



COMPUTERISED TOMOGRAPHY VERSUS DIAGNOSTIC LAPAROSCOPY IN DIAGNOSIS OF ABDOMINAL TUBERCULOSIS

Surgery

Tariq A Mir*

*Corresponding Author

Muneer A Wani

Mir Nadeem

Ajaz N Koul

ABSTRACT

Background: Abdominal tuberculosis presents with vague symptoms and marked by a delay in establishing a diagnosis. Present study was done to compare the utility of Computerised Tomography abdomen with diagnostic laparoscopy in the diagnostic algorithm of Abdominal Tuberculosis.

Method: This study enrolled 25 patients who underwent a preoperative Computerised Tomography followed by an operative procedure in the form of a diagnostic laparoscopy or explorative laparotomy. In these patients findings observed on the preoperative Computerised Tomography were compared with intra-operative findings and tabulated.

Results: The commonest findings on Computerised Tomography were ascitis (72.7%), mesenteric lymphadenopathy (40.9%), omental thickening (36.4%) and retroperitoneal lymphadenopathy (13.4%). Other findings observed on Computerised Tomography abdomen were omental thickening, bowel wall thickening, omental stranding, loculated ascitis, tubo-ovarian mass and matted gut.

In the patients who underwent diagnostic laparoscopy/laparotomy the commonest findings observed was presence of tubercles over peritoneal surface. Tubercles over gut and peritoneum were present in 72% and on omentum in 32%. Other common findings were adhesions (56%), ascitis (52%), cocoon abdomen was present in 28%. Other findings were omental thickening, visceral and parietal peritoneum thickening, loculated collection, ileo-caecal mass, gall-bladder mass, mesenteric lymphadenopathy and ileal strictures.

Discussion: Computerised Tomography was found to have a better sensitivity for omental thickening, retro peritoneal lymphadenopathy, bowel wall thickening, omental stranding and mesenteric thickening. Diagnostic laparoscopy had a better sensitivity for tubercles, particularly those less than 5mm, adhesions, matting of gut (cocoon abdomen) and ileal strictures. These two diagnostic modalities had nearly equal sensitivity towards findings like collection, loculated or generalised and peritoneal thickening. Moreover, the retrieval of tissue for histopathological examination is possible only with laparoscopy/laparotomy, making it a more accurate diagnostic investigation.

Conclusion: Computerised Tomography has a better sensitivity for omental thickening, retro peritoneal lymphadenopathy, bowel wall thickening, omental stranding and mesenteric thickening. Diagnostic laparoscopy was found to have better sensitivity for detection of tubercles, particularly those less than 5mm, adhesions, matting of gut (cocoon abdomen) and ileal strictures while these findings were easily picked up on laparoscopy. Both these diagnostic modalities had nearly equal sensitivity towards findings like intra-abdominal collection, loculated or generalised and peritoneal thickening.

KEYWORDS

Introduction:

Living in the 21st century with advanced healthcare and medical science, Tuberculosis continues to be a major health problem in the developing world. With issues like immigration from endemic areas, increased prevalence of immunosuppression, and emergence of multidrug- and extensively drug-resistant strains of Mycobacterium tuberculosis; tuberculosis continues to be a healthcare challenge in the developed world [1-6]. Extrapulmonary disease occurs in 27-49% of all reported cases of tuberculosis in developed countries, and the abdomen is the most common extra thoracic site of infection.[2,3,7] The disease involves multiple different sites in the abdomen in 27% of patients with abdominal tuberculosis and concurrent active pulmonary involvement occurred in 36-47% of patients with abdominal disease.[1,8,9] With HIV, the risks of developing tuberculosis increase and the disease is of multi-organ nature in more likelihood. [3,7] The sources of genesis for abdominal tuberculosis are multiple. One common occurrence is reactivation of a latent focus in abdomen which was formed during the primary infection. Other possible sources are haematogenous or lymphatic spread from current active tuberculosis, ingestion of the pathogen, or by direct extension from adjacent involved tissues. [10] Abdominal tuberculosis can be asymptomatic or cause non-specific symptoms such as weight loss, abdominal pain, fever, abdominal distension, vomiting, diarrhoea, and anorexia.[8] Early diagnosis of abdominal tuberculosis is challenging owing to its varied clinical manifestations and the difficulty in obtaining specimens for tissue culture wherever attempted. There are numerous modalities of diagnosis, both definitive and supportive. 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]

The purpose of this study is to compare the findings in ATB on CT and

diagnostic laparoscopy viz a viz the diagnosis and management of ATB.

Materials and Method: This study was undertaken in the Department of General and Minimal Invasive Surgery and Infectious Disease Unit of General Medicine SKIMS Soura, Srinagar, Jammu and Kashmir, India. The study was retrospective and prospective in design spanning a period of four years (2012-2016). All the patients underwent thorough assessment in form of detailed history, general physical and systemic examination, analysis of blood and ascitic fluid, radio-imaging, and when indicated diagnostic laparoscopy/laparotomy.

Results: We registered 46 patients with abdominal tuberculosis out of which 44 underwent a CT scan and 25 of them underwent operative procedure. (Diagnostic laparoscopy in 18, explorative laparotomy in five). Thirty four were female while the rest were males. The female to male ratio in our study was 2.1:1. Mean age of patients in our study was 31.8 years. Most of the patients (71.7%) belonged to the age group of 20-40 years. Most of our cases (78.3%) belonged to rural areas. More than half (58.7%) of our cases were literate while 41.3% were illiterate. Family history of TB was presented in 15.2% and previous history of TB was present in 4.3%. One of our patients (2.2%) was having HIV infection and one was on immunosuppression drugs for rheumatoid arthritis.

Computerised Tomography was done in 44 patients out of the 46 cases. The commonest findings on CT were ascitis(72.7%), mesenteric lymphadenopathy (40.9%), omental thickening (36.4%) and retroperitoneal lymphadenopathy (13.4%).(Figure 1) Other findings on CT in ATB are tabulated as in Table 1:

Table 1: CT Findings in studied patients [n=44]

CT Findings	No. of Patients (n)	Percentage (%)
Ascitis	32	72.7

Mesenteric 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
Tuboovarian Mass	3	6.8
Nodular Peritoneal Deposits	2	4.5
Small Gut Obstruction	2	4.5
Mesenteric Thickening	2	4.5
Abdominal Mass	2	4.6
Matted Gut	1	2.3

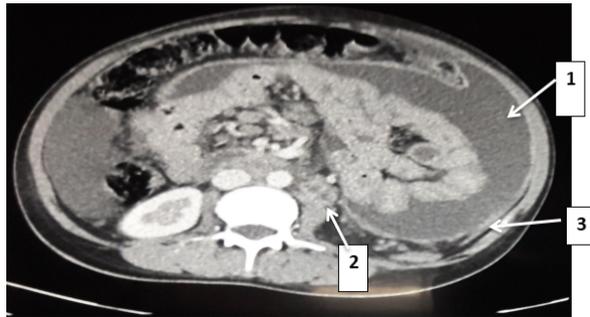


Figure 1: CT findings. 1: loculated collection, 2: Enlarged Retroperitoneal Lymph Node with central necrosis, 3: wall loculated collection

Diagnostic laparoscopy was performed in 20 (43.5%) patients in two of which it had to be converted to laparotomy because of extensive adhesions. Five of our patients (1.1%) were diagnosed to have abdominal TB on explorative laparotomy performed for some other reason. The commonest intraoperative finding was presence of tubercles. (Figure 2) Tubercles over gut and peritoneum were present in 72% of the cases, these tubercles were multiple in number, white-yellowish in colour, uniformly sized (4-5mm) and diffusely distributed. Other common findings were adhesions (56%), ascitis (52%), tubercles on omentum (32%) and cocoon abdomen was present in 28%. Intraoperative findings are tabulated as in Table 2:

Table 2: Intra-operative Findings in studied patients [n=25]

Findings	No. of Patients (n)	Percentage (%)
Tubercles/Nodules Over Gut And Peritoneum	18	72
Adhesions	14	56
Ascitis	13	52
Tubercles On Omentum	8	32
Cocoon Abdomen	7	28
Omental Thickening	2	8
Visceral and Parietal Peritoneum Thickening	2	8
Loculated Collection	2	8
Ileo-caecal mass	1	4
GB mass	1	4
Mesenteric Lymphadenopathy	1	4
Ileal Strictures	1	4

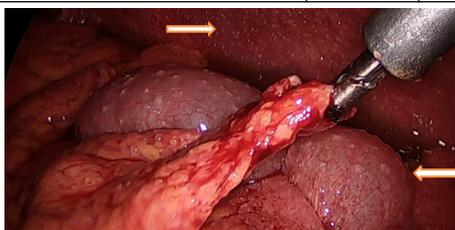


Figure 2: Laparoscopic Picture Showing Tubercles Over Perietal and Visceral Peritoneum

Discussion:

In the 25 patients in whom both CT and diagnostic laparoscopy/laparotomy were done, the intra operative findings were compared with CT findings and it was observed that Computerised Tomography and Diagnostic Laparoscopy/Laparotomy are complementary to each other in diagnosing abdominal tuberculosis. While certain findings are easily missed on the CT scan, they were identified on Diagnostic Laparoscopy/Laparotomy e.g tubercles. On Diagnostic laparoscopy tubercles over peritoneum were found in 21 patients, adhesions in 14, cocoon abdomen/matted gut in 7 and ileal stricture in one patient, however these findings were missed in the preoperative CT scan in all of these patients. Both these modalities showed equal efficiency in detecting ascitis (13), loculated collection (2) and peritoneal thickening (2). CT detected omental thickening in 10 cases, however on diagnostic laparoscopy omental thickening was detected in only two out of these patients. Mesenteric lymphadenopathy was found only in one patient intraoperatively while 11 patients showed the finding on the CT scan. CT detected retroperitoneal lymphadenopathy in five patients, bowel wall thickening in five, omental stranding in three, mesenteric thickening in two patients, however these findings were missed by diagnostic laparoscopy/laparotomy in all these cases as show in Table 3 below:

Table 3: Comparison of CT and Laparoscopy/Laparotomy Observations

Findings	Number of cases having Finding on laparoscopy	Number of cases having finding on CT	Number of cases in which Laparoscopy detected finding but CT missed	Number of cases in which CT detected finding but laparoscopy missed
Tubercles over peritoneum	21	0	21	0
Adhesions	14	0	14	0
Cocoon abdomen/matted gut	7	0	7	0
Ileal strictures	1	0	1	0
Ascitis	13	13	0	0
Loculated collection	2	2	0	0
Peritoneal thickening	2	2	0	0
Omental thickening	2	10	0	8
Mesenteric lymphadenopathy	1	11	0	10
Retroperitoneal lymphadenopathy	0	5	0	5
Bowel wall thickening	0	5	0	5
Omental stranding	0	3	0	3
Mesenteric thickening	0	2	0	2

In our knowledge there is no single study comparing CT with diagnostic laparoscopy in the diagnostic work up of abdominal tuberculosis, though many workers have studied these two diagnostic modalities in isolation.

In majority of studies, features of peritoneal and mesenteric disease predominate being present in almost 80-100% patients. [14, 15] 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%)[15, 14, 16, 17].

Another commoner type of involvement was the lymph nodes in the range of 40-60% [14,15, 16]. 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 ± Mesenteric ± paraaortic) (48%)
- Mesenteric: (26%)
- Peripancreatic/Portal: (13%)
- Para aortic: (13%)

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 intestinal tuberculosis can be described in the following table [15]

Ileocecal and distal ileum: (50%)

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

The commonest findings on CT are ascitis (72.7%), mesenteric lymphadenopathy (40.9%), omental thickening (36.4%) and retroperitoneal lymphadenopathy (13.4%)[22]. 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. [14]

On the other side of the story, multiple studies have been conducted on the utility of laparoscopy in diagnosis of ATB and found the mere physical appearance to be of diagnostic importance in 78-82% [18, 10, 19, 20, 21]. In no particular order, the various physical findings on laparoscopy were ascitis, presence of milliary tubercles (1-3mm) on visceral and peritoneal peritoneum, fibroadhesive bands, omental thickening and hyperemia. [18,19,20, 21]. A long fibrous band extending from the parietal to the visceral peritoneum termed stalactitis a rarer finding but is characteristic of abdominal tuberculosis. [19].

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

Conclusion:

From the statistics given, we conclude that CT has a better sensitivity for omental thickening, retro peritoneal lymphadenopathy, bowel wall thickening, omental stranding and mesenteric thickening. These findings were missed on diagnostic laparoscopy in a good proportion of patients (see table above). Diagnostic laparoscopy had a better sensitivity for tubercles, particularly those less than 5mm, adhesions, matting of gut (cocoon abdomen) and ileal strictures while these findings were easily picked up on laparoscopy. These two diagnostic modalities had nearly equal sensitivity towards findings like collection, loculated or generalised and peritoneal thickening. Moreover the gold standard for definitive diagnosis of ATB to date remains the histopathological examination of retrieved tissue specimen which is possible only with laparoscopy/ laparotomy

References

1. Singhal A, Gulati A, Frizell R, et al. Abdominal tuberculosis in Bradford, UK: 1992e2002. *Eur J Gastroenterol Hepatol* 2005;17:967e71.
2. Forssbohm M, Zwahlen M, Loddenkemper R, et al. Demographic characteristics of patients with extrapulmonary tuberculosis in Germany. *Eur Respir J* 2008;31:99e105.
3. Kruijshaar ME, Abubakar I. Increase in extrapulmonary tuberculosis in England and Wales 1999e2006. *Thorax* 2009;64:1090e5.
4. LoBue PA, Enarson DA, Thoen TC. Tuberculosis in humans and its epidemiology, diagnosis and treatment in the United States. *Int J Tuberc Lung Dis* 2010;14:1226e32.
5. Walls T, Shingadia D. The epidemiology of tuberculosis in Europe. *Arch Dis Child* 2007;92:726e9.
6. Kodmon C, Hollo V, Huitric E, et al. Multidrug- and extensively drug resistant tuberculosis: a persistent problem in the European Union European Union and European Economic Area. *Euro Surveill* 2010;15. pii:19519.
7. Kipp AM, Stout JE, Hamilton CD, et al. Extrapulmonary tuberculosis, human immunodeficiency virus, and foreign birth in North Carolina, 1993e2006. *BMC Public Health* 2008;8:107.
8. Ramesh J, Banait GS, Ormerod LP. Abdominal tuberculosis in a district general hospital: a retrospective review of 86 cases. *QJM* 2008;101:189e95. 9. Tan KK, Chen K, Sim R. The spectrum of abdominal tuberculosis in a developed country: a single institution's experience over 7 years. *J Gastrointest Surg* 2009;13:142e7.
10. Leder RA, Low VH. Tuberculosis of the abdomen. *Radiol Clin North Am* 1995;33:691e705.
11. Fee MJ, Oo MM, Gabayan AE, et al. Abdominal tuberculosis in patients infected with the human immunodeficiency virus. *Clin Infect Dis* 1995;20:938e44.
12. Akgun Y. Intestinal and peritoneal tuberculosis: changing trends over 10 years and a review of 80 patients. *Can J Surg* 2005;48:131e6.
13. Chou CH, Ho MW, Ho CM, et al. Abdominal tuberculosis in adult: 10-year experience in a teaching hospital in central Taiwan. *J Microbiol Immunol Infect* 2010;43:395e400.
14. Rocha EL, Pedrassa BC, Bormann RL, Kierszenbaum ML, Torres LR, D'Ippolito G. Abdominal tuberculosis: a radiological review with emphasis on computed tomography and magnetic resonance imaging findings. *Radiol Bras*. 2015 Mai/Jun;48(3):181-191.
15. Tariq Sinan, Mehraj Sheikh, Salwa Ramadan, Sukhpal Sahwney and Abdulla Behbehani, CT features in abdominal tuberculosis: 20 years experience. *BMC Medical Imaging* 2002, 2:3
16. Satish K Bhargava, Pardeep Kumar, Sumeet Bhargava. Role of Multi Slice CT in Abdominal Tuberculosis. *JIMSA* January-March 2013 Vol. 26 No. 1
17. W-K. Lee a,*, F. Van Tonder a, C.J. Tartaglia a, C. Dagia a, R.L. Cazzato b, V.A. Duddalwar c, S.D. Chang d. CT appearances of abdominal tuberculosis. *Clinical Radiology* 67 (2012) 596e604
18. Apaydin B, Pasoy M, Bilir M, Zengin K, Saribeyoglu K, Taskin M. Value of diagnostic laparoscopy in tuberculous peritonitis. *Eur J Surg* 1999;165:158-63.
19. Faizollah Safarpour, Menochehr Aghajanzade, Mohammad Reza R. Kohsari, Saba Hoda, Ali Sarshad, Delaram Safarpour. Role of Laparoscopy in the Diagnosis of Abdominal Tuberculosis. *The Saudi Journal of Gastroenterology*. Volume 13, Number 3 Jumada AlThany 1428 July 2007
20. Arshad M. Malik. Diagnostic Laparoscopy for Abdominal Tuberculosis: A Promising Tool for Diagnosis.
21. Tariq A. Mir, Ajaz N. Koul, Muneer A. Wani, Ajaz A. Malik, Waseem Qadir, Gh H. Mir Demographic And Clinical Profile Of Abdominal Tuberculosis: A Study From A

- Developing Region. *International Journal of Current Research in Life Sciences*. Vol. 06, No. 03, pp.xxxxx 2017
22. Tariq A. Mir, Mir Nadeem, Mir Waseem, Gh Hussain Mir, Muzaffar Mushtaq, Sajad Ahmad Bhat Computerised Tomography In The Diagnosis Of Abdominal Tuberculosis. *Global Journal for Research Analysis*. VOLUME-6, ISSUE-12, DECEMBER-2017 • ISSN No 2277 - 8160