



Computerised Tomography Findings of Abdominal Tuberculosis – A Must Know

Authors

Dr Subhasish Panda¹, Dr. Subhashree Dash^{2*}, Dr Savitri Bhagat³, Dr B.B. Panda⁴

P.G. Department of Radiodiagnosis, V.S.S. Institute of Medical Sciences and Research, Burla, Odisha, India

*Corresponding Author

Dr Subhashree Dash

Abstract

Introduction: Tuberculosis is a commonly prevalent disease in India owing to widespread overpopulation and malnutrition and has a rising trend due to the increasing incidence of HIV and use of immunosuppressive drugs. Although a great mimicker of several other diseases such as inflammatory bowel diseases, carcinoma and other infectious bowel diseases, ultrasonography and computed tomography are very useful in arriving at a confident diagnosis of abdominal tuberculosis.

Methods: This was an observational cross-sectional study conducted to evaluate the spectrum of abdominal tuberculosis using CT (computerised tomography). A total of forty six patients of abdominal tuberculosis were evaluated over a period of one year. The associated findings and complications produced by this disease were also evaluated. Isolated Genitourinary and solid organ involvement was excluded.

Results: Peritoneal involvement was the most common feature followed by affliction of gastrointestinal tract. Loss of mural stratification was most commonly seen. Extraabdominal findings of pulmonary involvement were predominant in these cases.

Conclusion: CT findings along with laboratory and clinical findings can significantly help in diagnosis of abdominal tuberculosis.

Keywords: extrapulmonary, lymphadenopathy, necrotic, peritoneal, peritonitis, cocoon, ileocaecal, Crohn, intussusceptions.

Introduction

Even with the global pandemic grabbing all eyeballs, tuberculosis is a common potentially life threatening disease having a global burden of about 12 million. It can virtually affect any organ of the body. Although pulmonary, lymphatic, genitourinary forms of tuberculosis are most frequent, abdominal involvement is a common presentation of tuberculosis and may involve solid viscera like liver and spleen, pancreas, gastrointestinal tract, gall bladder, peritoneum and abdominal lymph nodes⁽¹⁾.

Mycobacterium tuberculosis can reach gastrointestinal tract by ingestion of infected sputum, the haematogenous route, contiguous spread from involved lymph nodes and the fallopian tubes⁽²⁾. Upon ingestion of sputum, acid fast bacillus accumulates in the Peyer's patches of terminal ileal region due to relative stagnation in that region resulting in ileocaecal tuberculosis. Mesentery and omentum can be affected by disseminated miliary tuberculosis of the bowel and the peritoneum and is thought to be caused by hematogenous spread or local spread from GI involvement (penetration of

involved bowel or lymph nodes draining into the peritoneum).

In abdominal TB, peritoneal involvement is the most common form followed by gastrointestinal involvement. Although a great mimicker of several other entities such as inflammatory bowel disease and neoplasms, imaging findings are highly suggestive to arrive at a conclusive diagnosis along with corroboration of clinical features and laboratory findings. This study highlights the commonly encountered as well as some extremely rare manifestations of abdominal tuberculosis.

Materials and Methods

A total of 46 patients clinically diagnosed to be suffering from abdominal tuberculosis referred to the Postgraduate Department of Radiodiagnosis, VIMSAR, during July 2016 to Dec 2017 were included in this study. Non-contrast and contrast enhanced CT (oral plus intravenous and rectal when required) examination of patients were carried out using Siemens Somatom Emotion CT Scan machine. Confirmatory diagnosis of tubercular involvement of the abdomen was achieved by satisfactory fulfillment of at least one of the following criteria –

- Elevated Adenosine Deaminase (ADA) or LDH values in the peritoneal fluid
- Positive Polymerase Chain Reaction (PCR)
- Positive Culture of Ascitic Fluid
- Satisfactory Response to Antitubercular Therapy

Isolated solid organ involvement and genitourinary tuberculosis were excluded from the study.

Results

Out of the 46 patients enrolled in the study, 35 patients were radiographically diagnosed to be suffering from abdominal tuberculosis. Among them 21 were males (60%) and 14 were females (40%). The most common presenting clinical features was low-grade fever (60%) followed by abdominal pain (50%), abdominal distension, documented weight loss and constipation. Bowel involvement (small bowel in particular) was

identified in 11 cases (31.4%), with ileo-caecal region most commonly involved (Table 3).

The pattern of bowel involvement and CT enhancement findings are depicted in Table 4 and 5. An abdominal cocoon (now termed sclerosing encapsulated peritonitis) was found in two cases while a solitary case of jejuno-jejunal intussusception was also seen. Bowel obstruction was the most frequently found complication (Table 6). Peritoneal collection was the most common peritoneal finding (Table 7) and homogenous discrete lymph nodes were mostly observed (Table 7). Associated findings of pulmonary tuberculosis were seen in 40% of cases (Table 8).

Table 1. Tomographic Findings of Study Subjects

Gross findings	No. of Patients	Percentage
Peritoneal Involvement	31	88.57
Gastro-intestinal Tract Involvement	11	31.4

*Please note that the numbers in above table are overlapping, due to the presence of both findings in multiple patients.

Table 2 Pattern of Peritoneal Involvement

Pattern	Number of Patients	Percentage
Peritoneal Collection	17	48.57
Peritoneal Thickening (Smooth) (Nodular)	9	25.71
Omental Thickening / Caking	2	5.71
Mesenteric Stranding/ Nodes	4	11.4
Mesenteric Stranding/ Nodes	17	48.57
Total	31	88.57

*Please note that the numbers in above table are overlapping, due to the presence of both findings in multiple patients.

Table 3 Bowel Loop Involved in the Patients

Site of Bowel Loop	Focal	Segmental	Diffuse	Total	Percentage
Stomach	1	-	-	-	2.8
Jejunum	-	1	-	1	2.8
Ileum	-	1	-	1	2.8
Ileocaecal	-	7	-	7	20
Ascending Colon	-	1	-	1	2.8
Total	1	10	0	11	31.4

Table 4 Pattern of Bowel thickening

Pattern of Involvement	Number of Patients	Percentage
Symmetric Thickening	6	54.5
Asymmetric Thickening	5	45.4

Table 5 Pattern of CT Enhancement of Bowel Loops

Pattern of enhancement	Number of Patients	Percentage
Mural stratification present	3	27.2
Loss of mural stratification	8	72.7
Mucosal hyperenhancement	6	54.5

Table 6 Complications of Bowel Tuberculosis

Complication	Number of Patients	Percentage
Perforation	1	2.85
Bowel obstruction (Proximal dilatation)	4	11.4
Intussusception	1	2.85
Total	5	14.2

Table 7 Lymph Node Characteristics

Pattern of Lymph Nodes	Number of Patients		Percentage of Lymphadenopathy
	Enlarged	Not Enlarged	
Necrotic	5	-	25
Homogenous, Discrete	7	2	43.7
Confluent / Matted	2	-	11.7
Calcified	0	1	6.2
Total	14	3	

Table 8 Association with Other Sites

Association	Number of Patients	Percentage
Pulmonary Tuberculosis	14	40
Solid organ involvement (Liver, Spleen, Pancreas)	3	8.5
Psoas abscess	2	5.7
Vertebral involvement	3	8.5

1(A)

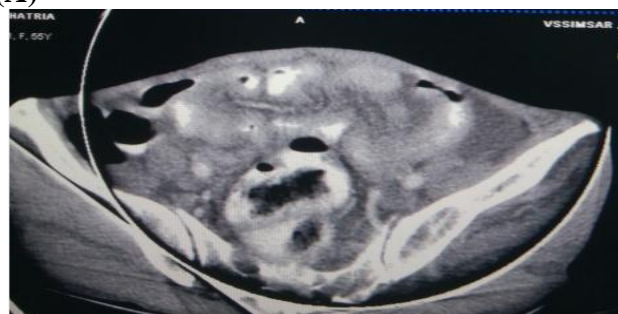


1(B)



Fig 1 (A). Post contrast CT showing non enhancing peritoneal collection bounded by smoothly thickened enhancing parietal peritoneum (arrow). Fig 1 (B). CT showing omental stranding (arrow) and free hypodense fluid in peritoneum.

2(A)



2(B)



Fig 2 (A). CT showing segmental symmetric thickening of ileal loops in iliac region, with hypodense peritoneal collection. Fig 2(B) depicts multiple lymph nodes located in close approximation in right iliac fossa (arrow) adjacent to thickened and narrowed ileocaecal valve. Also seen is proximal dilatation of distal ileum.

3(A)



3(B)



Fig 3 (A) Axial CT identifying a jejunojejunal intussusception (arrow) with mural thickening which resolved after Antitubercular therapy. Fig 3(B) Coronal CT showing caecal pull up in another patient.

4(A)



4(B)

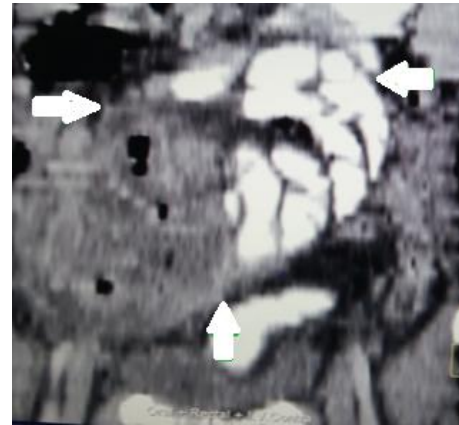
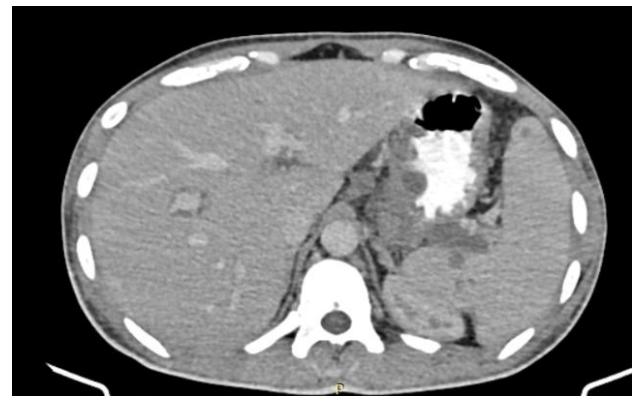


Fig 4 (A). USG image and Fig 4(B)- corresponding CT image showing congregation of small bowel loops in the center of abdomen with a fibrous membrane (thick arrows in b) surrounding the loops suggestive of Sclerosing Encapsulated Peritonitis.

5(A)



5(B)



Fig 5 (A) Axial CT showing stomach mural involvement secondary to necrotic nodes and 5(B) Axial images in same patient show a non enhancing hypodense lesion (arrows) in tail of pancreas presumed to be tubercular affection.

Discussion

The most common site involved in abdominal tuberculosis is the peritoneum followed by gastrointestinal tract, as seen in the present study (Table 1)⁽³⁾. Peritoneal TB can be of three types- dry type, wet type and mass forming⁽⁴⁾. Classically, the more common 'wet' form demonstrates exudative peritoneal collection, and the 'dry' form is caused by fibrinous exudates and tubercles with widespread signs of peritoneal inflammation. Review of literature suggests CT findings of peritoneal tuberculosis include soft tissue density thickening with stranding of the mesentery and omentum, thickened bowel loops, high attenuation peritoneal collection and low density lymph nodes.^(5,6)

In our study most common type of peritoneal involvement was high attenuation peritoneal collection i.e. in 27 cases (77.1%) (Table 2). Out of this, smooth peritoneal thickening was found in 9 cases, nodular peritoneal thickening in 2 cases and omental caking in 4 cases.

Gastro-intestinal involvement of bowel loops occurs most commonly in the ileo-caecal site with circumferential thickening and regional lymphadenopathy, assumed to be due to abundance of lymphatic tissues and venous stasis at this site⁽⁷⁾. Later, ileocaecal valve involvement, gross asymmetric wall thickening, adherence of bowel loops and even a complex mass formation may be seen. In our study (Table 3), ileocaecal involvement was most common, i.e. in 8 out of 11 cases, involving bowel (Fig 2B). Symmetric thickening was slightly more common (6 cases) as compared to asymmetric thickening (5 cases); segmental (6-40cm) involvement being the most common longitudinal extent (Table 4)⁽⁸⁾. Focal involvement (upto 5 cm in length) is more suggestive of neoplastic etiology and was seen in only one case of stomach tuberculosis. Loss of mural stratification was more common than preservation of the same (Table 5), the later favouring Crohn's disease according to most studies^(6,9). However, conflicting studies have been encountered⁽¹⁰⁾. Other findings favouring Crohn's are non necrotic lymph nodes, skip lesions, concomitant colonic and anorectal

involvement, fistulas, etc. Mucosal hyper enhancement, although a nonspecific finding, is seen in active tuberculosis, as in more than half of our cases⁽¹¹⁾.

Isolated colonic, duodenal and gastric involvement is rare⁽¹²⁾. Concomitant gastric and pancreatic involvement secondary to necrotic abdominal nodal invasion was seen in 1 case (Fig 5). Ascending colon involvement was also seen in 1 case (2.8%) only (Table 3), lower than that described in literature⁽¹³⁾.

Sclerosing encapsulating peritonitis, formerly referred to as abdominal cocoon, can be classified as idiopathic and secondary. Idiopathic cause was first described by Foo et al in 1978 which primarily affects young females from tropical and subtropical countries⁽¹⁴⁾. Secondary etiologies include chronic ambulatory peritoneal dialysis, ventriculo-peritoneal shunts, treatment with praxolol, tuberculosis, sarcoidosis, protein S deficiency, etc. The classic findings of abdominal cocoon on CT scan consist of a thick fibrotic membrane causing total or partial encasement of the small intestine⁽¹⁵⁾. Two cases (5.4%) of sclerosing encapsulating peritonitis were identified in our study (Fig 4).

Perforation and fistula are recognised complications, the small bowel and colon being the most common sites. However, in our study, this was present in only one case (2.85%) (Table 6). Other complications include intussusception and small bowel obstruction, both of which were relatively more common in the present study (Fig3A)⁽¹⁶⁾.

Mesenteric nodes are most common, enlarged usually, demonstrating central hypodensity consistent with necrosis (caseation) with occasional calcification^(17,18). This correlated well with our study (Table 7), where lymphadenopathy was found in 16 cases (45.7%) of which all were mesenteric. However, in our study homogeneously enhancing nodes (10 cases) outnumbered necrotic nodes (1 case). Calcified nodes were found in 1 case only (2.8%). As expected, pulmonary tuberculosis was the most common associated organ system involved (Table 8).

This study had certain limitations. Firstly, the frequency of findings described were region specific. Certain investigations like Serum ADA, RT-PCR although expensive, don't have a specificity or sensitivity of 100%. Involvement of bowel, spleen and pancreas were only confirmed by histopathological analysis of abdominal lymph nodes and not by direct biopsy of the organs.

Conclusion

The prevalence of tuberculosis in India remains high and hence, abdominal involvement of Mycobacteria must be seriously considered in our clinical setup. Though majority of imaging findings are nonspecific, radiological diagnosis of abdominal tuberculosis is possible only through corroboration of the CT findings with clinical and biochemical findings along with follow up, subsequent to a high degree of suspicion.

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