

Original Research Article

Abdominal Tuberculosis: Clinical Presentation, Diagnosis, Outcome and Experience with 11 Cases

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Abstract

Tuberculosis is a common health problem. Abdominal tuberculosis constitutes about 2% of all tubercular cases and it's the sixth most common extrapulmonary tuberculosis. The aim of this study was to evaluate the clinical presentation, diagnosis and effective treatment of abdominal tuberculosis. This is a retrospective study including 11 patients (4males and 7 females), with clinical features of abdominal tuberculosis. They were divided according to the clinical presentation into two groups. The first group included patients presented as acute abdominal pain mainly due to bowel obstruction or as peritonitis and were prepared and treated by explorative laparotomy and definitive diagnosis of abdominal TB was made by tissue biopsy. The second group included patients with chronic symptoms. The results observed in this study were that abdominal pain was the commonest symptom followed by abdominal distention, anorexia, weight loss and fever. Tender right lower abdominal quadrant was found in 7 patients(63.6%) and right iliac fossa mass was found in 3 patients (27.3%). Explorative laparotomy was needed for 5 patients (45.5%) who presented as acute abdomen. Strictures were found in 3 patients (27.3%), adhesion in one patient (9.1%) and peritonitis caused by perforation in the terminal ileum was recorded in one patient. Ascitic fluid analysis for AFB stain and culture confirm the diagnosis of abdominal tuberculosis in patients who presented with chronic symptoms of tuberculosis. All patients showed good response to ATT therapy. No mortality or recurrence was recorded during ATT treatment or during follow up period. We concluded that abdominal tuberculosis is difficult to diagnose due to vague and non specific symptoms and signs such as abdominal pain, anorexia, weight loss and fever. High index of suspicion and clinical awareness is needed for definite diagnosis which depends on PCR or histopathology or AFB stain.

Key words: Extrapulmonary tuberculosis, intestinal tuberculosis, tuberculous peritonitis.

الخلاصة

إن مرض التدرن الرئوي هو مشكله صحية شائعة في الدول النامية من ضمنها العراق يشكل ٢% من كل حالات التدرن وهو سادس تدرن خارج الرئة ترتيباً. الغرض من الدراسة هو لتقييم التقديم السريري وطرق تشخيص المرض والعلاج الناجع للتدرن ألبطني . تمت دراسة رجعيه شملت ١١ مريض (٤ ذكور و ٧ إناث) الذين تظهر عليهم علامات سريرييه لمرض التدرن الرئوي تم التحري عنهم بصوره شامله وقسموا وفق العلامات السريرية إلى مجموعتين: المجموعة الأولى شملت المرضى الذين تعرضوا لحالات البطن الحادة بسبب انسداد الأمعاء او التهاب البريتون الحاد وتم تحضير المرضى وعلاجهم بعمليات البطن الاستكشافية الذي من خلاله تم تشخيص التدرن ألبطني بصوره نهائيه وذلك بأخذ عينه من الجزء المصاب وتحليلها نسيجياً أما المجموعة الثانية شملت المرضى الذين ظهرت عليهم علامات مزمنة للمرض كآلام البطن وانتفاخها مع فقدان الوزن وارتفاع في درجة حرارة الجسم . أظهرت النتائج إن الم البطن كان أكثر أعراض المرض شيوعاً يليه انتفاخ البطن وفقدان الشهية والوزن مع ارتفاع درجة حرارة الجسم ثم تشخيص كتله الجزء الأسفل الأيمن من البطن في ثلاث مرضى فقط و ٥ مرضى خضعوا لعملية استكشاف البطن بسبب الأم البطن الحادة والتي ظهر فيها التضيق في ٣ مرضى والتصاق الأمعاء في مريض واحد مع التهاب البريتون الحاد بسبب انفجار الأمعاء في مريض واحد

أيضا وبين تحليل سائل استسقاء البطن ايجابيه الفحص لعصيات التدرن في المرضى الذين خضعوا لهذا الفحص وجميع المرضى وجدوا استجابته في علاج التدرن ألبطني ولم يلحظ في هذه الدراسة أي حاله وفات او رجوع المرض خلال فترة العلاج أو فترة المتابعة. إن مرض التدرن ألبطني على الرغم من ندرته إلا انه صعب التشخيص بسبب فقدان الأعراض ألسريرييه المحددة له وان الوعي ألسريري ضرورية ملحه لتشخيص هذا المرض .

Introduction

Abdominal tuberculosis is the most common type of extra-pulmonary tuberculosis, consisting mainly of tuberculosis of intestinal tract, parietal peritoneum, omentum, mesentery and its draining lymph node and rarely involves other solid abdominal organs mainly the liver, spleen and pancreas. The extra-pulmonary tuberculosis constitutes about 11%-16% of all tuberculous patients, out of which 3% to 4% belong to abdominal tuberculosis [1]. The incidence of abdominal tuberculosis and the severity of the disease are thought to be increased in immunocompromised, malnourished and poor patients [2]. Tuberculosis bacilli reach the intestinal tract mainly by haematogenous route, swallowing of infected sputum or by a direct spread from infected contiguous lymph node and fallopian tube. Peritoneal tuberculosis usually presented in three distinct forms: wet form associated with ascites, dry type accompanied with adhesion, and fibrotic type presented as omental thickening with or without mild loculated ascites [3].

Abdominal tuberculosis tends to affect patients in their third and fourth decades of life. Females are slightly more commonly infected. [4] Diagnosis is usually delayed and challenging and less

than 50% of patients are defiantly diagnosed as real cases of abdominal TB. [5]. Treatment if started early, it is usually valid and successful. Complications and late sequelae for inadequately treated patients include adhesion, obstruction and blockage due to strictures. Intestinal tuberculosis may result in infertility in female patients. Immunocompromised patients or misdiagnosed and delayed end stage disseminated infection have poor prognosis [6].

Despite advances in diagnostic facilities and drug therapy, abdominal tuberculosis remains a major diagnostic dilemma because the disease can mimic many intra-abdominal conditions including inflammatory condition including inflammatory bowel diseases, malignancy and other infectious diseases. The definitive diagnosis is only made at laparoscopy or during explorative laparotomy for acute abdominal pain with biopsy of the lesion and by culture of aspirated ascetic fluid [3,7].

The aim of this study was to evaluate the clinical presentations, diagnosis and the treatment of 11 patients with abdominal tuberculosis.

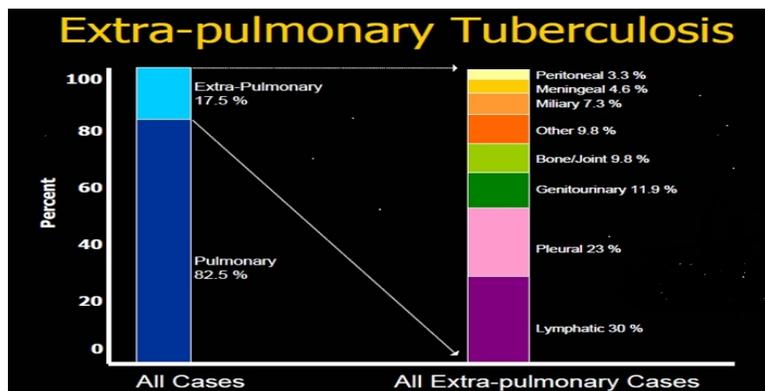


Figure 1: Distribution of extra pulmonary tuberculosis

Patients and Methods

This is a prospective study conducted on 11 patients with presumed diagnosis of abdominal tuberculosis presenting at one major Teaching hospital in Basra from February 2009 to March 2013. These patients were classified into two categories according to the main involved organ. The first group includes 7 patients presented with intestinal tuberculosis and the remaining second group includes those patients with peritoneal tuberculosis. The diagnosis of abdominal TB was based on clinical manifestations of the patients, blood investigation, radiological findings, biopsy for histopathology and tissue culture for mycobacterium bacilli and analysis of ascitic fluid for AFB stain and culture. Blood investigations include complete blood counts, ESR and Mantoux test. The radiological investigations include chest X ray and plain abdominal X rays for all patients, and barium follow through for selected patients. Ultrasound was done for all patients and CT scan for few selected patients (four) only to detect peritoneal and nodal involvement.

Patients were classified according to their presentation into two main groups. The first group (5 patients, 45.5%) included those patients who were presenting with acute symptoms of pain, vomiting, constipation which revealed intestinal obstruction or perforation which required urgent intervention. The definite diagnosis in these patients was made by operative findings and histopathology of biopsied tissue. The second group (6 patients, 54.5%) includes patients with chronic symptoms such as pain, fever, abdominal distention, anorexia, weight loss, ascites and altered bowel habit. The diagnosis in these patients was made by contrast study and by paracentesis and examination of ascitic fluid.

Surgical procedures were needed mainly for patients presented as acute abdomen

(first group) and included resection and anastomosis, adhesiolysis and stictoplasty and primary repair of perforation. Biopsy from suspected lesions and all resected specimens were sent for histopathological examination.

After confirmation of diagnosis, all patients were sent to TB center to complete their treatment by anti-tuberculous therapy for 9 months during which they were followed up every three months for assessment and for any complications that should arise.

Results

This study included 11 patients (4 males and 7 females) with the presumptive diagnosis of abdominal tuberculosis. Their age range from 25- 67 years with a mean age of 52.6 year. The age of more than half of the patients were above 50 years and most of them were poor and of low socioeconomic class. Seven patients (63.6%) are considered to have primary abdominal tuberculous disease and four patients (36.4%) had secondary disease with clear findings of pulmonary TB on chest X rays. Five patients presented with clinical features of acute abdominal pain due to intestinal obstruction or peritonitis and the other 6 patients had chronic symptoms of vague abdominal pain, anorexia, weight loss, fever and sweating. The duration of symptoms before intervention range from 2 weeks to 6 months. The main symptoms given by the patients were summarized in Table-1. Abdominal pain was the frequent and the leading symptom followed by anorexia and weight loss. Clinical examination revealed abdominal distention due to ascites in 8 patients and right iliac fossa mass in 3 patients. The location of abdominal tuberculosis is mainly in the terminal ileum and ileocaecal region (7 patients, 63.6%).

Table 1: Clinical manifestations of patients with presumptive diagnosis abdominal tuberculosis

Symptoms	No	%
Abdominal pain	11	100
Weight loss	9	81.1
Abdominal distention	8	72.7
Anorexia	8	72.7
Fever and sweating	8	72.2
Nausea and vomiting	6	54.5
Constipation	5	45.5
Diarrhea	4	36.4
Right iliac fossa mass	3	27.3

In this study, anaemia was found in most of the patients (n=10, 90.9%), elevated ESR in 8 patients (72.7%), WBCs count was within normal range in the most of the cases except in 2 patients where WBCs count was more than 11000 cell/ cu. mm. Mantoux test was positive in 8 patients (72.7%). Paracentesis and ascitic fluid study was performed for 6 patients who proved to have ascites by ultrasonography. Barium follow through was done for 3 patients and revealed lesions suggestive of tuberculosis. Abdominal ultrasound was done for all

patients and the abnormalities observed in all patients. These abnormalities are as follow: ascites in 8 patients, right iliac fossa mass in 3 patients, thickening of omentum in 3 patients and enlargement of mesenteric lymph nodes in 5 patients. Abdominal CT scan was offered for 4 selected patients and findings were mild to moderate ascites in 4 patients, thickening of the wall of terminal ileum in 2 patients, right iliac fossa mass in 3 patients and mesenteric lymphadenopathy in 3 patients.

Table 2: Diagnostic tools in 11 patients with abdominal tuberculosis.

Diagnostic tool	NO	%
Paracentesis and acetic fluid analysis	6	54.5
- AFB stain	4	
- TB culture	2	
Laparotomy and biopsy	5	45.5
- Intestinal lesion with caseous necrosis.	4	
- Peritoneal lesion with mesenteric lymphadenitis.	1	

Five patients in this study needed surgery due to presentation as acute abdomen. At laparotomy, evidence of tuberculosis in the form of multiple tubercles in the peritoneum , intestinal wall thickening , strictures ,mesenteric lymph adenopathy with the presence of reactionary ascites

(Table 2). Various surgical procedures were done for these patients according to the laparotomy findings of each case. The surgical procedures included adhesiolysis and biopsy (3 cases), limited resection and anastomosis (one case) and closure of perforation and stricturoplasty (one case).

Histopatho-logical examination of all resected biopsies was done to establish the definite diagnosis of abdominal tuberculosis (Table 3).

Distal ileum and ileocaecal regions were the commonest site of involvement in

cases of intestinal tuberculosis (7 patients) and peritoneal tuberculosis with the involvement of mesenteric lymph node in 4 patients. Solid abdominal organs like spleen, liver or pancreas involvement was not recorded in this study (Table 4).

Table 3: Operative findings during laparotomy of 5 patients with acute abdomen pain

Operative findings	No.	%
Stricture	3	27.3
RIF mass	3	27.3
Adhesions	1	9.1
Intestinal perforation	1	9.1

Table 4: Sites of involvement by abdominal tuberculosis

Sites of the tuberculous lesion	No.	%
Peritoneum	4	36.4
Terminal ileum	3	27.3
Ileocaecal region	4	36.4
Mesenteric lymphadenitis	8	72.7
Upper small intestine	0	0
Solid organ	0	0

Discussion

Abdominal tuberculosis mandates the involvement of a single or multiple areas of gastrointestinal system with peritoneum and terminal small intestine being the most frequently involved sites [8,9,10]. The mesentery and its lymph nodes are also affected but to a lesser extent while the proximal part of gastrointestinal tract and the solid abdominal organ are rare sites. Abdominal tuberculosis can occur at any age and in both sexes but young and adults female patients are most commonly affected [8,10]. The mean age of patients in this study was 57.6 year and most of them were

females (7 patients, 63.6%). Majority of the patients in this study were poor with low income and of low socioeconomic class. Poor nutritional status, anaemia and bad sanitation are the main factors contributing to this disease [8,9,11]. The increase in frequency of female abdominal tuberculosis was reported in several literature [4,8,10,11]. It is thought that, in addition to malnutrition and poverty, tuberculosis in females usually reaches the peritoneal cavity through the Fallopian tube infection which already attacked the tubes during the reproductive period of life when they were sexually active.[11]

The co-occurrence of associated pulmonary tuberculosis with the abdominal tuberculosis is variable with range between 20 to 50%. The incidence of this association in the present study was 30% as compared to 23% in 26 patients by Raul et al study [10] and 21% in 230 patients study by Tariq *et al.* [11]. The high incidence of coexistence of pulmonary TB and abdominal TB could be explained by the lower socioeconomic circumstances [12]. Abdominal tuberculosis is a diagnostic dilemma and it is usually challenging, particularly when the evidence of pulmonary infection is absent [13]. Its symptoms and signs are usually non specific and mimic many intra abdominal conditions. In keeping with other studies, the symptoms of the majority of our patients (9 patients, 82%) dated back for more than three months duration at time of their first presentation. This delay in presentation can be justified by the fact that the diagnosis of abdominal tuberculosis in the initial stage is usually challenging and difficult due to non specificity of the symptoms, and as a result, some patients presented late with complications such as bowel obstruction and peritonitis due to perforation [9,14].

The clinical manifestations of abdominal tuberculosis is usually non specific and, therefore, often leads to diagnostic delay and development of various complications [15,16]. Abdominal pain is the most common symptom in this study recorded in all patients (100%), it is colic in intestinal type and dull in the peritoneal type. Other symptoms were anaemia, loss of weight and appetite (80%), fever (70%), abdominal distention due to ascites (60%), altered bowel habit mostly diarrhea (20%) and mass in the right iliac fossa in 30% of patients which was hard, nodular, non mobile, non tender with impaired resonance, which mimic caecal carcinoma.

These symptoms are quite consistent with symptoms experienced with several similar studies [11,16,17].

Abdominal tuberculosis can involve any parts of the intestine but the terminal ileum and ileocaecal region are most commonly involved sites due to presence of abundant Peyer patches (organisms get trapped in the Peyer patches); and stasis of luminal contents favored by ileocaecal valve and so the bacterial contact time with mucosa is more [17]. Terminal ileum and ileocaecal region were the most common site affected in our patients (7 patients, 63.6 %) followed by peritoneum and the mesentery (4 patients, 36.4%).

Investigations of patients suggestive to have abdominal tuberculosis should start with complete blood count and ESR, chest X ray to find out primary focus, U/S of abdomen to see ascites, caecal wall thickening, nodal status and other organs [14]. Abdominal CT scan is better and more reliable than U/S. Barium study X ray (Enteroclysis) followed by barium enema or barium follow through X ray is also useful. Signs suggestive of abdominal tuberculosis by Barium study include: pulled up caecum, wide (obtuse) ileocaecal angle, calcification, hurrying of barium due to rapid flow and lack of barium in inflamed segment (Steirlin sign), narrow ileum with thickened ileocaecal valve (Fleischner sign or inverted umbrella sign) and presence of ulcer and strictures in the terminal ileum and caecum (Napkin lesion) [14,18]. Patients submitted to barium follow through in this study showed narrowed terminal ileum and ileo-caecal junction, dilatation of proximal ileum and the caecum appears shrunken and “pulled-up” away from right iliac fossa.

Ultrasound features observed in abdominal tuberculosis include: thickened bowel wall, mesentery, omentum and peritoneum,

loculated and/or interloop ascites, bowel loop radiates from its mesenteric root (stellate sign), mesenteric thickness more than 15 mm, mesenteric lymph node enlargement and matted and pulled up caecum presenting with a mass in subhepatic region (pseudo-kidney sign) [18,19]. Ultrasound examination was offered to all patients in this study. The predominant findings obtained by this exam were echogenic thickening of mesentery with mesenteric lymphadenitis. Other findings include dilatation and active peristalsis of terminal ileum, matted small bowel loops, mild to moderate ascites with omental thickening observed less frequently.

CT scan is very useful and reliable investigation in abdominal tuberculosis, it is done with oral contrast- CT enteroclysis. Findings include thickened peritoneum and bowel wall, ileocaecal valve thickening, enlarged, necrosed and matted mesenteric lymph node, adhesion. CT guided FNAC, biopsy and aspiration of fluid can be also be done. Although the findings of ultrasound and CT scan were abnormal in all our patients but none of these finding was specific or characteristic of abdominal tuberculosis. These observations were also noted by Sinan *et al.* [8] and Baloch *et al* [15].

Ascitic tap fluid analysis by paracentesis for patients with abdominal distention due to ascites is important diagnostic procedure. Analysis of ascites fluid in abdominal tuberculosis is exudates with protein level > 2.5 g/dl, serum-ascites fluid albumin gradient is < 1.1, lymphocyte predominant cell, glucose <30 mg and LDH more than 90 units /liter. AFB in ascitic is positive only in less than 30% of cases [20]. The time taken for growth (6 weeks) was very long to be utilized in diagnosis. We depended on ascitic fluid examination for

patients with chronic symptoms and ascites. The findings were not conclusive and the aspirate obtained by paracentesis was clear exudative straw colored fluid with lymphocytes predominate. The diagnosis of abdominal TB was made at laparotomy (4 patients) by histopathological examination of resected biopsy which revealed epithelioid granulomas with central caseous necrosis. Muneef *et al* [12] reported that about 68% of peritoneal biopsies were positive by smear or culture.

The main differential diagnosis of intestinal tuberculosis is Crohns disease; as its clinical and histological features are quite similar [21,22,23]. Other pathology includes lymphoma, caecal carcinoma, Diverticular disease, acute appendicitis and other infectious process of gastrointestinal tract such as *Yersenia*, histoplasmosis, *Mycobacterium avium* complex enteritis (MAC enteritis) and inflammation caused by cytomegalovirus [23].

In our study, adhesion and fibrosis were most common findings during laparotomy followed by stricture and stenosis of terminal ileum and proximal large bowel region (Table 3). Peritoneal involvement with mesenteric lymphadenitis noted in four patients. Perforation of terminal ileum was recorded in one patient only which was small and on the antimesenteric border. The main indications for surgery in abdominal tuberculosis are: intestinal obstruction, acute abdominal presentations like perforation, bleeding, intra abdominal abscess formation or fistula formation and uncertain diagnosis [20, 22, 23].

Undiagnosed and untreated abdominal TB can result in a mortality rate of 50-60% [23]. However, this disease is usually curable after proper treatment. Management of abdominal tuberculosis requires anti-tuberculous treatment for 6-9 months. World health organization (WHO) now

recommends anti-tuberculous drugs for 6 months. For uncomplicated cases: 4 drugs for 2 months and 2 drugs for 4 months. Complicated cases:- 4 drugs for 2 months, and 2 drugs for 7 months [20,25]. Because of complications and difficulty in managing recurrent cases of abdominal tuberculosis one year therapy is commonly used in developing countries [23,25,26]. First line drugs are: Isoniazid 5mg/kg; Rifampicin 10 mg/kg; Ethambutol 15mg/kg; Pyrazinamide 25mg /kg. Second line drugs are: Amikacin, Kanamycin, PAS (Para Amino-Sulphuric acid), Ciprofloxacin, Ofloxacin, Clarithromycin, Azithromycin, Rifabutin. Patients in this study were referred to TB center for antituberculous treatment and first line drugs are prescribed. All 11 patients were successfully treated and no mortality was encountered in our patients. Chang *et al.* [27] and Chen *et al*[28] reported that the mortality rate of treated abdominal TB were 13.2% and 14.8 respectively while Rauf Shaikh *et al.* [29] reported mortality rate of 15.4% in their

study. Baluch [30] has zero mortality and Dandapat [31] had a post operative mortality of 6.4%. The low mortality rate in this study could be explained by prompt and early diagnosis and by adapting very effective treatment and close follow up of all patients.

Patients in this study were followed up and monitored during anti-tuberculous therapy and for 6 months after that for the response to the treatment and for any complications. We followed patients by regular weight check to see for gain, improvement in appetite , reduction in abdominal pain and distention, absence of fever, normal hemoglobin , normal ESR. U/S abdomen was done to all patients after antiTB therapy which showed improvement in sonographic features. Repeated surgery was not needed in this study. Repeated surgery in abdominal tuberculosis is difficult and usually dangerous as the chances of developing faecal fistula and further adhesions are more likely [32,33,34]

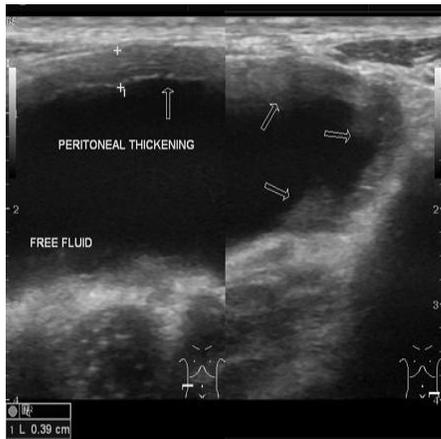


Figure 2: U/S abdomen: Abdominal Tuberculosis ascites and thickening of parietal peritoneum.

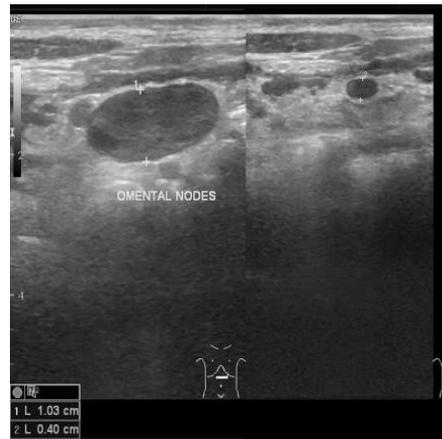


Figure 3: U/S abdomen: Abdominal tuberculosis: mesenteric adenitis.

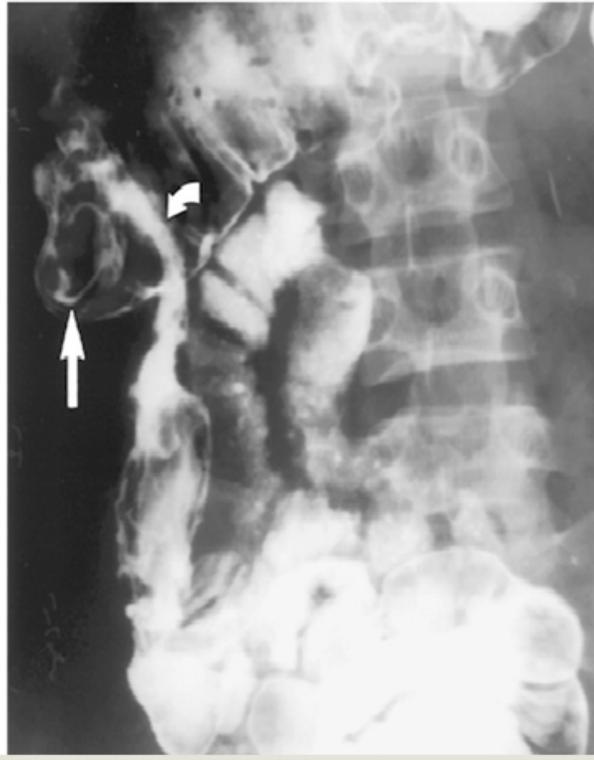


Figure 4: ileocaecal tuberculosis: Pulled-up (straight arrow), obtuse ileocaecal angle

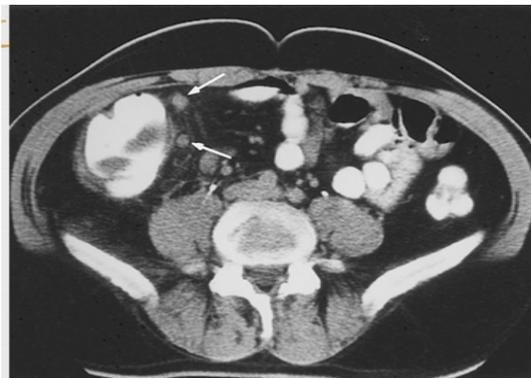


Figure 5: CT scan of Intestinal TB: shows thickening of caecum with pericaecal inflammatory changes. Mesenteric lymph nodes are also evident (arrows).

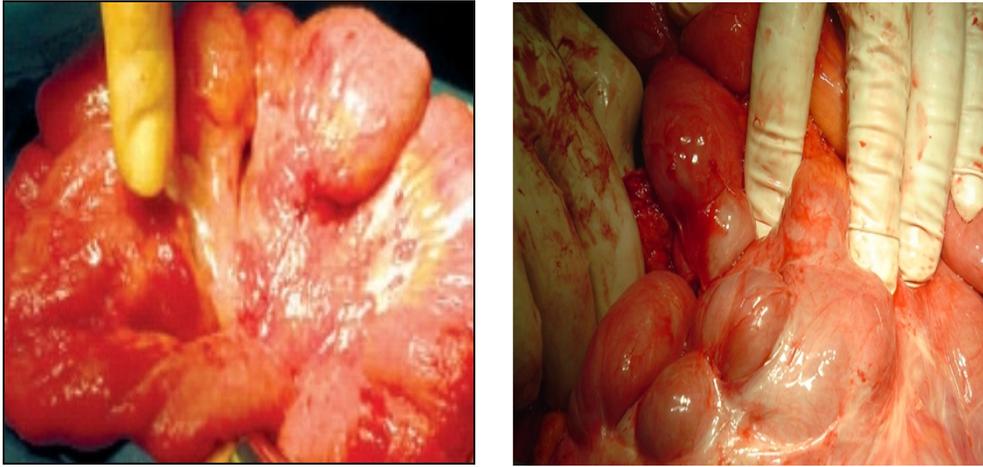


Figure 6: On-table findings in intestinal tuberculosis: extensive involvement with multiple tiny tubercles, thickening, adhesion and involvement of mesenteric lymph node.

Conclusion

Abdominal tuberculosis constitutes a major health problem in our country and presents a diagnostic dilemma and challenge due to various presentations of patients with vague abdominal pain and non specific physical findings. The disease is slightly more common adult and middle age females. The terminal ileum, ileocaecal region and peritoneum are the frequently involved site of infection. The disease can present as acute abdominal pain that needs urgent laparotomy or as chronic process with non specific abdominal pain and abdominal distention with anorexia and weight loss. As results, laparotomy with histopathological examination of resected biopsy or examination of ascitic fluid is frequently necessary to establish the diagnosis. Early diagnosis and establishment of anti-TB therapy, besides the surgical management of the complications are crucial for cure and survival.

References

1-Marshall JB. Tuberculosis of the gastrointestinal tract and peritoneum. *Am J Gastroenterol.* 1993;7: 989-999.
 2-Maartens G, Wilkinson RJ. Tuberculosis. *Lancet* 2007; 370:2030-2043.
 3- Lazarus AA, Thilagar B. Abdominal tuberculosis. *Dis Mon* 2007; 9: 83-86.

4- Sharma MP, Bhatia V. Abdominal tuberculosis. *Indian J Med Res* 2004; 120:305-315.
 5- Bolukbas C, Bolukbas FF, Kandir T, *et al.* Clinical presentation of abdominal tuberculosis in HIV serological adult. *BMC Gastroenterol* 2005;4: 5-21.
 6- Uygur-Bayramicilio O, Dabak G, Dabak R. Aclinical dilemma: abdominal tuberculosis. *World J Gastroenterol* 2003; 9(5):1098-1101.
 7-Sheer TA, Coyle WJ. Gastrointestinal tuberculosis. *Curr Gastroenterol Rep* 2003;5:273-278.
 8-Sinan T, Sheikh M, Ramadan S, Sahweney S, Behbehani A. Clinical features in abdominal tuberculosis: 20 years experience. *BMC* 2002; 2: 3-16
 9-Rasheed S, Zinicola R, Watson D, Bajwa A, McDonald PJ. Intra-abdominal and gastrointestinal tuberculosis. *Colorectal Dis* 2007; 9: 733-783.
 10-Raul CE, Lidia MC, Araceli EH, *et al.* Renal tuberculosis. *Cir Cir* 2010; 78: 442-447.
 11- Tariq NA. Abdominal TB. The surgical audit of its presentation. *Pak J Surg* 1993; 9 (3): 82-6.
 12-Muneef MA, Mewish Z, Mohmoud SA, Sadoan SA, Bannatyne R, Khan Y. Tuberculosis in the belly : a review of forty six cases involving the gastrointestinal tract and peritoneum. *Scan J Gastroenterol* 2001; 36: 528-532.

- 13-Demir K, Oktan A , Kaymakoglu S, Diincer D, Besisik F , Cevikbas U, Ozdil S, Bostas G , Mungun Z, Cakaloglu Y. Tuberculous peritonitis –reports of 26 cases, detailing diagnostic and therapeutic problems. *Eur J Gastroenterol* 2001; 13: 581-585.
- 14-Naz F, Chaud Harvy ZA, Hao A, Ahad A et al . Abdominal tuberculosis. A review of 25 cases *Ann king Edward Med Coll* 1999; 5: 180-3.
- 15-Baloch NA, Anees S,Baber M,Maingol M et al. Abdominal tuberculosis . A review of 68 cases. *J Surg Pak* 2002; 7:12-19.
- 16-Channa GA, Khan MA. Abdominal tuberculosis: surgeon perspective. *J Surg Pak* 2003; 8:18-22.
- 17- Pereira JM, Madureira AJ, Vieira A, Ramos I. Abdominal tuberculosis: imaging features. *Eur J Radiol* 2005; 55: 173-80.
- 18-Collado, Caroline, *et al.* Gastrointestinal tuberculosis: 17 cases collected in 4 hospitals in the north eastern suburb of Paris. *Gastroenterologie Clinique et Biologique* 2005; 29: 419-425.
- 19-Poyrazoglu OK, Timumurkaan M, Yalinz M et al. Clinical review of 23 patients with tuberculous peritonitis: presenting features and diagnosis. *J Dig Dis* 2008; 9: 170-174.
- 20-Ozan H, Ozercan K, Orhan A. Peritoneal Tuberculosis Mimicking Peritoneal Carcinomatosis.*Eur J Gynaecol Oncol.*2009;30(4):426-30.
- 21- Amouri A, Boudabbous M, Munf et al. Current profile of peritoneal tuberculosis: study of a Tunisian series of 42 cases and a review of the literature. *Rev Med Intern* 2009; 30: 215-220.
- 22- Kumar S,Pandey HI, Sagg UP. Abdominal tuberculosis. In Taylor-Johnson CD. Aeditors. Recent advances in surgery. 28ed. London Royal Society of medicine press; 2008:47-58.
- 23- Ahmed M, Mughal MA, Maingol MA. Varied intestinal tuberculosis: An experience at Sandeman hospital. *Quetta J coll. Physician Surg Pak* 2000;10 :246-248.
- 24-Akgun V. Intestinal and peritoneal tuberculosis: Changing trend over 10 years and review of 80 patients. *Can J Surg* 2004;48(2):131-136
- 25- Bernhard JS, Bhatia G, Knauer CM. Gastrointestinal tuberculosis. *J Clin Gastroenterol* 2001; 1: 397-402.
- 26- Ramesh J, Banait GS, Omerod LP. Abdominal tuberculosis in a district general hospital: a retrospective review of 86 cases. *Q J Med* 2008; 101:189-195.
- 27- Chang HT, Leu S, Hsu H, Lui WY. Abdominal tuberculosis- a retrospective analysis of 121 cases. *Zhonghua Yi Xue Za Zhi (Taipei)* 1991; 47: 24-30.
- 28- Chen YM, Lee PY, Perng RP. Abdominal tuberculosis in Taiwan: a reportfrom Veterans General Hospital, Taipei. *Tuber Lung Dis* 1995; 76: 35-38.
- 29- Sheik R, Ayub M, Malik KA, et al. Abdominal tuberculosis – Profile of 26 cases. *P J Surg*2008; 24(4):217-219.
- 30-Baluch N, Tufail M, Durani K, Ahmed M. Abdominal tuberculosis: A varied presentation *Pak J Surg*1993; 9: 8-12.
- 31-Dandapat MC, Mohan Rao V. Mngagement of abdominal tuberculosis. *Indian journal of tuberculosis.* 1985; 32 (3):126-129.
- 32-Eduardo Brambilla, Marcos Dal Ponte, Leonardo Glimone *et al.* Intestinal tuberculosis in immunocompetent/HIV negative patients: case report of two patients. *J Coloproctol* 2012; 32: 35-37.
- 33-Almadi MA, Ghosh S, Aljebreen AM. Diffrentiating intestinal tuberculosis from Crohns disease: a diagnostic challenge. *Am J Gastreterol* 2009; 104: 1003-1012.
- 34-Akinkuolie AA, Adias AO, Agbakwuru EA *et al.* Abdominal tuberculosis in a Nigerian teaching hospital. *Afr J med Sci* 2008; 37: 225-229.