National Journal of Medical and Allied Sciences

[ISSN Online: 2319 – 6335, Print: 2393 – 9192|Original article |Open Access]

Website:-www.njmsonline.org

ULTRASOUND FINDINGS IN ABDOMINAL TUBERCULOSIS: USUAL AND UNUSUAL APPEARANCES

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ABSTRACT

Introduction: Tuberculosis is a major health problem in developing countries. Abdominal tuberculosis is not an uncommon manifestation of extra pulmonary tuberculosis. Recognition of its usual and unusual findings is important for diagnosis of the disease.

Material and Methods*:* This retrospective study involved 150 abdominal tuberculosis patients over a period of 5 years in rural & urban population of Nashik district in Maharashtra. Abdominal ultrasound using Siemens (Accuson X500) and Philips HD 11 with convex & linear probes was done to find out the intestinal and extraintestinal disease involvement and appearances.

Results: Abdominal tuberculosis was found to be more common in rural population and had a slight female predominance. In extraintestinal involvement; ascites was found in 44% cases, peritoneal thickening was found in 15 % cases, tubercles were found in 5% cases and thick swollen mesentery in 7% cases. Lymphadenopathy was seen in 47% cases. In intestinal involvement, isolated bowel wall thickening (30%), bowel ulceration (3%), bowel lump with pseudo kidney appearance (11%), matting and clumping of bowel loops (16.5%) and complex bowel mass (8.5%) were seen. Some of the unusual patterns like "club sandwich appearance" (11%) and "multilayered sandwich appearance"(2%) were also seen.

Conclusion: Because of nonspecific symptoms abdominal Tuberculosis is mostly under diagnosed or misdiagnosed for chronic acidity, gastritis /colitis or chronic appendicitis. Knowledge of both usual and unusual findings is essential to diagnose abdominal tuberculosis. Hence abdominal ultrasound should be used as a primary cost effective screening modality for diagnosis which helps in management of abdominal tuberculosis.

Key words: Abdominal tuberculosis, ultrasonography, high resolution.

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INTRODUCTION

Tuberculosis is still a major health problem in developing countries. Abdominal TB can involve the gastrointestinal tract, peritoneum, lymph nodes or solid viscera and is the 6th most frequent site of extrapulmonary involvement constituting up to 12% of extrapulmonary TB and 1-3% of the total cases of tuberculosis.[1-3] Patients presents with one of three main types of disease, i.e. intestinal, peritoneal, or mesenteric lymph node involvement, though there is considerable overlap, and mesenteric lymphadenopathy has been documented in almost all patients irrespective of the predominant type of disease.[4] Disease is relatively common in young adults.[5] This study was undertaken to find out the usual and unusual appearances of tuberculosis on ultrasound.

MATERIAL & METHODS

This Retrospective study was conducted in Dr. Shivde's diagnostic centre. The period of the study was from 2010 to 2014. Informed consent of the patients was taken. Abdominal ultrasound of 150 tuberculosis patients was conducted in rural and

urban population of Nashik district in Maharashtra using Siemens (Accuson X500) and Philips HD 11 with convex & linear probes to find out the intestinal and extraintestinal disease involvement and appearances.

RESULTS

Out of 150 patients, 87 were females & 63 were males. Most of the patients (No=111) were from rural population. 23 patients were infected with HIV. Common ultrasound findings were ascitis, lymphadenopathy and bowel wall thickening.

Table: Ultrasound findings among patients

Ultrasound Findings	No. of patients	Percentage %
a) Extra-intestinal disease		
Ascitis	66	44
1.Free Ascitis	44	29
Fibrin strands present in free ascites	11	
Fine internal echoes and debris present in free ascites	7	
2.Loculated Ascitis	15	10
3.Loculised Ascitis at one site	7	5
Peritoneum / Mesentry	42	28
Peritoneal thickening	23	15
Peritoneal Tubercles	8	5
Thick swollen mesentry	11	7
Lymphadenopathy	71	47
1.Discrete	48	32
2.Matting (conglomerate) & large nodes	23	15
3.Cold abscesses	8	5
Hepatic involvement	16	10.6
Splenic involvement	8	5.3
b) Intestinal disease		
Bowel wall thickening	50	30
1.Strictures in terminal ileum IC junction and caecum +/- ascending colon	45	
2. Multiple Stricture were also seen in ileal loops	3	
3. Multiple Strictures of large bowel was seen in ascending / transverse colon	2	
Ulceration	5	3
Bowel lump with pseudokidney sign	17	11
Matting and clumping of bowel loops	25	16.5
Complex bowel mass	13	8.5

Hepatic involvement was seen in 16 cases, out of which, hepatomegaly was seen in 11cases and calcific foci/ healed granulomas were seen in 5 chronic cases. In cases with hepatomegaly, hepatic granuloma were seen in 3 cases, hepatic abscess in 2 patients and small hypoechoic / isoechoic lesions were seen in 3 HIV positive cases.

Splenic involvement was seen in 8 cases. Splenomegaly was seen in 5 cases and patients had multiple hypoechoic areas/ splenic abscesses which were seen more commonly in immune compromised patients (5 cases). Multiple calcific foci due to splenic granulomas were seen in 3 cases.

Mostly the disease appeared as combination of intra and extraintestinal disease. Some of the unusual patterns were seen which were due to combination of both intestinal and extraintestinal tuberculosis which were as follows:

Among the localized ascites, which was the least common, 17 cases presented with typical club sandwich appearance.

Unusual bowel wall thickening was seen as adhesion and layering of bowel loops on one another which appeared as multilayered sandwich appearance was seen in 3 cases.

Dilated bowel loops & increased gas shadows due to sub-acute or chronic bowel obstruction was seen in 5 cases.

Thickened swollen mesentery was seen in 11 patients, having appearance of radiating bowel loops of bowel and mesentery stranding out like spokes from root of mesentery in ascitic fluid known as “Stellate sign”.

DISCUSSION

Tuberculosis is still a major health problem in developing countries like India. In our study we found the disease to be having female predominance (58%) and to be more common in young adults (18-35 years). In studies done by Saaiq et al[6]on 233 patients and in a study done by Kishore et al[7], similarly they found that disease was slightly more common in females. This may be explained by a fact that Indian rural and suburban females especially of poor socioeconomic class are most malnourished in the family.

Disease was more common in rural population and among HIV patients.

Ascites, Lymphadenopathy and bowel wall thickening were common findings seen in our study.

Abdominal tuberculosis was distributed in 2 categories: *intestinal* and *extra intestinal.*

Extra intestinal disease comprises of involvement of peritoneal cavity, peritoneum, mesentery, lymphnodes, liver and spleen.

Peritoneal cavity involvement: Ascites was seen in 30 % of cases in a study done by Jain et al[4] and in 46% in a study done by Kedar et al[8]. In our study, ascites was seen in 44 % of cases. It was seen as

Free ascitis which was commonest appearance (44 cases) (figure 1), followed by loculated ascites (15 cases), i.e. encysted fluid collections with septae (figure 2) and Inter bowel fluid or localized ascites (7 cases) (figure 3) which was the least common form. Similar findings were observed by Kedar et al[8] which showed free type of ascites as the commonest, followed by loculated and localised type as the least common.

Unusual findings were observed in some patients as fibrin strands/ septae in 11 cases and fine internal echoes and debris in ascitic fluid in 7 cases.

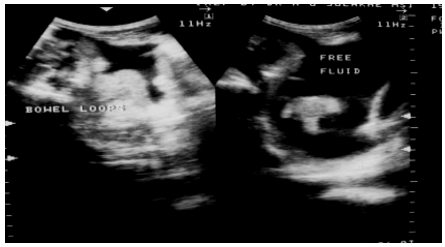

Fig 1: Free ascites with clear fluid

Fig 2: Loculated ascitis i.e. encysted fluid collections with septae

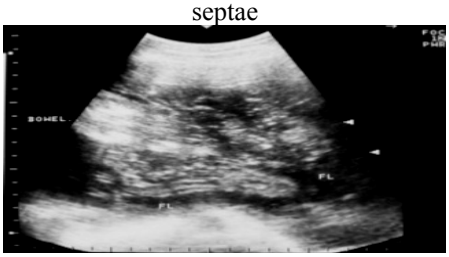

Fig 3: Inter bowel fluid or Loculised Ascitis: Thin film of fluid collection between bowel loops & interloops, (loculised or focal ascitis)

Fig 4: Ascitis with debris

Tuberculous peritonitiswas seen as well-defined collection of fluid with thick internal echoes, thin internal strands & floating echoes. Aspiration showed thick fluid & confirmed.

Fig 5: Tuberculous peritonitis

1. ***Involvement of peritoneum/ mesentery*** was seen in 28% cases, in which mesenteric thickening was seen in 8 % cases while peritoneal thickening was seen in 15% cases and peritoneal nodules/ granulomas/ tubercles which were least common were seen in 5 % cases. Kedar et al[8] found peritoneal thickening in 14 % cases and peritoneal nodules/ tubercles in 3% cases.

Fig 6 a.: Peritoneal thickening was seen as an irregular echogenic sheet like thickening along the peritoneal surface. b. Peritoneal thickening best seen with ascites

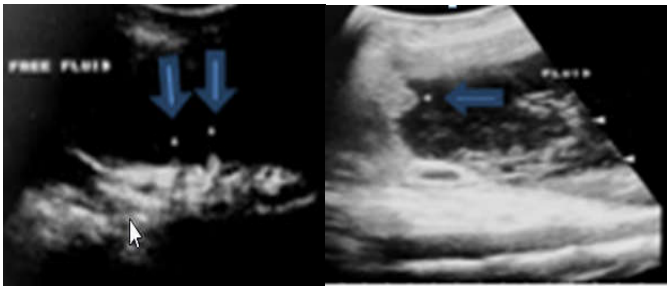

Fig 7:Peritoneal nodules (Granulomas), seen as small echogenic nodules on surface deposits along peritoneal surfaces

Thick swollen mesentry causing fixing of bowel loops & radiating bowel from mesentery in ascitic fluid mimics like radiating spokes giving appearance of ***"stellate sign"***or sometimes seen as ***"step ladder pattern".*** Kedar et al[8] found this pattern in 6.6% caseswhich was similar to our findings which showed 7% cases showing this unusual pattern.

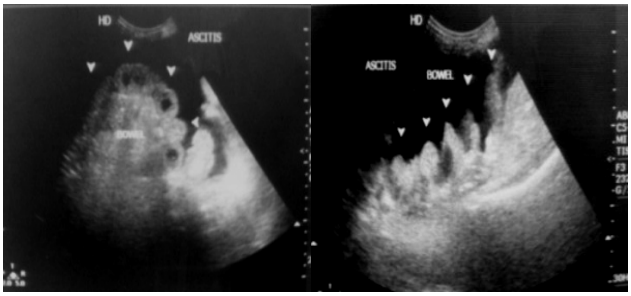

Fig 8: (a,b) Thick Swollen mesentry (stellate sign) Fig 9: Thickened mesentry with bowel lump & fixed bowel loops

1. Lymphadenopathy was a common finding in our study. According to Hopwell et al[5] lymphadenopathy is the commonest manifestation of abdominal tuberculosis and may occur in upto 55 % of patients. Similarly in our study 52 % cases presented with lymphadenopathy.Common sites were mesenteric in midline and in right paraumbilical region. Other sites found in our study were–portahepatis/caeliac, and peripancreatic region. The lymph nodes were either discrete or seen as mated conglomerate. In our study, lymphnodes were seen as discrete in 32 % cases, matted/ conglomerated in 15 % cases and as cold abscess in 5 % cases. Kedar et al[8] found total 37% cases with lymphadenopathy including cold abscesses.

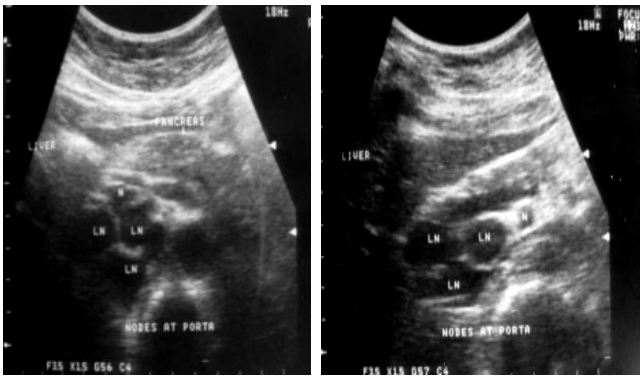

Fig 10: Enlarged Lymphnodes at portahepatis

Uncommonly they can appear as adherent to bowel loops due to periadenitis which causes inflammation of the lymphnode. In 1 case a large lymphnode at portahepatis was seen as invadingporta region and compressing on portal vein causing portal HT and cavernoma.

Fig 11: Large lymphnode at portaHepatis – invading porta region and compressing on portal vein causing portal HT and cavernoma in Drug-Resistant T.B

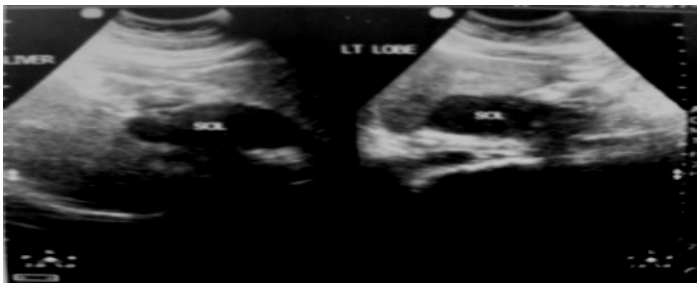

Fig 12: Lymphnodes-Large lymphnode with central necrotic area causing cold abscess.

2. Hepatic involvement was seen ashepatomegaly with liver lesions.Calcific granulomas were most commonly seen in chronic cases. Small granulomas or abscess were commonly seen in HIV positive patients. Agrawal et al[9] found abscesses in 11% HIV positive patients with abdominal TB. We found abscesses in 2 patients (8 %) HIV positive patients with abdominal TB.

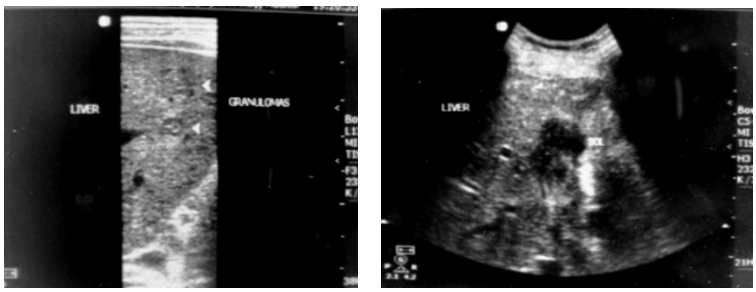

Fig 13 a: liver granulomas. Fig b: liver abscess.

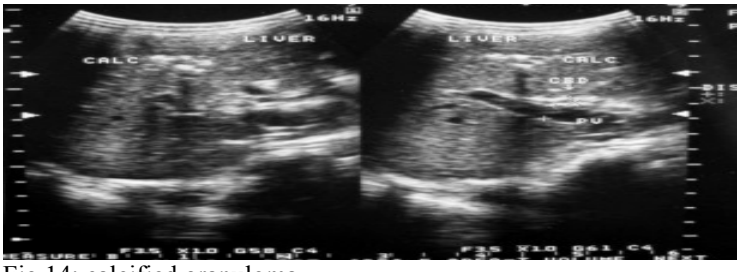

Fig 14: calcified granuloma

2. Splenic involvement was seen as multiple small hypoechoeic areas with central echogenic shadow due to splenic granulomas or tiny abscess, commonly seen in HIV positive patients. In a study done by Agrawal et al[9], 25 % of patients of abdominal TB with HIV had splenic hypoechoic areas/ abscesses. Splenic enlargement was seen in 27.8% (9). We studied 25 HIV positive patients having abdominal TB, 5 patients (20%) had splenic hypoechoic areas/ abscesses. Splenomegaly was seen in 5 patients (20%) in our study.

Presence of splenic abscesses in patient having tuberculosis raises high suspicion of concomitant HIV infection(9).

Multiple calcific foci due to calcified splenic granulomas can be seen in chronic cases.

Fig 13: splenic abscesses. Fig 14: splenic granulomas.

Intestinal disease: According to Leder and Low et al[10]. Involvement of intestinal tract is seen in 65 to 78%[(10)].In our study abdominal TB involved intestines in 73.3 % cases.

Bowel wall thickening as an isolated finding was seen in 30% cases in our study which most commonly involved terminal ileum,ileocaecal region and ascending colon where concentric /thickening (between 8 to 25 mm) was seen. Small bowel involvement was not much common in our study, isolated ileal involvement is seen in 3 patients. Long segment stricture of ascending colon and ileocecal region was common and was seen as "String sign" on USG. These findings were confirmed in some cases with barium studies which showed similar string sign. Sub Hepatic bowel mass with echogenic central lumen which produces "pseudo kidney appearance" can be seen. Bowel ulceration which can be superficial or deep can be seen unusually. It was seen in 3% cases of our study compared to 8.8% in a study by Kedar et al[8]. Rest of cases were due to combination with extraintestinal disease.

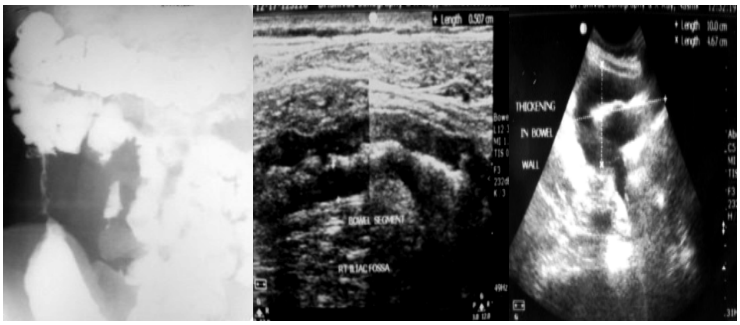

Fig 15: String sign on USG compared with barium study. Fig 16: Sub-Hepatic Bowel Masses with pseudo kidney appearance

Combination of Intestinal and extra intestinal TB :can be seen which appears as adhesion and clumping of bowel loops seen as fixation of bowel loops due to combined findings due to thickened or inflamed mesentery, tuberculous peritonitis, shown as bowel mass of Tubular structure with linear strands.

Fig17: Adhesions & clumping

Bowel mass with Multilayer sandwich appearance (seen in 3 cases) which is due to adhered bowel loops interposed on one-another and Club sandwich appearance(seen in 5 cases) due to localized fluid between layers of bowel are also uncommon manifestations of combined intestinal and extraintestinal tuberculous disease.

Large complex bowel mass (seen in 13 cases) due to fixed fibrotic type of TB peritonitis formed due to adherent bowel loops, lymph nodes and mesentery with exudative fluid in between can be seen. There can be cold abscess or burst abscess in center giving rise to a large mixed echoic complex

mass in abdomen.Dilated bowel loops & increased gas shadows due to sub-acute or chronic bowel obstructioncan be seen which was seen in 5 cases of our study.

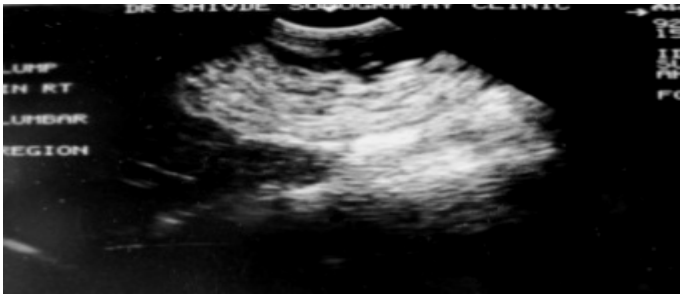

Fig 18: Bowel lumps due to adhesions Fig 19: Complex bowel mass. Fig 20:Dilated bowel loops & increased gas shadows due to sub-acute or chronic bowel obstruction.

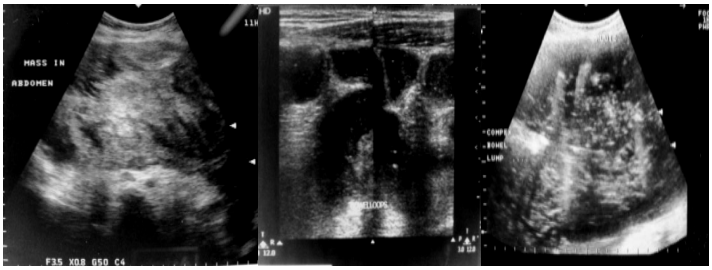

Fig 21:Thickening with adhesions and layering of bowel loops on one another giving rise to multilayer sandwich appearance.

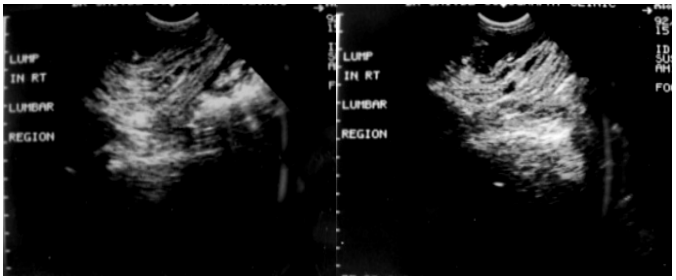

Fig22: Club sandwich appearance because of localized fluid between layers of bowel [Inter bowel fluid or exudates]

CONCLUSION

Because of nonspecific symptoms abdominal Tuberculosis is mostly underdiagnosed or mis diagnosed for chronic acidity, gastritis /colitis or chronic appendicitis. Knowledge of both usual and unusual findings is essential to diagnose abdominal tuberculosis. Hence abdominal ultrasound should be used as a primary cost effective screening modality for diagnosis which helps in management of abdominal tuberculosis

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Conflicts of Interest: None Funding: None

Citation: Shivde R, Patel K, Mittal S, Prasla S. Ultrasound findings in Abdominal Tuberculosis: Usual And Unusual Appearances. National Journal of Medical and Allied Sciences 2016; 5(2):64-69