Original Article

COMPARISON OF COMPUTERIZED TOMOGRAPHIC AND ULTRASONOGRAPHIC FINDINGS IN ABDOMINAL TUBERCULOSIS

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Abstract

Introduction: Abdominal TB is very common in third world countries with poor socioeconomic status like Pakistan. Majority of patients end up in intestinal obstruction and other complications and finally undergo surgery. Abdominal tuberculosis may be, enteric, peritoneal, nodal and solid visceral TB or in any combination of these four varieties. In some cases, response to therapeutic trials of anti-tuberculous drugs is the basis of diagnosis that may cause a delay in the diagnosis of other diseases which mimic abdominal tuberculosis. Therefore, diagnosis of abdominal tuberculosis is an ongoing challenge to the physicians, especially with limited resources. Ultrasound and CT are good diagnostic helping tools in diagnosis of abdominal tuberculosis.

Objectives: To compare the diagnostic accuracy of Computerized Tomographic and Ultrasonographic findings in Abdominal Tuberculosis considering Histopathology as gold standard.

Study Design: Comparative cross sectional.

Setting: Department of Diagnostic Radiology, Mayo Hospital Lahore.

Duration of Study: Twelve months after the approval of synopsis, from June 2007 to May 2008.

Subjects and Methods: 50 patients with clinically suspected abdominal tuberculosis who were candidate for elective surgery were selected. History, examination and relative investigation were recorded and analyzed with SPSS version 10.

Results: CT is a better modality in finding ileocecal involvement, omentum involvement and para-aortic lymphadenopathy than USG and USG is slightly better in finding mesenteric lymphadenopathy than CT in abdominal tuberculosis.

Conclusion: Although none is 100% accurate but there is difference in diagnostic accuracy of computerized tomographic and ultrasonographic findings in abdominal tuberculosis. In short combined together, these two modalities can be of great help in pre-operative diagnosis of ATB and in decreasing the mortality and morbidity of the disease.

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Introduction

Tuberculosis is one of the major public health problem in the developing countries like Pakistan with the high morbidity and mortality.[1] Abdominal tuberculosis accounts for the 11 – 16% of total incidence.[2] Abdominal tuberculosis is difficult to diagnose because the clinical features are vague and non-specific and the detection mycobacterium in culture or smear is low. The procedures required for obtaining tissue for histopathological examination or culture are more costlier and invasive and are not easily available in developing countries.[3] The routinely done investigations like ultrasound, barium X-Rays and CT scan and Mantoux test provides a supportive value. Another way of diagnosing is to see response to the therapeutic trials of antituberculous drugs but disease mimicking abdominal tuberculosis like abdominal lymphoma, Crohn's disease and malignancy are diagnosed lately.[4] Therefore, it's an ongoing challenge for physicians to diagnose abdominal tuberculosis particularly working with limited resources.

Ultrasonography and computed tomography are widely used for the diagnosis of the abdominal tuberculosis. The features includes ascites either fibrinous, septate or clear, paraaortic and mesenteric lymphadenopathy, omental thickening and mass, ileocaecal thickening or the mass. Study shows the different sensitivity and specificity of ultrasound and computed tomography in detecting these.[5] Ascites and mesenteric lymphadenopathy are better appreciated in ultrasound whereas paraaortic lymphadenopathy, ileocaecal mass are better appreciated in CT. However a cost effective method is not well established. Therefore, the aim of the present study is to compare the diagnostic accuracy of the ultrasonography and CT in diagnosis the abdominal tuberculosis either in alone or with combination of the both.

Materials and Method

Fifty patients of either sex and any age with clinical suspicion of abdominal tuberculosis were studied from june 2007 to may 2008. Pregnant patients were excluded from the study. Their age, sex, symptoms, medical history and clinical findings were recorded. All the patient underwent ultrasonography and CT abdomen with and without i/v contrast. Ultrasonography was performed using 3.5MHZ curvilinear probe and 10 MHZ linear probe with special attention to small bowel thickness, mysentry, iliecaecal region, paraaortic and mysenteric lymphadenopathy and ascites. Abdominal CT without and with i/v contrast was performed using helical CT. Scanner parameter were kvp 120 – 140 and mAs 200 – 300. Slice thickness 10mm, pitch of 1.5 and reconstruction interval 10mm. Patients were than given 1.5ml/kg of non-ionic contrast (urografin). $1/4^{th}$ of the contrast was given in the form of repeated oral sips diluted in 1000ml of plain water starting from 4 hours before the scan. Before giving i/v contrast test dose of 5ml was given. If patient had been fine remaining dose was given as bolus in 1 to 2 minutes and patients were scanned again for abdomen keeping the CT setting constant. Delayed images were obtained if required. All the data obtained were collected through specially designed proforma.

Results

Out of 50 patients 27(54%) were male and 23 (46%) were female. The mean age was 31.6 ± 16.5 years with maximum age of 75 years and minimum age was 7 years.

Ultrasound Findings

On Ultrasonography 9 (18%) had ascites which was thick, fibrinous and septated in 6 (12%) patients and was free clear fluid in only 3 (6%). 2 (4%) had hepatosplenomegaly and only one (2%) patient had splenomegaly. One (2%) patient had focal lesions (suspected tuberculomas) in the liver and 1 (2%) had focal lesions in the spleen. Mesenteric lymphadenopathy was noted in 21 (42%) patients. Omental thickening or mass was appreciated in 20 (40%) of the patients. Para-aortic lymphadenopathy was noted in 17 (34%). Illeocecal wall thickening / mass was appreciated in 36 (72%) of the patients. 3 (6%) had isolated colonic involvement and only one (2%) patient had illeocecal and colonic involvement simultaneously.

Computerized Tomographic Findings

Ascites was noted in 9 (18%) patients out of 50 patients on CT scan. Out of which 3 (6%) had clear free fluid while 6 (12%) had debrinous septated ascites. Para-aortic lymphadenopathy was noted in 21 (42%) of patients. Mesenteric lymphadenopathy was noted in

23 (46%) patients. Omental thickening or mass was appreciated in 38 (76%) of the patients Hepatosplenomegaly was present in 2 (4%) patients and splenomegaly alone was appreciated in only 1 (2%) patient. Regarding intestinal involvement 38 (76%) had illeoceal involvement. 2 (4%) had isolated colonic lesion and 2 (4%) showed up with both colonic and illeoceal lesion.

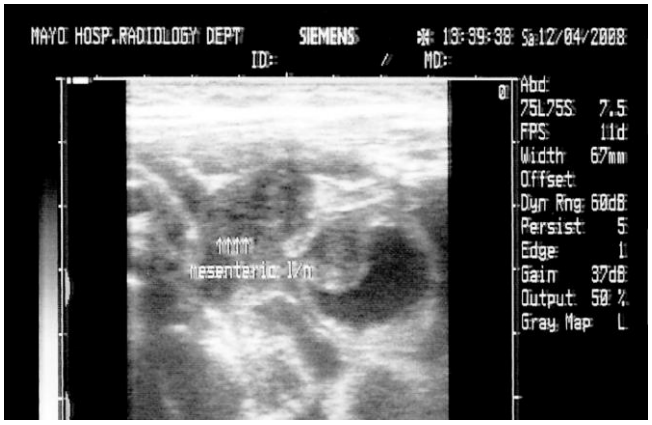

Fig. 1: Usg showing mesenteric lymphadenopathy.

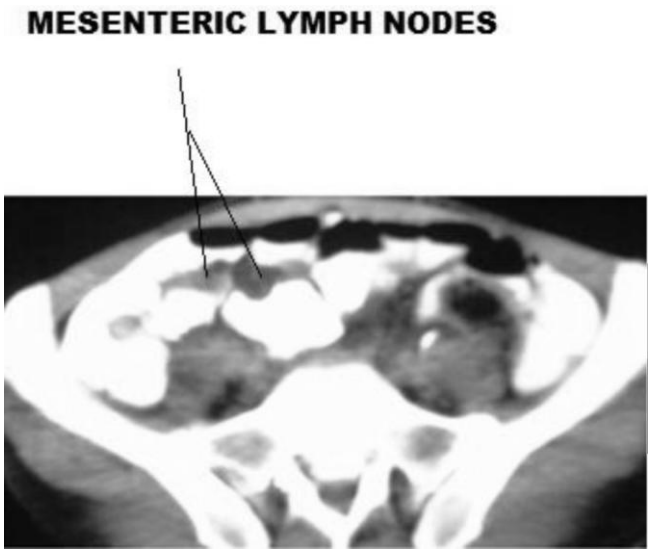

Fig. 2: CT showing mesenteric lymphadenopathy.

Histopathology

Histopathology was gold standard in this study and showed diagnostic evidence of tuberculosis (caseating granulomas) in 41 (82%) patients. Out of 50 patients 5 (10%) had histopathological reports showing malignant cells. 2 (4%) patients did not have their biopsy or FNAC done. In 2 (4%) patients histopathological reports showed nonspecific changes which do not favour the diagnosis.

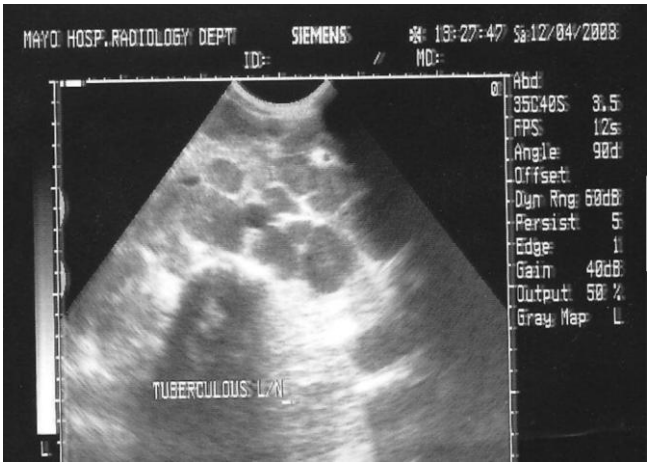

Fig. 3: Ultrasound showing paraaortic lymphadenopathy.

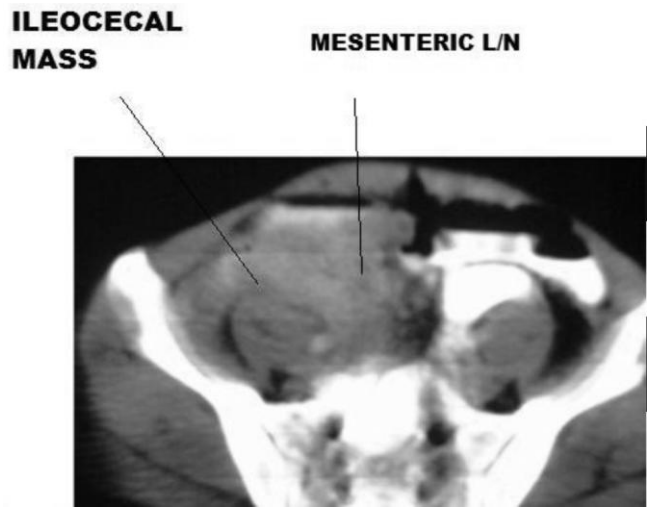

Fig. 4: CT image of ileocaecal mass.

Discussion

The main focus of this study was to assess and compare the diagnostic yield of Computerized Tomographic and Ultrasonographic findings of abdominal tuberculosis and to find the better non-invasive (non-surgical) diagnostic modality. Abdominal tuberculosis has wide range of variations not only on presenting complaints and their durations and signs but also has variable range of specific and non-specific imaging findings.

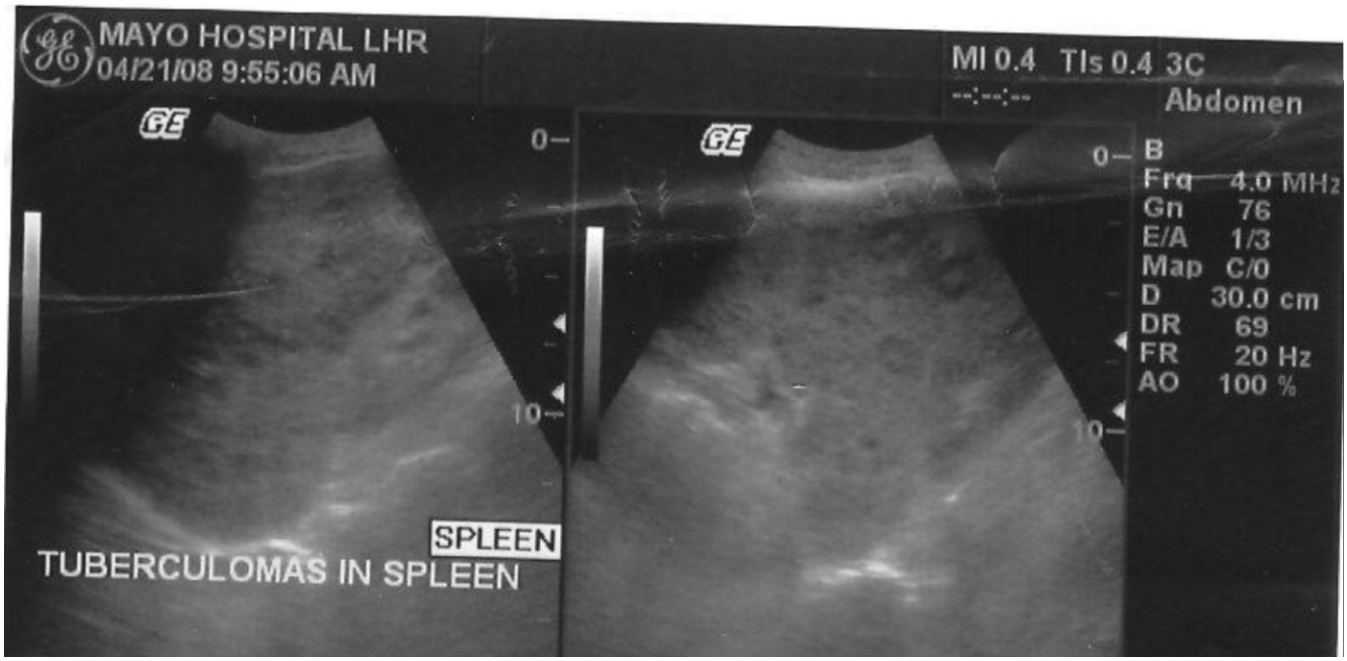

Fig. 5: Ultrasound image of tuberculomas in spleen.

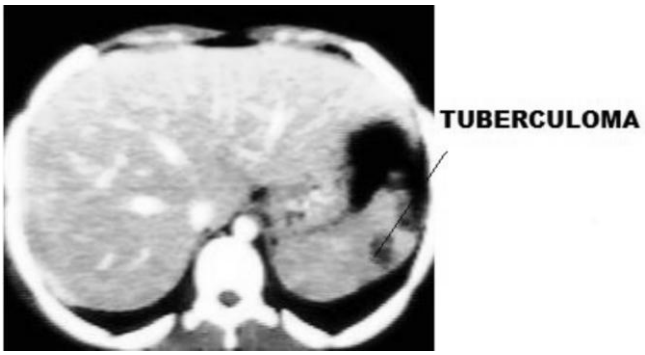

Fig. 6: CT images showing a hypodense area in spleen suggesting tuberculoma.

Fig. 7: CT demonstrating thick ascites.

In this study the mean age was 31.6 year, male to female ratio had been 1.17:1 and 90% patients belonged to low or lower middle socioeconomic status. Ibrahim and Osoba[6] found mean age 52 year and male to female ratio of 1.3:1in their 75 patients study. The most common presenting symptoms were anorexia and abdominal pain which were observed in 63/75 (84%) each. Weight loss was the presenting symptom in 54/75 (72%) of patients. Low grade fever occurred in 27/75 (36%), while high grade fever was recorded only in 12/75 (16%). Other symptoms included vomiting (36%), sweating (36%), cough (26%), diarrhoea (16%) and dysphagia (4%). Abdominal tenderness was the most common clinical sign which was observed in 55/75 (74%), followed by ascites and abdominal mass in 32/75 (42%) each. According to Basu abdominal pain

Table 1: Comparison of Sensitivity, Specificity, NPV, PPV and Diagnostic Accuracy of CT and USG findings in ATB.

Findings		Sensitivity %	Specificity %	NPV %	PPV %	DA %
Ascites	On CT	17.07	77.7	17.07	77.7	28
	On USG	17.07	77.7	17.07	77.7	28
Para aortic Lymphadenopathy	On CT	41.46	55.55	17.25	23.08	48
	On USG	29	44.4	13.39	19	32
Mesenteric Lymphadenopathy	On CT	43.9	44.44	14.8	17.39	44
	On USG	46.34	77.77	24.13	33.3	52
Omentum involvement	On CT	82.92	55.55	41.66	14.7	78
	On USG	39	55.55	16.67	25	42
Ileocaecal involvement	On CT	87.8	66.66	54.54	15.38	84
	On USG	78	44.44	30.77	10.18	78
Colonic involvement	On CT	5	88.89	17.02	266.6	20
	On USG	5	88.89	17.02	266.6	20
Hepatic Lesions	On CT	2.44	88.89	16.67	400	18
	On USG	2.44	88.89	16.67	400	18
Splenic Lesions	On CT	2.44	100	18.36	900	20
	On USG	2.44	100	18.36	900	20

(90.43%) had been the most common symptom and abdominal distension (83.43%) was the most common sign.[7]

In this study the most common finding of ATB was ileocecal involvement which was appreciated in 39/50 (78%) patients on CT and in 37/50 (74%) patients on USG with sensitivity 87.8% and 78%, specificity 66.66% and 44,44%, NPV 54% and 30%, PPV 15% and 10% and diagnostic accuracy of 84% and 78% respectively. The second most common finding was of ATB was omental mass / thickening which was appreciated in 38/50 (76%) patients on CT and in 20/50 (40%) patients on USG with sensitivity 82% and 39%, specificity 55% and 55%, NPV 41% and 16%, PPV 14% and 25% and diagnostic accuracy of 78% and 42% respectively. This was possibly due to limitation in omentum visualization on USG because of gas filled gut loops or because of ascites. According to Balakan omental thickening is noted in 42% of the cases in ATB.[8]

Mesenteric lymphadenopathy was appreciated in 23/50 (46%) patients on CT and in 21/50 (42%) patients on USG with sensitivity 43% and 44%,specificity 46% and 77%, NPV 14% and 24%, PPV 17% and 33% and diagnostic accuracy of 52% and 44% respectively. Para-aortic lymphadenopathy was noted in 21/50 (42%) patients on CT and in 17/50 (34%) patients on USG with sensitivity 41% and 29%, specificity 55% and 44, 44%, NPV 17% and 13%, PPV 23% and 19% and diagnostic accuracy of 48% and 32% respectively. Balakan showed presence of lymphadenopathy in 68% of the patients in his study.[8]

Ascites was appreciated in 9/50 (18%) patients both on CT and USG with sensitivity 17%, specificity 77%, NPV 17%, PPV 77% and diagnostic accuracy of 28% with both modalities. In 6 (12%) patients it was thick septated and only in 3 patients it was free ascites. In a study by Balakan[8] the most common finding on USG was peritoneal tuberculosis, which was characterized by ascites. Although there were variable amounts of ascites fluid, most of them were free ascites (n = 12, 63%). Ascites was loculated in 4 (21%) patients with fibrotic type AT.

Colonic involvement was appreciated in 3/50(6%) patients both on CT and USG with sensitivity 5%, specificity 87%, NPV 17%, PPV 266% and diagnostic

accuracy of 20% with both modalities. Hepatic tuberculomas were present in 2/50 (4%) patients both on CT and USG with sensitivity 2.44%, specificity 88%, NPV 17%, PPV 400% and diagnostic accuracy of 18% with both modalities.

Splenic tuberculomas were present in 1/50 (2%) patients both on CT and USG with sensitivity 2.44%, specificity 100%, NPV 18%, PPV 900% and diagnostic accuracy of 20% with both modalities. Hepatomegaly was present in 2 (4%) and splenomegaly was noted only in 1 (2%) patient which is comparable to the study findings of Balakan.[8]

In another study Sinan and Sheikh[9] has found peritonitis 77.5% as the most common CT finding in patients with ATB. Lymphadenopathy was 46.9%, GIT involvement was only 38.9% and solid organ involvement was 10% contrary to the present study. Similarly in another study A. Malik found peritoneal tuberculosis as ascites as the most common finding in abdominal tuberdculosis.[10]

Regarding the CT findings, according to Zissin et al[11] the most common manifestations of abdominal TB were ascites of a variable amount and omental infiltration, seen in 10 of the 13 patients with intraperitoneal disease. Eight patients also had smooth thickening of the parietal peritoneum.

Conclusion

Although there is wide range of presentation of abdominal tuberculosis and Computerized Tomography and Ultrasonography both can pick them up but none has 100% diagnostic accuracy for ATB findings. Although both CT and USG share same sensitivity, specificity, NPV, PPV and diagnostic accuracy for some ATB findings, however these two modalities do differ in their these characteristics and CT has better sensitivity, specificity, NPV, PPV and diagnostic accuracy for finding ileocecal involvement, omental involvement and paraaortic lymphadenopathy in patients of ATB.

USG is found to be slightly better in picking mesenteric lymphadenopathy. In short combined together these two modalities can be of great help in pre-operative diagnosis of ATB and in decreasing the mortality and morbidity of the disease.

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