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COMPUTERISED TOMOGRAPHY IN THE DIAGNOSIS OF ABDOMINAL TUBERCULOSIS

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KEYWORDS :

Introduction:
Tuberculosis continues to be a major health problem in the developing world even to this day. While the developed world was close to eradication of this disease, certain factors lead to the reappearance of this dreadful disease in the western world. Issues like immigration from endemic areas, increased prevalence of immunosuppression, and emer-gence of multidrug-resistant and extensively drug-resistant strains of Mycobacterium tu-berculosis have led to the realisation that tuberculosis continues to be a healthcare chal-lenge in the developed world [1-6]. Extrapul monary disease occurs in 27-49% of all report-ed cases of tuberculosis in developed countries, and the abdomen is the most common ex-tra thoracic site of infection.[2,3,7] Concurrent active pulmonary involvement occurred in 36-47% of patients with abdominal disease.[1,8,9] The genesis of abdominal tuberculosis finds its origin from various sources a) reactivation of a latent focus in abdomen which was formed during the primary infection b) haematogenous or lymphatic spread from current active tuberculosis c) ingestion of the pathogen, or d) by direct extension from adjacent in-volved tissues. [10] Abdominal tuberculosis can be asymptomatic or cause non-specific symptoms such as weight loss, abdominal pain, fever, abdominal distension, vomiting, diar-rhoea, and anorexia.[8] Definitive diagnosis can only be established by showing caseating granulomas, positive acid-fast bacillus, culture for M. tuberculosis, or a positive polymerase chain reaction. There usually is a delay in diagnosis arising both, from the patient and the physician leading to significant morbidity and mortality. [9,11,12,13]

Early administration of chemotherapy in abdominal tuberculosis is important as it can achieve satisfactory results. [14] Positive response to therapy, itself helps in diagnosis [15] and prevents the development of complications, which may require surgery. The diagnostic trajectory in a suspected case of ATB starts with a chest radiograph as abdominal involvement complicates pulmonary tuberculosis in 6% - 38% of patients. [16] Plain radiograph of the abdomen is next in line which may show numerous non-specific findings like ascites, gaseous distension of the intestinal loops, right iliac fossa mass, signs of perforation, calcification and enlargement of the liver and spleen. Barium studies are a useful guide for gastrointestinal tract involvement but not for solid viscera.

Ultrasound (US) is a useful initial investigation. The whole abdomen, including the viscera, can be evaluated by US, and guided biopsies/fine needle aspirations obtained, which help in diag-nosis.

Computed tomography (CT) has been found to be very useful in abdominal tuberculosis. CT scan is reported to have higher sensitivity and accuracy than ultrasonography in detecting high-density ascites, caseous necrosis of lymph nodes (rim enhancing lesions with attenuated centre) and mesenteric involvement, as bowel gas may prevent visualisation of the mesentery on US.
The aim of the present study was to study the usefulness of standard contrast enhanced ab-dominal CT scan in the diagnosis of ATB.

Methods and Material: We included 44 patients in this study who were suspected with ATB over a period of three years, from 2013-2016. All the patients underwent thorough assessment in form of detailed history, general physical and systemic examination, analysis of blood and ascitic fluid, ra-dio-imaging, and when indicated diagnostic laparoscopy.

Results: The mean age in our study group was 31.8 years. Thirty three of our patients were male while the rest eleven were males, with a female to male ratio of 3:1. Most of the patients (72%) belonged to the age group of 20-40 years. Most common symptoms were fever (60.9%), ab-dominal distension (60.9%), weight loss (58.7%), abdominal pain (50%) and anorexia (50%). Other symptoms were generalised weakness (28.3%), nausea (17.4%), night sweating (13%), cough (13%), constipation (8.7%), breathlessness (4.3%), cervical swelling (4.3%), bleeding P/R (4.3%), low backache (2.2%), and hemoptysis (2.2%). The commonest signs were abdominal tenderness, followed by abdominal distension and occasionally palpable lymphadenopathy in inguinal or cervi-cal regions.

Chest radiograph showed signs of active or healed tuberculosis in 28% patients.

The commonest findings on CT were ascitis (72.7%), mesenteric lymphadenopathy (40.9%), omental thickening (36.4%) and retroperitoneal lymphadenopathy (13.4%). Other findings are listed in table 1.

CT Findings in studied patients [n=44]

CT Findings	No. of Patients (n)	Percentage (%)
Ascitis	32	72.7
Mesentric Lymphadenopathy	18	40.9
Omental Thickening	16	36.4
Retroperitoneal Lymphadenopathy	14	30.4
Bowel Wall Thickening	9	20.5
Parietal Peritoneum Thickening	8	18.2
Visceral Peritoneum Thickening	5	11.4
Hepatomegaly	5	11.4
Omental Stranding	4	9.1
Loculated Collection	3	6.8

Tuboavarian Mass	3	6.8
Mass	3	6.8
Nodular Peritoneal Deposits	2	4.5
Small Gut Obstruction	2	4.5
Mesenteric Thickening	2	4.5
Abdominal Mass	1	2.3
Matted Gut	1	2.3

Peritoneal tuberculosis: Peritoneal involvement with tuberculosis was seen in nearly 100% of pa-tients. The most common presentation was that of wet ascitic type in 32 patients. Dry or fibrotic type was less common and seen in 12 patients. The various presentations of peritoneal disease can be tabulated as under:

Ascitis	**32**	**72.7**
Omental Thickening	16	36.4
Parietal Peritoneum Thickening	8	18.2
Visceral Peritoneum Thickening	5	11.4
Omental Stranding	4	9.1
Loculated Collection	3	6.8
Nodular Peritoneal Deposits	2	4.5
Mesentric Thickening	2	4.5
Abdominal Mass	1	2.3

Ascitis: Ascitis is by far the commonest finding on CT abdomen being present in 32 (72.7%) pa-tients. Ascitis was mild in 20.5%, moderate ascitis in 29.5%, and massive ascitis in 15.9%. The categorisation into mild, moderate and massive was done by an experienced radiologist. Furthermore ascitis was septate in 6.8%, while as in the rest it was generalised. In 27.3% (19) of cases there was no ascitis.

Ascitis	No Ascitis	12	27.3
	Mild Ascitis	9	20.5
	Moderate Ascitis	13	29.5
	Massive Ascitis	7	15.9
	Septate Ascitis	3	6.8

Mesenteric involvement: Mesenteric changes ranged from mild involvement in the form of mini-mal linear stranding, thickened and crumpled omentum with vascular bundles, increase in mesenteric fat density, to more extensive involvement resulting in diffuse infiltration, clumping together of bowel loops, tethering, forming an abdominal mass.

Lymphadenopathy: This was the second commonest finding on CT in ATB. Mesenteric lymphade-nopathy was seen in 18 (40.9%) patients while retroperitoneal lymphadenopathy was seen in 14 (30.4%) patients. The enlarged nodes were between 0.4 and 5 cm in size. The most common group of lymph nodes involved were mesenteric, followed by peripancreatic/periportal and para aortic nodes. In about 48% of patients more than one group was involved.

Intestinal tuberculosis: The tubercular involvement of gut was seen in 13 patients. The affliction of gut was global in 1 (2.3%), isolated small gut in 5 patients 11.4%, isolated large gut in 1 (2.3%). In small gut, multiple segments of concentric thickening are particularly seen in tuberculosis usually with proximal dilatation. The ileocaecal junction was the commonest site of involvement with 9 patients. The extensive involvement of ileocecal region was marked by thickening, heterogeneous enhancement, pulled up cecum, thickened and gaping ileocecal valve, pericecal fat stranding. The manifestations of intestinal disease were in the form of bowel wall thickening in 9, acute or sub-acute small gut obstruction in 2 (4.5%), gut mass (2.3%)and rarely ulcer formation.

Solid organ involvement: In few patients the tuberculosis of abdomen concomitantly involved the solid organs in abdomen and pelvis. Nine of our patients had such visceral involvement with five showing liver involvement and three showed a tubo-ovarian mass. In addition one patient showed a mass lesion in gallbladder and other in hepatic flexure. Hepatic involvement was marked by small foci of calcification, fibrotic nodules, occasionally large nodular fibrotic areas with hepato-megaly. There as a close association with periportal and peripancreatic lymphadenopathy.

Discussion: Many studies have been conducted on the utility of CT in abdominal tuberculosis. In most of them, features of peritoneal and mesenteric disease predominate being present in almost 80-100% patients. [17,18]. The presentation could be divided into wet, dry and fibrous on the basis of features like ascitis, fibrous stranding, omental thickening, nodules and fat stranding, wet being the most common (50-90%)[17,18, 19, 20,21]. This closely corroborates with the results of our study wherein we observed peritoneal involvement in nearly 100% patients with ascitis (wet) in 72.7%.

Another commoner type of involvement was the lymph nodes in the range of 40-60% [17,18,19,21]. The involvement of lymph nodes, as described by Tariq Sinan et. al (BMC Medical Imaging 2002, 2:3) could be listed as follows

Distribution of Lymph nodes :

- Diffuse (Peripancreatic ± Mesentric ± paraaortic) (48%)
- Mesentric: (26%)
- Peripancreatic/Portal: (13%)
- Para aortic: (13%)

This again is in close agreement with our findings of lymphad enopathy; mesenteric (40.9%), retroperitoneal (30.4%) or diffuse (17%).

Next common finding on Abdominal CT in ATB is the involvement of GIT between 35-70% in the form of strictures, bowel thickening, matted bowel, and rarely perforation. The distribution of in-testinal tuberculosis can be described in the following table [18]

Ileocecal and distal ileum: (50%)

- Small bowel: (36.8%)
- Large bowel: (10.5%)
- Stomach (ulcer): (5.2%)

In present study we found very similar figures for involvement of gut in ATB.

Other uncommon findings on CT scan in various studies are involvement of hepatobiliary system, spleen, pancreas, ureters, kidneys, female and male genital organs, and adrenal glands. [17][21]

These findings closely corroborate with those in our study as listed above tables.

Conclusion: The findings witnessed from the present study suggest that a contrast enhanced CT abdomen is a good modality of investigation in suspected cases of abdominal tuberculosis with excellent diagnostic accuracy. Given the relatively low cost and readily availability of this investigation, it can form an important tool in the early diagnosis of abdominal tuberculosis and help reduce or minimize the delay in diagnosis of ATB.

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