abdominal tuberculosis who presented to OPD or Emergency of GMC Jammu were included in study and aim was to study the various diagnostic methods in abdominal tuberculosis.

**Results:** In our study, 104 patients of abdominal tuberculosis who presented to emergency or OPD Department of General Surgery, GMC Jammu were studied. The most common chest x-ray finding was opacity/consolidation. The most common abdominal x-ray finding was multiple air fluid levels, followed by free gas under diaphragm. The most common USG finding in our study was free fluid which was closely followed by dilated bowel loops. Some of the patients required diagnostic laparoscopy and even laparotomy for final diagnosis.

**Conclusion:** In non-emergency setting, patient may need a battery of investigations including CECT, special biochemical markers for making diagnosis of abdominal Kochs. In spite of specialized investigations, some patients may require diagnostic laparoscopy for

confirmation of diagnosis which aids in inspection of macroscopic lesions and obtaining tissue for histopathology.

**Keywords:** Abdominal Tuberculosis, Diagnosis of Abdominal Tuberculosis, Diagnostic workup of Abdominal Tuberculosis, Diagnostic Laparoscopy

## Introduction

Tuberculosis is recognised as a contagious disease by the time of Hippocrates (400 BC), when it was termed as '*phthisis*' (Greek Phthinien, meaning to go waste away)<sup>1</sup>. Mycobacterium tuberculosis is the most common causative organism, being rarely caused by Mycobacterium bovis.

Mycobacterium tuberculosis is thin, slender, straight or slightly curved bacillus, strongly acid and alcohol fast and an obligate aerobe. The property of acid fastness is due to presence of mycolic acid in its cell wall. It grows slowly with generation time of 14-15 hours and colonies appear after 10-14 days of incubation at 37°C, but growth may be delayed for 6-8 weeks.

Tuberculosis mainly affects the people of low and middle socioeconomic status. Malnutrition, poor housing conditions, overcrowding and occupational hazards which are offshoots of poor socio-economic status are known to foster tuberculosis.

Tuberculosis can affect all the systems of our body with abdominal tuberculosis being the sixth most common site of affection in extra-pulmonary tuberculosis after lymphatic, genitourinary, bone and joint, miliary and meningeal tuberculosis<sup>2</sup>.

Although the incidence of tuberculosis has decreased over time, there has been a resurgence of this lethal infectious disease in recent years, growing in parallel to the increasing incidence of HIV. The key to the diagnosis of TB remains a high index of suspicion. The techniques used for diagnosis can be classified as:

1. Haematological tests: Haemoglobin, ESR
2. Bacteriological diagnosis: Smear examination, Culture methods, Guinea pig inoculation
3. Immunological and Molecular biological methods: Tuberculin skin testing (Mantoux test), ELISA, SAFA, NAAT
4. Biochemical markers: ADA( Adenosine deaminase), interferon- $\gamma$  levels
5. Imaging studies

- a) Chest X-ray
  - b) Abdominal X-ray
  - c) Barium meal and Barium enema
  - d) USG
  - e) CECT Abdomen and Pelvis
6. Clinical sampling techniques
- a) Endoscopic, Laparoscopic and Colonoscopic biopsies
  - b) Operative biopsy

A definitive diagnosis of abdominal tuberculosis is not always possible with non-invasive imaging tests including contrast radiology, CT scan, MRI and abdominal ultrasonography. Molecular diagnostic methods such as PCR are very useful but are not widely available. Many research studies have been conducted for serological diagnosis of tuberculosis but their clinical utility, particularly in extrapulmonary TB, remains to be established. Laparoscopy with tissue biopsy is seen to be having an added advantage in diagnosis.

Abdominal tuberculosis (uncomplicated) is mainly managed by anti-tubercular drugs but the complications such as perforation peritonitis and acute intestinal obstruction require prompt surgical intervention followed by anti-tubercular drug therapy.

### Material and methods

The study entitled “**DIAGNOSTIC WORKUP OF ABDOMINAL TUBERCULOSIS**” was a prospective study conducted in the department of General Surgery, Govt. Medical College Jammu from 1<sup>st</sup> November 2017 to 31<sup>st</sup> October 2019. All patients suspected of abdominal tuberculosis who presented to OPD or Emergency of GMC Jammu were included in study and aim was to study the various diagnostic methods in abdominal tuberculosis.

The study protocol included thorough history taking, and examination, routine investigations and special investigations like Mantoux test, Sputum for AFB, Barium studies, Computerized Tomography( CT) scan abdomen, Ascitic fluid analysis in patients with ascites, PCR Ascitic fluid and blood for tuberculosis, Colonoscopy, Diagnostic Laparoscopy, Histopathological examination of the specimens obtained during exploratory laparotomy and /or diagnostic laparoscopy.

### Results

In our study, 104 patients of abdominal tuberculosis who presented to emergency or OPD Department of General Surgery, GMC Jammu were studied. The age range of the study population was from 3 years to 70 years. The maximum concentration of the study

population was in the economically productive age group of 10-40 years, with a peak incidence in the age group of 21-30 years. The sex ratio was 1.26: 1.

Pain abdomen was the most common presenting symptom in the study population and most common sign was abdominal tenderness. Erect chest x-ray was done in all patients and was normal in 56 patients. The most common chest x-ray finding was opacity/consolidation in 14 patients (13.5%). Pleural effusion was seen in 12 patients. Active cavitary lesions were seen in 6 patients, having active pulmonary tuberculosis. Table 1 represents the various chest x-ray findings in the study population.

**Table 1: Chest x-ray findings**

CHEST X-RAY FINDINGS	FREQUENCY	PERCENTAGE
OPACITY/CONSOLIDATION	14	13.5
FREE GAS	14	13.5
FIBRO-BRONCHIECTATIC CHANGES	12	11.5
PLEURAL EFFUSION	12	11.5
ACTIVE LESION(CAVITY)	6	5.8
PROMINENT HILARS	8	7.7
NORMAL	56	53.8

Abdominal x-ray was normal in 46 patients (44.2%). The most common abdominal x-ray finding was multiple air fluid levels, which was seen in 40 patients (38.5%), followed by free gas under diaphragm seen in 14 patients (13.5%). Table 2 represents the various abdominal x-ray findings in the study population.

**Table 2: Abdominal X-ray findings**

ABDOMINAL X-RAY FINDINGS	FREQUENCY	PERCENTAGE
AIR FLUID LEVELS	40	38.5
FREE GAS	14	13.5
GROUND GLASS APPEARANCE	4	3.8
CALCIFICATION	0	0.0
NORMAL	46	44.2

Ultrasonography was done in 94 patients, the most common USG finding in our study was free fluid which was seen in 46 (48.9%) patients which was closely followed by dilated bowel loops seen in 38 (40.4%) patients. Table 3 represents the various USG findings in the study population.

**Table 3: Abdominal USG findings (n=94)**

USG CHANGES	FREQUENCY	PERCENTAGE
FREE FLUID	46	48.9
DILATED BOWEL LOOPS	38	40.4
MESENTRIC/OTHER LN ENLARGEMENT	26	27.7
ENTERITIS/COLITIS	16	17.0
THICKENED AND MATTED LOOPS	6	6.4
HYPERTROPHIC IC JUNCTION	2	2.1
PULLED UP CAECUM	2	2.1

CECT abdomen was done in 24 patients in whom diagnosis was in doubt. CECT findings are usually an extension of the USG findings. As in USG, free fluid, dilated bowel loops and mesenteric lymph node enlargement were the most common findings. However, strictures which are difficult to appreciate in USG are easily visualized in CECT due to the use oral contrast. Table 4 represents the various CECT findings in the study population

**Table 4: Abnormal CECT findings**

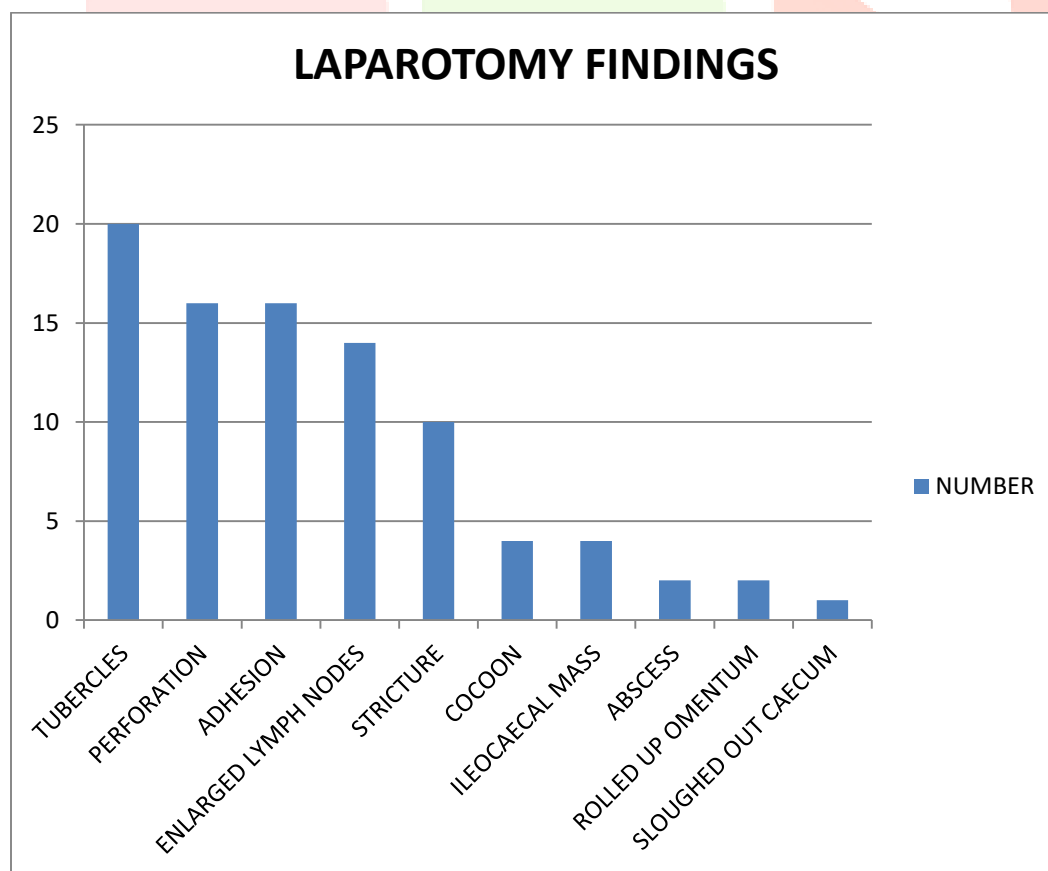
<b>CECT CHANGES</b>	<b>FREQUENCY (N=24)</b>	<b>PERCENTAGE</b>
FREE FLUID	16	66.7
MESENTRIC/OTHER LN ENLARGEMENT	10	41
THICKENED AND MATTED LOOPS	8	33.3
ILEOCAECAL THICKENING	8	33.3
DILATED BOWEL LOOPS	6	25
COCOON	4	16.7
INFLAMMED BOWEL LOOPS	4	16.7
PERFORATION	2	8.3
MULTIPLE SKIP LESIONS	2	8.3
STRICTURE	2	8.3
ULCERATIVE THICKENING	0	0
PULLED UP CAECUM	0	0

Among Hematological Investigations the average haemoglobin of the study population was 9.1g/dl with a range from 5.3 g/dl to 13.3 g/dl. Anaemia was seen in about 86% of patients. Anaemia of normocytic normochromic variety is usually seen in patients of chronic inflammation like TB. ESR was done in 52 patients and was raised in 42 patients. ESR is not of much diagnostic value but is considered to be an index of activity of disease. Sputum for AFB was done in 92 patients and it was positive in only 6 cases. Mantoux test was done in 80 patients and was positive only in one patient. Ascitic fluid of 30 patients was examined for ADA levels. It was found to be raised in 26 patients and equivocal in 2 patient and normal in 2 patient. CB-NAAT was done in 24 patients and it was positive in 16 patients. Diagnostic laparoscopy was performed in 10 patients in whom there was diagnostic delima. The various laparoscopic findings were multiple tubercles, ascites and lymphadenopathy. Table 5 represents various diagnostic laparoscopic findings.

**Table 5: Diagnostic Laparoscopy findings**

LAPAROSCOPY FINDINGS	FREQUENCY (N=10)	PERCENTAGE
MULTIPLE TUBERCLES	8	80
ASCITES	6	60
LYMPH NODE ENLARGEMENT	2	20
ADHESIONS	2	20
STRICTURE	0	0

Various laparotomy findings in the study population were, perforation in 14 patients, bands/adhesions in 16 patients, stricture in 10 patients and ileo-caecal mass in 4 patients, two of which was having perforation, cocoon in 4 patients and 2 patients had abscess. Figure 1 shows Bar graph of Laparotomy findings.

**Figure 1 : Bar graph of Laparotomy findings**



The most common procedures performed were stoma in 14 patients, adhesiolysis in 14 patients, resection anastomosis in 10 patients, resection with stoma in 4 patients. All patients who underwent laparotomy, laparoscopy or colonoscopy underwent some sort of tissue sampling. Tissue samples were taken in 44 patients of the laparotomy group, 10 patients of the diagnostic laparoscopy group and 6 patients of the colonoscopy group. 2 patient underwent FNAC of the cervical lymph node. Only 2 out of 62 samples did not show definitive evidence of tuberculosis, but this patient was still considered as having abdominal tuberculosis on the basis of per-operative findings and clinical suspicion. The histology specimen just showed changes of chronic inflammation.

## Discussion

Abdominal tuberculosis is quite common in this part of the world and because of non-specific presentations and delay in diagnosis, is associated with complications and therefore needs noticeable attention. The male to female ratio of the study population was 1.26 with 58 males as compared to 46 females. Although the overall incidence of tuberculosis is more in males, in case of abdominal tuberculosis female patients predominate, as shown in various studies like the study conducted by **Das et al., (1976)**<sup>3</sup> which showed female to male ratio of 2.6:1.

The most common symptom in this study was abdominal pain which was seen in 98 patients i.e. 94.2% of the study population. The most common sign in the present study was abdominal tenderness which was seen in 60 patients accounting about 57.7%. The same pattern was observed by **Das et al., (1976)**<sup>3</sup> in their series.

The average haemoglobin of the study population was 9.1g/dl with a range from 5.3 g/dl to 13.3 g/dl. Anaemia was seen in about 86% of patients. **Bhansali SK (1977)**<sup>4</sup> in his study observed that anaemia was a consistent feature of majority of patients of abdominal tuberculosis. More than 80% of the patients had haemoglobin level of less than 12g/dl. ESR was done in 52 patients and was found raised in 42 patients. ESR is a marker of inflammation in the body and is significantly elevated in patients with tuberculosis. ESR is not of much diagnostic value but is considered to be an index of activity of disease. Complete treatment however brings the ESR levels back to normal. **Patil S et al., (2017)**<sup>5</sup> in their series observed that ESR was raised in 22 patients out of 28 patients.

Chest x-ray was done in all 104 patients and was normal in 56 patients. Out of the 48 patients who had abnormal chest x-ray, many had more than one findings. The lesions can range from simple opacity or consolidation to effusion. In cases of active tuberculosis cavitory lesions may be seen. Chest x-ray may also show signs of healed tubercular infection like prominent hilar lymph nodes or fibro-bronchiectatic changes. Free gas under diaphragm was seen in 14 patients, which was indicative of perforation. Chest x-ray findings



support the diagnosis of abdominal tuberculosis but a negative chest x-ray does not rule out abdominal tuberculosis.

**Charokar K *et al.*, (2016)<sup>6</sup>** in their series of 72 cases in whom chest x-ray was performed, findings suggestive of pulmonary tuberculosis was present in 6 patients, two patients had apical lesions, one had miliary mottling and 2 had right sided pleural effusion.

Abdominal x-ray was normal in 46 patients (44.2%). The most common abdominal x-ray finding was multiple air fluid levels, which was seen in 40 patients (38.5%). It is in accordance with the most common presentation of tuberculosis i.e. obstruction.

**Chaudhary *et al.*, (2016)<sup>7</sup>** in their series of 756 patients had normal abdominal x-ray in 444 (58.7%) patients. Multiple air fluid levels in 237 (32%) patients.

The most common USG finding in our study was free fluid which was seen in 46 (48.9%) patients which was closely followed by dilated bowel loops seen in 38 (40.4%) patients. Free fluid could have been caused by peritoneal TB causing ascites, perforation or transudation of fluid in late stages of obstruction.

CECT abdomen was done in 24 patients in whom diagnosis was in doubt. CECT findings are usually an extension of the USG findings. As in USG, free fluid, dilated bowel loops and mesenteric lymph node enlargement were the most common findings. However, strictures which are difficult to appreciate in USG are easily visualized in CECT due to the use oral contrast. One patient had multiple skip lesions, which was reported as Crohn's disease by radiologist. The patient was operated for obstruction and ileostomy was done. However, biopsy later showed tubercular aetiology. This finding shows how tuberculosis can even mimic Crohn's disease.

**Charokar K *et al.*, (2016)<sup>6</sup>** in their series of 72 cases of abdominal tuberculosis had CECT done in only 6 cases, out of which 4 had cocoon formation and mesenteric thickening was seen in 4 cases.

Sputum for AFB was done in 92 patients and was positive in only 6 patients. Sputum smear is a helpful investigation in the setting of a patient having productive cough, as it is a non-invasive investigation, which is confirmatory for tuberculosis and helps in suspecting that the patient with pulmonary tuberculosis might be having concomitant abdominal tuberculosis.

**Patil S *et al.*, (2017)<sup>5</sup>** in their study on 60 patients performed sputum for AFB examination on 18 patients and it was negative in all the patients.

Ascitic fluid of 30 patients was examined for ADA levels. It was found to be raised in 26 patients and equivocal in 2 patient and normal in 2 patient. Fluid ADA is a very useful investigation in the presence of ascites and its raised levels provide an indirect evidence of

abdominal tuberculosis. However, negative or equivocal reports does not rule out the presence of tuberculosis.

Colonoscopy was done in 6 patients and biopsies were taken which provided the confirmed histopathological diagnosis of the disease. Colonoscopy is a very useful investigation in patients presenting with bleeding per rectum or features of colitis. 4 patients had diffuse colitis and 2 patients had ulcers. Colonoscopy findings for tuberculosis are very non-specific and should be accompanied by tissue sampling to confirm the diagnosis. Multiple biopsies should be taken and care should be taken that the sub-mucosa is also sampled as that is where tuberculosis starts in gastrointestinal tract.

Diagnostic laparoscopy was done in 10 patients to obtain a diagnosis. Omental biopsy was done in all the patients and was used to clinch the diagnosis. In 6 patients who had ascites, ascitic fluid analysis was done. ADA was raised in all. 2 patients had adhesion and adhesiolysis was done. Diagnostic laparoscopy helped in avoiding a formal laparotomy in these patients, thus reducing the convalescence period and period of hospital stay

**Ibrarullah M *et al.*, (2001)<sup>8</sup>** in their series evaluated the role of laparoscopy and colonoscopy in the diagnosis of abdominal tuberculosis. Thirty four patients were diagnosed to have abdominal tuberculosis on the basis of laparoscopy or colonoscopy. Laparoscopy was performed in 23 patients. Peritoneal tuberculosis was diagnosed in 19 of them, characterised by presence of ascites, multiple whitish tubercles, fibrous bands and adhesions, hyperemic edematous bowel loops or dense adhesions without ascites. Multiple jejunoileal hyperemic short segments with serosal neovascularization was noticed in three patients. One patient had caecal mass with pericaecal inflammatory adhesions. Peritoneal biopsy confirmed the diagnosis in 10 of the 15 patients. Laparoscopy provided positive diagnosis in 20/23 (87%) and positive histology in 10 of the 15 (67%) patients with peritoneal lesions. Thirteen patients underwent colonoscopy. Mucosal lesions involving terminal ileum, caecum and colon were noted in 11 patients. Colonoscopic biopsy confirmed the diagnosis in six of 11 patients (54%).

Most of the patients undergoing laparotomy had multiple findings. Various laparotomy findings in the study population were, perforation in 14 patients, bands/adhesions in 16 patients, stricture in 10 patients and ileo-caecal mass in 4 patients, two of which were having perforation, cocoon in 4 patients and two patients had abscess. The most common procedures performed were stoma in 14 patients, adhesiolysis in 14 patients, resection anastomosis in 10 patients, resection with stoma in 4 patients. Two patients in whom adhesiolysis was done developed entero-cutaneous fistula. Patients were later re-explored and ileostomy was performed.

**Bali RS *et al.*, (2017)<sup>9</sup>** in their study of 76 patients found ileal perforation as most common intra-operative finding seen in 30.3% of patients which was followed by, in order

of decreasing frequency, multiple small bowel perforation in 18.4%, solitary stricture with perforation in 11.8%, ileocaecal mass in 11.8%, adhesions and bands in 9.2%. The frequently performed procedures performed in order of decreasing frequency were ileostomy (32 patients), resection and anastomosis of the involved segment in 12 patients, primary repair of perforation (10 patients), right hemicolectomy (8 patients), adhesiolysis (6 patients), stricturoplasty (4 patients), jejunostomy (3 patients) and peritoneal and omental biopsy in 1 patient.

## Conclusion

Abdominal tuberculosis is one of the common manifestation of extrapulmonary tuberculosis with male preponderance occurring in the age group of 21-30 years. In non-emergency setting, patient may need a battery of investigations including CECT, special biochemical markers for making diagnosis of abdominal Kochs. In spite of specialized investigations, some patients may require diagnostic laparoscopy for confirmation of diagnosis which aids in inspection of macroscopic lesions and obtaining tissue for histopathology. Since the number of cases in our study were only 104, a further study with more number of cases is required to give further suggestions for the evaluation and management in our setup.

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