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Original Research Article

Abdominal tuberculosis in patients with acute abdomen: an observational single centre study

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ABSTRACT

Background: Abdominal tuberculosis tends to present with nonspecific features and can be hard to diagnose. Abdominal tuberculosis can mimic a variety of other abdominal conditions and only a high degree of suspicion can help in the diagnosis, otherwise, it is likely to be missed or delayed resulting in high morbidity and mortality. Therefore, a high index of suspicion, fortified with a general degree of awareness and knowledge of this form of the disease is essential.
Methods: A careful history taking, and thorough clinical examination was carried out in each case. All the patients were investigated. Some of the patients needed surgical intervention. For patients who responded favorably to conservative management and did not require surgery, diagnostic studies were carried out to confirm the presence of abdominal tuberculosis.
Results: Abdominal tuberculosis constituted a significant percentage (23.6%) of all cases attending the emergency with an acute abdomen. Ultrasound and CECT can show various findings which can be suggestive of abdominal tuberculosis, but there is no significant difference in PPV of ultrasound and CECT abdomen. Colonoscopy has PPV of 55.6% in diagnosis of abdominal tuberculosis. Gene Xpert is significantly better than AFB staining in diagnosing the abdominal tuberculosis with ascitic fluid examination.
Conclusions: Good clinicopathological workup in patients of abdominal tuberculosis results in earlier diagnosis and prompt management of this curable disease. Ultrasound and CECT can be suggestive of abdominal tuberculosis, but final diagnosis can be made only after histopathological examination/with gene Xpert report.

Keywords: Abdominal tuberculosis, Ultrasound, CECT whole abdomen, Colonoscopy, Gene Xpert

INTRODUCTION

In India, tuberculosis is responsible for considerable morbidity and mortality despite tremendous strides made in therapy and prophylaxis. Abdominal tuberculosis is the most common type of extra-pulmonary tuberculosis, including 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 3-4% belong to abdominal tuberculosis.[1] Extra-pulmonary tuberculosis is common amongst HIV infected patients.[2,3]

Clinical features of abdominal tuberculosis are varied and abdominal tuberculosis with an acute abdomen presents a challenge to the surgeon. It can present as intestinal obstruction, perforation peritonitis, acute appendicitis, abdominal pain with lump or abdominal pain with ascites.

Abdominal tuberculosis tends to present with nonspecific features and can be hard to diagnose. Abdominal

tuberculosis can mimic a variety of other abdominal conditions/ diseases and only a high degree of suspicion can help in the diagnosis, otherwise, it is likely to be missed or delayed resulting in high morbidity and mortality.

Therefore, a high index of suspicion, fortified with a general degree of awareness and knowledge of this form of the disease is essential. Diagnosis of the disease at an early stage has its own beneficial effects.

Earlier studies have documented an incidence of up to 16% of abdominal tuberculosis in patients with acute abdomen, while in our clinical practice at our centre in north India, the number of patients appears to be much higher.[4-6]

This study was conducted to document the incidence and various forms of presentation of abdominal tuberculosis in patients with acute abdomen, and to correlate various investigative procedures to have an insight into disease.

This study was the first of its kind, done among a section of urban population in north India.

METHODS

Source of data

Patients who presented to the department of surgery in St. Stephens hospital with acute abdomen.

Study design

The study design was of single centre prospective observational study.

Place of study

Study conducted at department of surgery, St. Stephen's hospital, New Delhi.

Inclusion criteria

Patients who presented with acute abdomen within the age group of 18-70 years were included in study.

Exclusion criteria

Patients who refused to give informed consent, patients with blunt or penetrating abdominal trauma, clinical findings, imaging, and operative findings suggestive of an alternate diagnosis, known case of malignant acute abdomen and patients aged <18 years, and >70 years were excluded from the study.

Study period

Study conducted from October 2018 to March 2020.

Methodology

A careful history taking, and thorough clinical examination was carried out in each case. All the patients were resuscitated with intravenous fluids, continuous nasogastric aspiration and foley catheterization. Blood samples collected from all patients were sent for routine hematology, blood biochemistry and serology. X-ray chest, x-ray abdomen erect, and supine were done for all patients. Ultrasound and CT of abdomen were also performed.

Some of the patients underwent emergency exploratory laparotomy after initial resuscitation, and some patients required surgical intervention after 24-48 hours of conservative treatment.

During surgery macroscopic appearance of the intestine, mesentery, regional lymph nodes suggested the diagnosis of abdominal tuberculosis. Surgical intervention was performed depending on surgical pathology. A specimen of diseased tissue was sent for histopathology.

For patients who responded favorably to conservative management and did not require surgery, diagnostic studies (USG/CT scan/ guided FNAC for histopathology, colonoscopy, pus/ ascitic fluid for gene Xpert) were carried out to confirm the presence of abdominal tuberculosis. Those found to be tuberculous were started on anti-tuberculosis therapy.

Based on the data collected from various studies which evaluated the incidence of abdominal tuberculosis in patients with acute abdomen, assuming (p)=10% as prevalence of abdominal tuberculosis with absolute precision of 5% we got the sample size of 140 which was sufficient for our study.[4,5] Formula used:

$n=Z^2_{\alpha/2} / pq/d^2$

$=1.96\times1.96\times0.1\times0.9/0.05\times0.0$

$=138.2976 \sim 140$

Where, p is the expected prevalence of abdominal tuberculosis.

$q=1-p.$

d is the desired level of precision (margin of error),

$Z^2_{\alpha/2}$ is the ordinate of standard normal distribution at α% level of significance.

A 95% confidence level gives us Z values of 1.96, per the normal tables.

Statistical analysis

Statistical analysis was performed by SPSS version 21.0

software. Continuous variables were presented as mean ± SD. Categorical variables were expressed as frequencies and percentages. PPV were calculated to analyze the diagnostic accuracy of ultrasound of abdomen, CT of abdomen, and colonoscopy. For all statistical tests, a p value of less than 0.05 was considered statistically significant.

RESULTS

A total of 140 patients were included in this study after taking due consent and after considering all inclusion and exclusion criteria. 65 (46.5%) patients were male and 75 (53.5%) were female, and male to female ratio was 1:1.2.

Out of 140 patients, 15 patients were of age <20 years (18-20 years) (10.7%), 35 patients were between 21-30 years (25%), 39 were between 31-40 years (27.9), 26 were between 41-50 years (18.6%), 14 were between 51-60 years (10%), and 11 were between 61-70 years age group (7.8%), and mean age of patients was 38.4 years.

Table 1: Distribution of various symptoms at presentation.

Symptoms	N	Percentage (%)
Pain abdomen	140	100
Nausea/vomiting	127	90.7
Constipation/ obstipation	85	60.7
Fever	42	30
Anorexia/ weight loss	34	24.3
Cough	10	7.14
Bleeding per rectum	3	2.14
Total	140	

All patients came with pain abdomen, which was associated with nausea and vomiting in 127 patients and constipation and obstipation in 85 patients. Fever was a symptom in 42 patients. While 34 patients had history of anorexia and weight loss. Per rectal bleeding was present in 3 patients (2.14%) and 10 patients (7.14%) gave history of chronic cough.

Out of 140 patients, 9 patients (6.4%) had history of pulmonary tuberculosis. 6 of them had completed anti tubercular therapy and 3 were on anti-tubercular therapy. Only 3 patients (2.1%) had family history of the tuberculosis.

Out of 140, 64 (45.7%) patients had abdominal distension, 99 (70.7%) patients had tenderness on abdominal palpation, 25 patients (17.8%) had guarding, 20 patients (14.3%) had splash (not succussion splash) on auscultation, 8 patients (5.7%) had rebound tenderness, 4 patients (2.8%) showed rigidity on palpation.

In chest x-ray erect films, free gas was present under right hemi diaphragm, for 22 patients (15.7%) out of 140 patients. For rest 118 patients, x-ray findings were nonspecific.

Xray abdomen erect, and supine films were taken after clinical evaluation of the patients. Out of 140 patients, there were multiple air fluid levels seen on 72 (51.4%) erect abdomen x-ray films, which were suggestive of intestinal obstruction. For 1 patient only dilated bowel loops were seen, which was suggestive of ileus. For rest 67 patients, findings were nonspecific.

Table 2: Distribution of ultrasound abdomen findings.

USG findings	N	Percentage (%)
Ascites	45	58.4
Inter bowel fluid	17	22
Bowel wall thickening	10	13
Lymphadenopathy	17	22
Total	77	

Out of 140 patients, for 77 patients, ultrasound findings were suggestive of tuberculosis. For 63 patients, findings were nonspecific. Findings on ultrasound abdomen which suggested tuberculosis were ascites, inter bowel fluid, bowel wall thickening and abdominal lymphadenopathy.

Table 3: Distribution of CECT abdomen findings.

CECT findings	N	Percentage (%)
Mural thickening	26	33.3
Mesenteric lymphadenopathy	37	47.4
Omental thickening	6	7.7
Ascites	27	34.6
Peritoneal thickening	3	3.8
Stricture, bands	26	33.3
Loculated peritoneal collection	6	7.7
Inter bowel adhesions	3	3.8
Mesenteric fat stranding	5	6.4
Total	78	

Out of 140 patients, for 78 patients, CECT findings were suggestive of abdominal tuberculosis. For rest of patients either CECT abdomen was not done, or findings were suggestive of alternative diagnosis.

CECT abdomen findings which suggestive of abdominal tuberculosis were, mesenteric lymphadenopathy, ascites, mural wall thickening, omental and peritoneal thickening, loculated abdominal collections, inter bowel adhesions, strictures, bands, and mesenteric fat stranding.

Ascites (34.6%), mesenteric lymphadenopathy (47.4%), circumferential mural wall thickening (33.3%), and strictures/ band (33.3%) were most common findings along with the omental/ peritoneal thickening, loculated abdominal collections, inter bowel adhesions and mesenteric fat stranding.

Colonoscopy was performed for 22 patients, out of 22 patients 4 patients (18.2%) had intestinal ulceration, 4

patients (18.2%) had intestinal stricture, 1 patient (4.5%) had ileocecal thickening and 1 patient (4.5%) had internal hemorrhoids. Colonoscopy findings were normal for 12 patients (54.5%). Biopsy taken during colonoscopy was sent for histopathological examination.

Out of 140 patients, 49 patients (35%) required surgery. 23 patients were taken up for emergency surgery, rest 26 patients were operated electively.

Table 4: Distribution of intraoperative findings.

Intraoperative findings	N	Percentage (%)
Intraabdominal fluid, loculated collections, intra-abdominal pus, feculent collection	31	63.3
Lymphadenopathy, caseous necrosis	10	20.4
Bowel, omental adhesions	14	28.6
Plastered omentum, peritoneum	2	4.1
Thickened omentum and bowel	7	14.3
Intestinal bands, stricture	14	28.6
Bowel perforation	20	41
Tubercles over bowel, peritoneum	2	4.1
Necrosed, friable, gangrenous bowel, omentum	7	14.3
Other findings suggestive of alternative diagnosis	11	22.4
Total	49	

Out of 140 patients, 49 patients were taken up for surgery, 31 patients (63.3%) had intraabdominal fluid/ pus or feculent collections/ intraabdominal loculated collections, 20 patients (41%) had bowel perforation, 14 patients (28.6%) had bowel or omental adhesions. The 14 patients (28.6%) had intestinal bands or stricture, 10 patients (20.4%) had abdominal lymphadenopathy/ caseous necrosed lymph nodes, seven patients (14.3%) had thickened omentum and bowel seven patients (14.3%) had bowel and omental adhesions, two patients (4.1%) had plastered omentum or peritoneum two patients (4.1%) had tubercles over bowel or the peritoneum.

The 11 patients had findings which were suggestive of alternative diagnosis. Other findings were-intra-abdominal mass, impacted gallstone, Meckel's diverticulum perforation, duodenal perforation, internal hernia, intussusception, peritoneal and omental deposits (suggestive of malignancy), phlegmon with creeping fat (inflammatory bowel disease).

Table 5: Distribution of histopathological findings.

HPE	N	Percentage (%)
Findings consistent with tuberculosis	26	45.6
Alternative diagnosis-IBD, malignancy, ischemic necrosis	31	54.4
Total	57	100

HPE/ fine needle aspiration cytology was done for 57 patients, samples for HPE taken during surgery, colonoscopy and through image guided biopsy. Out of 57 patients, for 26 patients (45.6%), findings of HPE were consistent with tuberculosis. For 31 patients (54.4%) findings of HPE suggestive of alternative diagnosis.

Alternative diagnosis made after histopathological examination were inflammatory bowel disease, malignancy, and ischemic bowel necrosis. One patient had malignancy along with intestinal tuberculosis.

Histopathological sample and ascitic fluid were sent for AFB staining for 43 patients, which came out to be positive for 4 patients (9.3%). Out of 26 HPE proven tuberculosis samples, AFB was positive for 3 patients (11.5%).

Out of 17 ascitic fluid samples, AFB was positive for 1 patient (5.9%).

For 17 patients, ascitic fluid was sent for gene Xpert, which came out to be positive for 7 patients (41.2%).

Table 6: Correlation of positive predictive value of AFB staining and gene Xpert from ascitic fluid examination, for diagnosis of abdominal tuberculosis.

Variables	AFB staining	Gene Xpert	P value
Positive	1	7	
Negative	16	10	0.015
Total	17	17	

Ascitic fluid was sent for AFB staining and gene Xpert for 17 patients. Gene Xpert was found to be significantly better in diagnosing abdominal tuberculosis from ascitic fluid examination ($p<0.015$).

Out of 140 patients, 71 patients (50.7%) had intestinal obstruction, 16 patients of intestinal obstruction undergone surgery. For 20 patients of intestinal obstruction, etiology came out to be tubercular, 25 patients had bowel perforation, out of which etiology came out to be tubercular for 9 patients, 23 patients had nonspecific pain abdomen; etiology came out to be tubercular for 3 patients, 1 patient had papillary adenocarcinoma of cecum along with colonic tuberculosis. Rest 20 patients diagnosed with various diseases ($n\leq5$).

Table 7: Distribution of final diagnosis of the patients presenting with acute abdomen.

Diagnosis	N	Percentage (%)	Tubercular etiology
Non-specific pain abdomen	23	14.3	3
Abdominal metastasis with unknown primary	1	0.7	0
Papillary adenocarcinoma of cecum with intestinal tuberculosis	1	0.7	1
Sealed bowel perforation	4	2.9	0
Colonic pseudo-obstruction	1	0.7	0
Duodenal perforation	3	2.2	0
Enteric ileus	1	0.7	0
Enteritis	2	1.4	0
Gall bladder perforation	2	1.4	0
Gastrointestinal stromal tumor	1	0.7	0
Inflammatory bowel disease	1	0.7	0
Bowel perforation	25	17.2	9
Internal hernia	1	0.7	0
Meckel diverticulum perforation	1	0.7	0
Mesenteric ischemia	1	0.7	0
Ruptured liver abscess	1	0.7	0
Intestinal obstruction	71	50.7	20
Total	140	100	33

Table 8: Distribution of site of involvement.

Site of tuberculosis	N	Percentage (%)
Disseminated Koch's	2	6.1
Ileal tuberculosis	5	15.2
Ileocecal tuberculosis	13	39.4
Colonic tuberculosis	2	6.1
Peritoneal tuberculosis	11	33.3
Total	33	100

Out of 140 patients, 33 patients (23.6%) were diagnosed with abdominal tuberculosis. Out of 33 patients 5 patients had ileal tuberculosis (15.2%), 13 patients had ileocecal tuberculosis (39.4%), 11 patients had peritoneal tuberculosis (33.3%), 2 patients had colonic tuberculosis and 2 patients had disseminated tuberculosis.

Ultrasound abdomen findings were suggestive of abdominal tuberculosis for 77 patients, out of which, etiology was confirmed to be tubercular on histopathology or with gene Xpert for 22 patients (28.6%).

CECT abdomen findings were suggestive of abdominal tuberculosis for 78 patients, out of which, etiology was confirmed to be tubercular on histopathology or with gene Xpert for 26 patients (33.3%).

Colonoscopy findings were suggestive of abdominal tuberculosis for 9 patients, out of which, etiology was confirmed to be tubercular on histopathology for 5 patients (55.5%).

Table 9: Correlation of positive predictive value of ultrasound abdomen and CECT abdomen for diagnosis of abdominal tuberculosis.

Variables	Ultrasound	CECT abdomen	P value
Confirmed as tubercular etiology	22	26	0.521
Negative	55	52	
Total	77	78	

On comparing the positive predictive value of ultrasound and CECT, it was found that there is no significant difference in positive predictive value of ultrasound and CECT abdomen ($p>0.05$).

DISCUSSION

Abdominal tuberculosis constituted a significant percentage (23.6%) of all cases attending the emergency with an acute abdomen. The incidence was 10% in a study by Mukhopadhyay et al.[5] The possible reasons for this high incidence in our study are-small sample size, single centre study, and the patient demography of our hospital, which is mostly from lower socioeconomic class.

Out of 33 patients, 10 patients (30.3%) were male, and 23 patients (69.9%) were female which is comparable to a study by Mukhopadhyay et al.[5.]

More than 50% patients were in age group of 21-40 years, and mean age of patients was 38.4 years, which is similar to studies done by Mukhopadhyay et al and Urabinahatti et al.[5,8]

Diagnosing the abdominal tuberculosis is not easy as it can present with various nonspecific features, or it can mimic various abdominal conditions.

Table 10: Comparison of incidence rate and gender distribution in various studies.

Variables	This study, (%)	Mukhopadhyay et al[5], (%)	Shimy et al[4], (%)	Singh et al[7], (%)
Incidence	23.6	10	15.5	13
Male	30.3	38.6	55.5	52
Female	69.9	61.4	44.5	48

The diagnosis can be confirmed by the presence of caseating necrotizing granuloma on histopathological examination or with the detection of mycobacterium on gene Xpert.

Clinical presentation of abdominal tuberculosis varies, and the most common presentations are intestinal obstruction, intestinal perforation, and nonspecific abdominal pain.

It was found that abdominal pain was associated with nausea and vomiting in 90.7% patients followed by constipation and obstipation in 60.7% patients and anorexia and weight loss in 24.3% patients. In a study done by Shimy et al pain was associated with vomiting in 55.5% patient, constipation in 60.6% patients and anorexia in 51% patients.[4]

On abdominal examination 64 (45.7%) patients had abdominal distension, 99 (70.7%) patients had tenderness on abdominal palpation, 25 patients (17.8%) had guarding. A study by Mukhopadhyay et al, showed tenderness in 87% of patients and guarding and rigidity in 30% of patients.[5] A study by Shimy, showed tenderness in 81% patients and rigidity in 48% patients along with the other findings.[4]

Only 6.4% patients had history of pulmonary tuberculosis, and 2.1% patients had history of tubercular contact. These findings are comparable with previous studies.[9]

In this study, on chest x-ray erect films, free gas was present under right hemi diaphragm, for 22 patients (15.7%), and multiple air fluid levels were seen on 72 (51.4%) erect abdomen x-ray films, while 1 patient had dilated bowel loops. These findings are consistent with a study by Urabinahatti et al.[8] A study by Mukhopadhyay et al showed multiple air fluid levels on 60% x-ray erect films and pneumoperitoneum on 20% x-ray films.[5]

It was found that, for 77 patients (55%) abdomen ultrasound findings were suggestive of tuberculosis. Findings on ultrasound abdomen which suggested tuberculosis were ascites, inter bowel fluid, bowel wall thickening and abdominal lymphadenopathy. Kedar et al evaluated ultrasound findings of various abdominal tuberculosis patients, and concluded that ascites, inter bowel fluid, bowel wall thickening, and abdominal lymphadenopathy are suggestive of abdominal tuberculosis.[10]

In our study, for 78 patients (55.7%) CECT findings were suggestive of abdominal tuberculosis. Ascites (34.6%), mesenteric lymphadenopathy (47.4%), circumferential mural wall thickening (33.3%), and strictures/ band (33.3%) were most common findings along with the omental/ peritoneal thickening, loculated abdominal collections, inter bowel adhesions and mesenteric fat stranding. A study by Flores et al showed peritoneal thickening in 83% patients, mesenteric lymphadenopathy in 50% patients followed by band in the 33% patients as well as the bowel wall thickening in the 16% of patients.[11]

Ultrasound abdomen and CECT abdomen can show various findings which can be suggestive of abdominal tuberculosis. But there is no significant difference ($p>0.5$) in positive predictive value of ultrasound (28.6%) and CECT abdomen (33.3%).

Colonoscopy has PPV of 55.6% in diagnosis of abdominal tuberculosis.

Gene Xpert is significantly better ($p<0.05$) then AFB staining in diagnosing the abdominal tuberculosis with ascitic fluid examination.[12-14]

AFB staining has the PPV of 11.5% on the tissue biopsy.

In our study, 49 patients were taken up for surgery and the most common intraoperative finding was intraabdominal fluid/ pus or feculent collections/ intraabdominal loculated collections (63.3%) followed by the bowel perforation (41%) as well as the bowel or omental adhesions and intestinal bands or stricture (28.6% each).

These intraoperative findings are consistent with studies done by Kumar et al and Urabinahatti et al.[8,15] A study by Mukhopadhyay et al showed intestinal strictures in 23.4% patients, bowel thickening in 21.9% patients, and bowel perforation in 34.1% patients.[5] A study by Shimy et al showed stricture in 21.3% patients, bowel hypertrophy in 28.5% patients, and bowel perforation in the 28.5% patients.[4]

The most common site of involvement is ileocecal junction followed by peritoneum, ileum as well as the colon.

Limitations

Limitations were-small sample size, single centre study and patient demography of our hospital, which is mostly from lower socioeconomic class.

CONCLUSION

Abdominal tuberculosis constituted a significant percentage (23.6%) of all cases attending the emergency with an acute abdomen. Diagnosing the abdominal tuberculosis is not easy as it can present with various nonspecific features, or it can mimic various abdominal conditions. Clinical presentation of abdominal tuberculosis varies, and the most common presentations are intestinal obstruction, intestinal perforation, and nonspecific abdominal pain. The most common site of involvement is ileocecal junction followed by peritoneum, ileum, and colon. Ultrasound abdomen and CECT abdomen can show various findings which can be suggestive of abdominal tuberculosis. But there is no significant difference ($p>0.5$) in positive predictive value of ultrasound (28.6%) and CECT abdomen (33.3%). Gene Xpert is significantly better ($p<0.05$) then AFB staining in diagnosing the abdominal tuberculosis with ascitic fluid examination.

Recommendations

After completion of my study and analysis of the results, recommend the following-Early diagnosis is the key factor in avoiding systemic and local complications of abdominal tuberculosis and good clinicopathological workup in patients of abdominal tuberculosis results in earlier diagnosis and timely management of this curable disease. Ultrasound and CECT abdomen can be suggestive of abdominal tuberculosis, but final diagnosis can be made only after histopathological examination or with gene Xpert report. Patients with ascites, abdominal lymphadenopathy or bowel wall thickening on ultrasound or CECT abdomen should raise suspicion for abdominal tuberculosis. AFB staining has exceptionally low sensitivity in diagnosing abdominal tuberculosis.

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