



## Assessment of 35 children with abdominal tuberculosis

### BOWEL

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### ABSTRACT

**Background/Aims:** To contribute to the diagnosis and treatment of pediatric abdominal tuberculosis cases by assessing the clinical, laboratory, and radiological features of patients who presented at our clinic and were diagnosed with abdominal tuberculosis.

**Materials and Methods:** Clinical, laboratory, and radiological features were reviewed retrospectively for 35 patients diagnosed with abdominal tuberculosis and followed up at the Pediatric Infectious Diseases Clinic between January 1987 and August 2012.

**Results:** The study group included 16 female (45.7%) and 19 male (54.3%) patients with an age range of 6 months to 16 years (mean: 9.77±4.36 years). Twenty-nine patients were diagnosed with tuberculosis peritonitis, five patients with intestinal tuberculosis, and one patient with pelvic tuberculosis. The most common signs and symptoms were ascites, abdominal pain, abdominal distention, weight loss, and fever. Mean duration of the complaints was 109 days (range: 10 days to 3 years).

**Conclusion:** Abdominal tuberculosis is a disease with an insidious course without disease-specific clinical and laboratory signs. When the disease is suspected, laparoscopy or laparotomy could be helpful in diagnosis. Employing ultrasound and computed tomography signs, abdominal tuberculosis should be included in differential diagnoses in regions with a high incidence of tuberculosis when there is abdominal pain, weight loss, ascites, history of contact with individuals with tuberculosis, and positive tuberculin skin test when patients have not been Bacillus Calmette Guerin BCG vaccinated.

**Keywords:** Gastrointestinal tuberculosis, tuberculous peritonitis, child

### INTRODUCTION

Tuberculosis (TB) is one of the foremost causes of infection-related mortality. TB incidence among children throughout the world was estimated at 490 000 (range, 470.000-510.000) in 2011. The total number of deaths from TB among human immunodeficiency virus HIV-negative children was estimated at 64.000 (range, 58.000-71.000) in 2011 (1). Abdominal TB is a rare manifestation of extrapulmonary TB, and a prevalence of around 3% has been noted previously in India (2). In a multicenter study from Turkey, among 539 pediatric

cases with tuberculosis, 23 (4.3%) had abdominal tuberculosis (3). It may involve the gastrointestinal tract, peritoneum, mesenteric lymph nodes, genitourinary tract in the abdomen, or other solid organs (e.g. liver, spleen and adrenal glands) (2,4,5). It results from hematogenous spread or contagious spread from an abdominal focus or mesenteric lymph node (6,7). Diagnosis of TB among children poses technical and operational issues, more so in the field of abdominal TB, in which the protean clinical manifestations continue to challenge physicians in diagnosis and therapy. We aimed to contrib-

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ute to early diagnosis and treatment and thereby to reducing morbidity and mortality by assessing, in light of the literature, the clinical, laboratory, and radiological findings observed in patients diagnosed with abdominal tuberculosis, which is rare in childhood.

## MATERIALS AND METHODS

Medical records of 35 patients with abdominal tuberculosis who were followed up at the Pediatric Infectious Diseases Clinic between January 1987 and August 2012 were reviewed retrospectively. Data on age, sex, clinical findings, diagnostic procedures, treatment, and clinical course were recorded. All other diseases that may cause ascites were excluded.

Diagnosis of abdominal TB was based upon: 1. a positive acid-fast bacilli smear or culture; 2. histopathology showing tubercular granuloma (with or without caseation); 3. radiologic features compatible with tuberculosis on ultrasound, or computed tomography (CT) of the abdomen; and 4. patients with a high index of clinical suspicion, with negative diagnostic work-up, but who still showed a good response to a therapeutic trial with anti-TB agents (3).

Tuberculin skin tests (TST) were examined 48-72 hours after intradermal injection of 5 tuberculin units of purified protein derivative. Tests were considered positive if the diameter of induration was  $\geq 15$  mm in BCG-vaccinated patients,  $\geq 10$  mm in unvaccinated patients, and  $\geq 5$  mm in HIV-positive patients. Data are expressed as means  $\pm$  standard deviations.

## RESULTS

Of the 35 patients, 16 were female (45.7%), and 19 (54.3%) were male. The age range was 6 months to 16 years, with a mean of  $9.77 \pm 4.36$  years. The duration of complaints at the time of presentation ranged from 10 days to 3 years (mean: 109 days). In 15 cases (42.9%), there was a history of contact with an adult with pulmonary tuberculosis. Six patients had never received a BCG vaccination, and the vaccination status of 14 patients was unknown. The remaining patients had received at least one BCG inoculation. Twenty-nine cases were diagnosed with tuberculous peritonitis, five cases with intestinal tuberculosis, and one case with pelvic tuberculosis. The most common symptoms and signs were ascites, abdominal pain, abdominal distention, weight loss, and fever (Table 1).

**Table 1.** Signs and symptoms of the patients at the time of presentation.

Symptom	n	%
Ascites	26	74.3
Abdominal pain	22	62.9
Abdominal distention	16	45.7
Weight loss	14	40
Fever	11	31.4

The mean hemoglobin level of patients was 10.8 g/dL, and the mean erythrocyte sedimentation rate (ESR) was 39.7 mm/h (range, 3-108). Thirteen cases were anemic (Hb  $< 11$  g/dL). Positive TST were noted in 14 cases (40%). Of the 12 cases in which ascites fluid could be analyzed, increased cellularity with lymphocyte predominance was observed in 11 cases, and an increase in neutrophils was observed in one case. Acid-fast bacilli were demonstrated in the sputum of one patient, in an intra-abdominal lymph node of another patient, and in ascites fluid of two patients. *Mycobacterium tuberculosis* was identified in the cerebrospinal fluid by polymerase chain reaction (PCR) in a patient diagnosed with tuberculous meningitis.

Chest X-rays of 11 patients were consistent with pulmonary tuberculosis. Thirty-one patients were assessed by abdominal ultrasound, and the most frequent findings were ascites, mesenteric lymphadenopathy, hepatic enlargement, splenic enlargement, and thickening of the intestinal loops (Table 2). The most common findings on abdominal computed tomography (CT) were ascites, mesenteric lymphadenopathy, mesenteric thickening, omental thickening, thickening of the intestinal loops, hepatic enlargement, splenic enlargement, intra-abdominal mass, and pelvic mass (Table 3).

Pathological examination of specimens obtained during laparotomy (n=19, 54.3%), laparoscopy (n=8, 22.9%) and ultrasound-guided fine needle aspiration biopsy (n=4, 11.4%) revealed chronic granulomatous inflammation. Four patients with negative diagnostic tests and suspicious clinical histories were diagnosed with tuberculosis based on their responses to

**Table 2.** Abdominal ultrasound findings

	n	%
Ascites	27	87.1
Mesenteric lymphadenopathy	6	19.4
Hepatic enlargement	5	16.1
Splenic enlargement	5	16.1
Thickening of the intestinal loops	4	12.9

**Table 3.** Abdominal computed tomography findings

	n	%
Ascites	10	41.7
Mesenteric lymphadenopathy	7	29.2
Mesenteric thickening	3	12.5
Omental thickening	3	12.5
Thickening of the intestinal loops	3	12.5
Hepatic enlargement	3	12.5
Splenic enlargement	1	4.2
Abdominal mass	1	4.2
Pelvic mass	1	4.2

anti-tuberculosis treatment. Among the six patients who presented with acute abdomen, three had perforated bowel, two had perforated appendicitis, and one had intestinal invagination. One patient with a perforated bowel developed an enterocutaneous fistula during follow-up.

The most common treatment was the combination of isoniazid, rifampicin, pirazinamid, and etambutol/streptomycin at pediatric doses. The combination treatment was terminated after 2 months, followed by maintenance on isoniazid and rifampicin for 10 months. Patients with tuberculous peritonitis with ascites were put on methylprednisolone at a dose of 2 mg/kg/day. The dose was gradually reduced, and the treatment was discontinued at week 6. Treatment was successful in all patients. Complications included the development of an enterocutaneous fistula in one patient and an ileus in another. An HIV-positive patient died of sepsis at 4 months of treatment. The mean follow-up period was 22.5 months (3 months to 7 years). No sequelae were observed during follow-up after treatment.

## DISCUSSION

Tuberculosis continues to be a serious public health problem in Turkey, particularly for children. The incidence in 2011 was 24 cases/100 000 individuals (8). The frequency of abdominal tuberculosis during childhood increases with deterioration in socioeconomic status and with increased frequency of tuberculosis associated with HIV infection. Male children were more commonly affected than female children in pediatric series with tuberculosis and peritoneal tuberculosis from our country (3,9-11). Furthermore, male gender was predominant in reports of extrapulmonary tuberculosis series including adult and pediatric cases (12,13). Among 115 children with abdominal tuberculosis from India and 102 children with extrapulmonary tuberculosis from Greece, most of the cases were males (14,15). In this study 19 of 35 patients were male (54.3%).

The infection causing abdominal tuberculosis may be contracted hematogenously or by the ingestion of sputum containing tuberculosis bacilli, the consumption of contaminated milk or food products, or by direct spread from neighboring structures (16). Peritoneal tuberculosis, with no gastrointestinal lesions, is always secondary and results from reactivation of a latent peritoneal focus from previous hematogenous spread or as a part of active pulmonary tuberculosis with miliary dissemination. It is usually caused by *M. tuberculosis* (17). In this study twenty-nine cases were diagnosed with tuberculous peritonitis, five cases with intestinal tuberculosis, and one case with pelvic tuberculosis. Mycobacterium tuberculosis was identified in the cerebrospinal fluid by PCR in a patient diagnosed with tuberculous meningitis. A primary infection in the lung was present in 31.4% of cases.

It can have a varied presentation, frequently mimicking other common and rare diseases. The clinician must look for tuber-

culosis, and confirm or exclude this treatable malady in any patient who presents with gastrointestinal disease such as Crohn's disease, abdominal lymphoma, and malignancies of the abdominal viscera (18). The spectrum of disease in children is different from adults, in whom adhesive peritoneal and lymph nodal involvement is more common than gastrointestinal disease (19). The clinical presentation of abdominal tuberculosis can be acute, chronic or acute on chronic. The duration of complaints at the time of presentation mean: 109 days in this study. Pain can be either colicky due to luminal compromise, or dull and continuous when the mesenteric lymph nodes are involved. The most common symptoms reported in various studies were fever (73-75%) (20,21), weight loss (46.9-81%) (21,22), fatigue (81%) (22), and abdominal pain (51.2-93%) (4,21,23-25). In agreement with the literature, the most common symptoms among our patients were abdominal pain, abdominal distention, weight loss, and fever.

When it is not suspected clinically, it is a source of significant morbidity and mortality. Culture of acid-fast bacilli or the demonstration of acid-fast bacilli or granulomas of tuberculosis in tissues, the detection of radiological findings of tuberculosis, and good response to anti-tuberculosis treatment despite negative tests, are all diagnostic criteria (26).

Sotoudehmanesh et al. (27) were able to establish diagnosis by laparotomy or laparoscopy in 74% of their cases (n=50). In the present study, we established the diagnosis by pathological examination of specimens obtained by laparotomy, laparoscopy, or fine-needle aspiration. Acid-fast bacilli were found in ascites fluid in two cases and in intra-abdominal lymph node tissue in one case. Four cases were diagnosed clinically and by radiological methods.

The invasive nature and expense of laparoscopy (28), the difficulty of demonstrating bacilli in ascites fluid, and the 6-week time period necessary for bacilli to grow in culture make diagnosis by invasive techniques difficult. For this reason, some researchers have recommended keeping tuberculosis in mind when patients in regions with high incidence of tuberculosis present with abdominal pain, weight loss, and ascites (29,30). In such cases, long-lasting abdominal symptoms, a history of contact with an adult with tuberculosis, the absence of BCG vaccination, a positive TST, high ESR, ultrasound, and CT findings can collectively inform the diagnosis (31). The reported tuberculosis exposure rate was 39.8% in a study of pediatric cases with tuberculosis from Turkey (3). A study by Tanrikulu and colleagues (31) reported a family history of tuberculosis in 13 (62%) of their 21 pediatric patients with peritoneal tuberculosis. In another study from India, the reported rate of tuberculosis exposure was 65.1% (15). In the present study, we found contact with an adult with pulmonary tuberculosis in 15 cases (42.9%).

A literature search indicated that the incidences of active pulmonary tuberculosis and of occult infection among abdominal

tuberculosis cases were 27.3% and 17%, respectively (32,33). This incidence was higher in the present study, with active pulmonary tuberculosis being found in 31.4% of our cases. This indicates that abdominal tuberculosis cannot be ruled out in the absence of findings related to pulmonary involvement.

Radiological examinations (chest X-ray, ultrasound, and CT) constitute the main diagnostic modalities when abdominal tuberculosis is suspected. Khan and coworkers (4) found that the most common findings were ascites (79%), lymphadenopathy (35%), omental thickening (29%), and thickening of the intestinal loops (25%) in abdominal ultrasound and CT. Active tuberculosis on chest X-ray was found in 4.8% of the cases. In the present study, 31.4% of patients showed active tuberculosis on chest X-ray. The most common findings on abdominal ultrasound were ascites (87.1%) and mesenteric lymphadenopathy (19.4%).

The presence of acid-fast bacilli in peritoneal fluid with positive culture has rarely been reported in the literature (29,34-36). Bölükbaş et al. (37), in a series of 88 cases of abdominal tuberculosis, calculated the microbiological diagnostic ratio as 11%. Bacilli were present in ascites fluid in two cases in the present study and in intra-abdominal lymph nodes in one case, although there was no growth in culture. Therefore, the probability of establishing diagnosis based on microbiological criteria is slim. In 88.6% of the cases in the present study, granulomas could be demonstrated histopathologically, in agreement with other literature (4).

Complications of abdominal tuberculosis reported in the literature have been intestinal perforation and ileus (8%) (31) and fistula (3.4%) (37). Among our cases, complications included intestinal perforation (8.6%), perforated appendicitis (5.7%), and intestinal invagination (2.9%). However, when these cases were appropriately treated, no sequelae were observed. One complaint at the time of presentation in abdominal tuberculosis is acute abdomen. The frequency of this varies between 7.7-15% (25,31,37,15). The frequency among our patients was 17.1%. Even though patients usually present with prolonged symptoms, it should be noted that patients with abdominal tuberculosis can also present with acute abdomen.

Limitations of this study include its retrospective nature and, therefore, our inability to employ laboratory techniques across all cases. Different forms of abdominal tuberculosis, especially in developing countries, may present with non-specific signs. This study indicates that morbidity and mortality can be decreased by early diagnosis and effective treatment, utilizing imaging techniques and invasive methods together when clinical signs are suspicious.

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