Original Article

Acute Presentation of Koch's Abdomen in Children: Our Experience

Basant Kumar, Vijai Dutta Upadhyaya, Sandeep Kumar Rahul, Laxmi Kant Bharti[1], Ram Nawal Rao[2], Sheo Kumar[3]

Departments of Pediatric Surgical Superspeciality, [1]Pediatric Gastroenterology, [2]Pathology and [3]Radiodiagnosis, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

Abstract

Background: To analyse our experience with acute presentations of abdominal tuberculosis (TB) in children for early diagnosis and management. **Materials and Methods:** From December 2010 to April 2016, available electronic and operation theatre (OT) records of 17 patients with confirmed diagnosis of abdominal TB were analysed retrospectively. Parameters reviewed were age, sex, presentations, diagnostic investigations, surgery/intervention performed, final outcome and follow-up. **Results:** Out of 17 patients, 6 (35.3%) were already operated elsewhere. The duration of symptoms ranged from 4 to 58 weeks. Abdominal pain was present in all cases whereas 11 (64.7%) had abdominal distension, 16 (94.1%) fever, 14 (82.3%) ascites, 9 (52.9%) vomiting, 14 (82.3%) weight loss, 6 (35.3%) anorexia and 4 (23.5%) night sweat. All patients needed surgical intervention for definitive diagnosis. Thirteen (76.5%) out of 17 patients managed by staged surgery and primary anastomosis/repair/adhesiolysis were done in 4 (23.5%) patients. The main post-operative problems were wound infections (8; 47.1%), subacute bowel obstruction (6; 35.3%) and chest infections (12; 70.6%). Follow-up period ranged from 3 months to 5.5 years. **Conclusion:** Abdominal TB should always be considered in differential diagnosis in children presenting with abdominal pain/distension, fever and ascites or with abdominopelvic mass. Recurrent bowel obstruction or anastomotic disruptions also give clues of its diagnosis. A careful history of illness, high index of suspicion, ascitic fluid adenosine deaminase or polymerase chain reaction for *Mycobacterium* needed for early diagnosis. Prompt minimal surgical interventions, preferred diversion over primary anastomosis, algorithmic vigilant post-operative care and early antitubercular treatment required for success in acute crisis.

Keywords: Abdominal tuberculosis, acute abdomen, antitubercular treatment, diagnosis, management

Introduction

Acute presentations of abdominal tuberculosis (TB) almost always pose a challenge during perioperative periods. The disease, though potentially curable, carries a significant morbidity and mortality. Initially, it presents with nonspecific signs and symptoms and usually involves multiple sites with different morphology, presents acutely latter in the absence of proper initial care. There is no single laboratory investigation is pathognomic.[1] Radiology often fails to diagnose it in acute settings. Bacterial culture and tissue histopathology are confirmatory but are time consuming. Demonstration of acid-fast bacilli (AFB) in the tissue or body fluids is usually a negative finding on microscopy. Immunological tests are rewarding but expensive and not easily available in various centres. Management of compromised child during acute presentation is quite difficult and solely depends on clinical judgement and surgical expertise of treating clinician.

The recommended management of Koch's abdomen during acute presentation is to relieve temporary surgical crisis only with minimum interventions. The permanent cure can only be achieved by a full course of antitubercular medications.[1-6] Here, we reviewed our experience retrospectively with acute presentations of abdominal TB in children for early diagnosis and management.

Address for correspondence: Dr. Basant Kumar, Department of Paediatric Surgical Superspeciality, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Raibareli Road, Lucknow - 226 014, Uttar Pradesh, India.
E-mail: drbkpg75@rediff.com

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Materials and Methods

We retrospectively reviewed the patients' electronic and OT records from December 2010 to April 2016, and all available data were collected. Parameters reviewed were age, sex, clinical presentations, diagnostic investigations, surgery/intervention performed, final outcome and follow-up.

Inclusion criteria

Patient must have a definitive diagnosis of TB and either operated or needed interventions for diagnosis.

Criteria of diagnosis

Either isolation of AFB from tissue, aspirate, lymph nodes (Microscopy/Culture) or pathognomic histology (Caseating granulomas) or positive polymerase chain reaction (PCR) with raised adenosine deaminase (ADA; >33 U/L) in body fluids.

Exclusion criteria

Patients with inadequate records or without definitive diagnosis were excluded from the study.

All included patients were from our department; a tertiary level paediatric surgical referral centre. After initial management, all patients underwent for laparotomy/intervention before 72 h. The common clinical presentations were abdominal pain/distension, vomiting, persistent fever and weight loss. The main indications of surgery were bowel obstruction/perforation and abdominal collection with persistent fever. Macroscopic appearance of abdominal cavity and surgery details were reviewed from OT-notes. All patients received standard full/extended course of antitubercular treatment (ATT) after surgery. We routinely advise ATT for 9 months (2 RHEZ +7 RH) in cases of abdominal TB and may extend up to 1 year depending on the condition of individual patient. During perioperative period (on nil per oral patient), we prefer to use second-line ATT (aminoglycoside and fluoroquinolones) and streptomycin.

Results

From December 2010 to April 2016, 42 patients were operated in acute conditions with suspected abdominal TB. Out of 42 patients, 17 patients had confirmed the diagnosis of abdominal TB. Age ranged from 3 to 17 years (median age 13 years), in which 7 were female (M:F = 10:7). None of the patients were immunocompromised, and there were no any associated co-morbid condition. None had concomitant pulmonary pathology. Out of 17 patients, six (35.3%) were already operated elsewhere, in which two patients had enterocutaneous fistula after multiple surgeries and presented with acute abdomen [Figure 1], three patients presented with adhesive bowel obstruction whereas one patient presented as pyeloduodenal fistula after percutaneous drainage for pyonephrosis. All patients needed surgical intervention for definitive diagnosis. The main differential diagnosis was inflammatory causes, Crohn's disease and malignancy [Table 1].

Figure 1: Entero-cutaneous fistula and scar marks of previous surgeries in a child of abdominal tuberculosis

The duration of symptoms ranged from 4 to 58 weeks. Contact history was traced in 7 (41.2%) patients and 14 (82.4%) patients had positive immunisation history (Bacille Calmette-Guérin). Abdominal pain was present in all cases whereas 11 (64.7%) had abdominal distension, 16 (94.1%) fever, 14 (82.3%) ascites, 9 (52.9%) vomiting, 14 (82.3%) weight loss, 6 (35.3%) anorexia and 4 (23.5%) night sweat. The average haemoglobin was 8.4 g/dl (ranged 6.8–12.2 g/dl) and average ESR was 48 mm/h (ranged 24–96 mm/h). Average serum albumin was 2.4 g/dl (ranged 1.8–3.4 g/dl). Raised serum CA-125 value was found in two patients performed for suspected tubo-ovarian malignancy. Anti-neutrophils cytoplasmic antibody was done in one patient to rule out Crohn's disease (result was negative). Abdominal ultrasonography (USG) was performed in all patients and abdominal computed tomography (CT-scan) was done in 5 patients. Abdominal findings on USG/CTscan that suggested TB; elucidated only in 4 (80%) patients.

Ascitic fluid ADA was estimated in 12 patients, in whom 9 (75%) patients had raised ADA value above 33 U/L. PCR for *Mycobacterium tuberculosis* on ascitic fluid/fine-needle aspiration cytology (FNAC) tissues was performed in 4 patients and positive results were found in 3 (75%) patients. Isolation of AFB was possible in only 2 (15.4%) out of 13 patients. Tuberculin test was positive only in 4 (33.3%) out of 12 patients [Table 2].

Initially, laparotomy was performed in 14 out of 17 patients and typical macroscopic findings of TB [Figures 2 and 3] including multiple diffuse involvements of peritoneum, white military nodules (tubercle) or plaques, enlarged/matted/caseating lymph nodes, omental thickening or mass-like appearance, fibrinous strands, ascites were observed in 9 patients. One patient had 'cocooned' abdomen and only omental/peritoneal biopsy was taken, but he responded well on ATT. Three out of 17 patients underwent surgical intervention for diagnosis initially. But latter, in spite of regular ATT, all needed laparotomy for bowel obstruction before 4 months

Table 1: Summary of patient's detail, presentation, intervention and follow-up

Patient's age/sex	Clinical presentation	Differential diagnosis	Intervention/operative finding	Diagnosis by	Follow-up
3 years/ males	Bowel obstruction, fever, growth failure	Inflammatory	Multiple ileal strictures enlarged LNs	Caseating granulomas	ATT; doing well
4 years/ males	Perforation peritonitis	Inflammatory	Ileal strictures with perforation, enlarged LNs	Caseating granulomas	ATT; doing well
6 years/ females	Bowel obstruction, fever, growth failure	Inflammatory	Ileocaecal mass ?Perforation, adhesions, enlarged LNs	Caseating granulomas	ATT; doing well
6 years/ males	Bowel obstruction	Inflammatory	Dense bowel adhesion, tubercles, enlarged LNs	Caseating granulomas	ATT; doing well
9 years/ males	Bowel obstruction	Inflammatory	Ileo-caecal mass ?Perforation, adhesions, enlarged LNs	Caseating granulomas	ATT; doing well
10 years/ females	Adhesive bowel obstruction (operated elsewhere)	Inflammatory	Plastered abdomen, tissue biopsy only	Demonstration of AFB, raised ADA	ATT; multiple episodes of SAIO; managed conservatively; gaining weight
10 years/ males	Adhesive bowel obstruction (operated elsewhere)	Inflammatory	Dense bowel adhesion, tubercles, enlarged LNs	Caseating granulomas, Raised ADA	ATT; two episodes of SAIO; managed conservatively; doing well
12 years/ males	Bowel obstruction	Inflammatory	Terminal ileal bowel mass, Suspected Perforation, Enlarged LNs	Caseating granulomas	ATT; doing well
13 years/ males	Adhesive bowel obstruction (operated elsewhere)	Inflammatory	Ascitic tap, FNAC from enlarged LNs	Raised ADA, positive PCR	ATT; Acute obstruction after 3 months laparotomy (excision of band); doing well
13 years/ males	Enterocutaneous fistula pain, fever, ascites/ collection, weight loss	Inflammatory	Internal bowel fistulae, tubercles, enlarged LNs	Caseating granulomas, raised ADA	ATT, surgery; doing well
14 years/ females	Adhesive bowel obstruction, (after percutaneous drainage for pyonephrosis)	Inflammatory	Malrotation of gut, horseshoe kidney with pyonephrosis of right moiety, adhesions, pyeloduodenal fistula, Enlarged LNs	Caseating granulomas, Raised ADA	ATT; adhesive obstruction in post-operative re-exploration episodes of SAIO; managed conservatively; doing well
14 years/ males	Bowel obstruction/ peritonitis	Inflammatory	Multiple ileal strictures with perforation, enlarged LNs	Caseating granulomas	ATT; doing well, lost in follow-up after 1 year
14 years/ females	Fever, pain, vomiting, diarrhoea, weight loss	Crohn's disease	Multiple ileal/colonic strictures; enlarged LNs	Non-caseating granulomas, raided ADA, positive PCR	ATT; surgery; doing well
15 years/ females	Abdominal mass, ascites, pain, fever, distension, SAIO, weight loss	Malignancy	Ascitic tap, Tru-cut biopsy	AFB isolation, raised ADA	ATT; laparotomy after 1 month for acute obstruction; gaining weight
16 years/ males	Bowel obstruction/ peritonitis	Inflammatory	Ileocaecal mass with ileal perforation, enlarged LNs	Caseating granulomas	ATT; doing well
16 years/ females	Enterocutaneous fistula pain, fever, ascites/ collection, weight loss	Inflammatory	Multiple ileocolic fistulas, fibrous adhesions. Tubercles, enlarged LNs	Caseating granulomas, raised ADA	ATT; surgery; episodes of SAIO; managed conservatively; doing well
17 years/ females	Pelvic mass, ascites, pain, fever, distension, SAIO, weight loss	Malignancy	Ascitic tap, guided FNAC	Raised ADA, positive PCR	ATT; laparotomy after 3 months for Acute obstruction; staged surgery; episode of SAIO; doing well

SAIO: Sub-acute intestinal obstruction; LNs: Lymph nodes; FNAC: Fine needle aspiration cytology; ADA: Adenosine deaminase; PCR: Polymerase chain reaction; ATT: Antitubercular treatment; AFB: Acid fast bacilli

of initial diagnosis. Thirteen (76.5%) out of 17 patients managed by staged surgery and primary anastomosis/ repair/adhesiolysis were done in 4 (23.5%) patients. The main post-operative problems were wound infections (8; 47.1%), subacute bowel obstruction (6; 35.3%) and chest infections (12; 70.6%).

Eight (47.1%) out of 17 patients had a history of ATT. Two patients had a history of full course of ATT for 6 months, but drug doses were not reliable whereas 6 were defaulters. Regardless of previous ATT, all patients received four-drug regimens of ATT comprising rifampicin (10 mg/kg/day), isoniazid (5 mg/kg/day), ethambutol (15 mg/kg/day) and pyrazinamide (30 mg/kg/day) for 2 months and then maintained on isoniazid and rifampicin for 9–12 months. During perioperative period (on nil per oral patient), streptomycin, amino glycoside and fluoroquinolones were used for minimum of 14 days to maximum for 4 weeks. Response was good in all patients. Empirical ATT was started in four patients before definitive histopathological diagnosis.

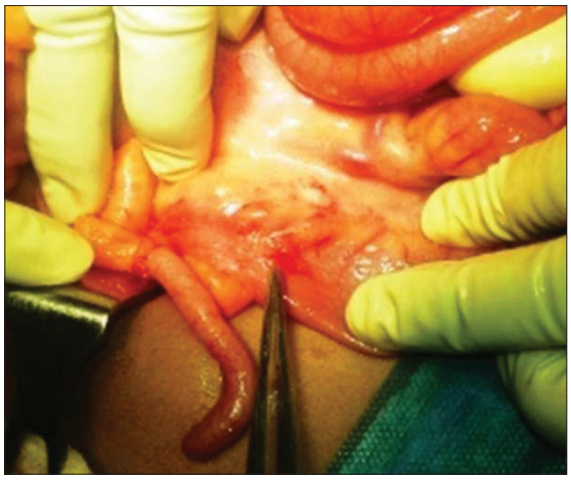

Figure 2: Intra-operative picture showing thick Ileocaecal junction with tubercle and distal ileal stricture

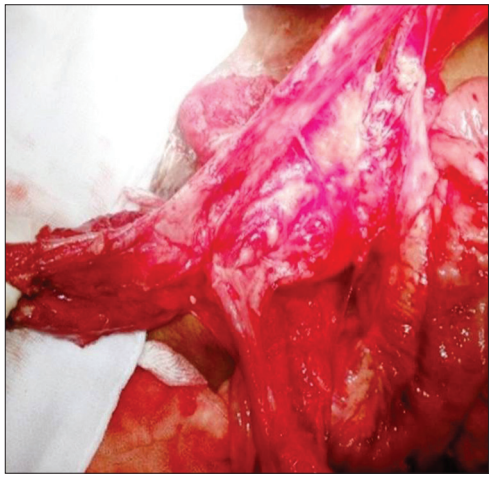

Figure 3: Intra-operative pictures showing internal bowel fistulae and multiple white tubercles

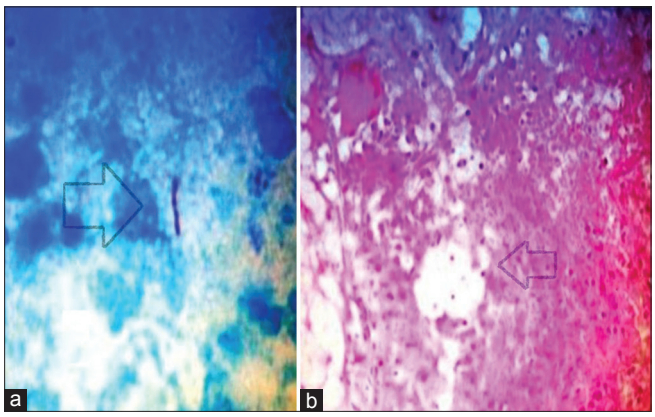

Figure 4: Picture showing isolation of acid-fast bacilli (a) and caseating granulomas (b) on histopathology

Total parental nutrition was given in two patients whereas partial parental nutrition along with distal stoma feed given in 7 patients. Follow-up period ranged from 3 months to 5.5 years. One patient was lost after initial 1 year of follow-up.

Table 2: Positive results of investigations before tissue diagnosis

Investigations	Number of patients		Percentage
	Performed	Positive results/ suggestive of TB	
CT-scan abdomen	5	4	80
X-ray chest	17	0	0
Tuberculin test (Mantoux test)	12	4	33.33
Ascitic fluid/tissue microscopy and culture for AFB	13	2	15.38
Ascitic fluid ADA	12	9	75
PCR for *Mycobacteria*	4	3	75

ADA: Adenosine deaminase; PCR: Polymerase chain reaction; AFB: Acid fast bacilli; CT: Computed tomography, TB: Tuberculosis

Discussion

Extrapulmonary TB constitutes 11%–17% of all cases of TB whereas abdominal TB involves up to 12% of extrapulmonary TB i.e. approximately 3%–4% of all tubercular cases. Six to 38% of untreated pulmonary TB may complicate to abdominal TB.[7-10] The usual causative organism is *M. tuberculosis*. Other strain *Mycobacterium bovis* is responsible for <5% of cases. *Mycobacterium intracellulare* and *Mycobacterium avium* strain usually found in immunocompromised hosts. Clinical presentation differs according to the site of involvement. Systemic manifestation can occur in up to 33% of cases. About 20% concomitant positive radiologic evidence of pulmonary TB is reported,[11-13] but in our series, none had such evidence. Almost all patients had features of bowel obstruction and peritonitis. Abdominal pain and distension, fever, ascites, vomiting and weight loss were prominent features. Small bowel, especially ileocaecal region is the most commonly involved site in the form of strictures or as a mass in this series, also reported in literature.[11-13]

The role of surgery is largely limited to tissue diagnosis in case of peritoneal and lymph nodal TB and management of complications (obstruction, perforation, fistula formation, etc.). In India, approximately 3%–20% of bowel obstruction (most common) and 5%–9% of gastrointestinal perforation (2nd to typhoid) occur because of abdominal TB.[11-13] Resection and anastomosis rather than simple closure of perforation is preferred. Stricturoplasty or segmental resection with 5 cm margins is recommended in cases of multiple strictures. Limited resection of ileocaecal area is preferred rather than formal right hemicolectomy.[11-13] We preferred staged surgery and resection and anastomosis over stricturoplasty. It helped in early enteral feeding in malnourished child, resulted in better outcomes.

TB is a paucibacillary disease and not always possible to obtain microbiological proof. A high index of suspicion in endemic area is needed for diagnosis. Typical granulomas reported in approximately 40% of abdominal TB, and it may present

only in lymph nodes.[13,14] Caseation is a histological marker for abdominal TB and helps in differentiating it from Crohn's disease. In host with good defence response or low virulence of organism, non-caseating granulomas may be seen.[14-16] We found caseating granulomas in almost all resected/biopsy specimens (15/17; 88%) except in two [Table 1 and Figure 4b].

Demonstration of AFB by microscopy or culture in tissue or body fluids is the gold standard for diagnosis but reported yield is quite low [Figure 4a]. We also found it very low (2/13; 15%). Body fluid ADA assay is a useful, rapid and minimally invasive screening test. Stimulation of T-cells by the *Mycobacterium* antigen causes its raised value in the body fluids. Reported sensitivity and specificity of ADA is 93% and 96%, respectively, if cut-off value is taken >33 U/L, but it gives false values in the presence of coinfection of human immunodeficiency virus and in malignant ascites.[17] Ascitic fluid ADA estimation had a good result in our series (9/12; 75%). PCR for *M. tuberculosis* in body fluids or in FNAC/biopsy tissues has rapid diagnosis but reported sensitivity and specificity is comparatively low (77% and 66%, respectively) in cases of abdominal TB,[18,19] but it gave promising result in our series (3/4; 75%) and helped to differentiate from dubious cases of malignancy and Crohn's disease.

Radiology often gives non-pathognomic findings that suggestive of tubercular enteritis. Various typical anatomical deformities, signs, changes in morphology of omentum, peritoneum, mesentery, bowel loops, lymph nodes etc., described in literature as USG, CT-scan, X-rays and contrast study's findings, but in acute settings, all are often not reliable. Other supportive tools include tuberculin test (Mantoux test), family screening and X-ray chest.[10-13,20,21] We strongly suspected abdominal TB in only four (23.5%) patients on the basis of radiology during acute crisis. Laparoscopy and peritoneal biopsy are reliable, quick and safe methods for the diagnosis of abdominal TB. The reported specificity on the laparoscopic appearance alone is approximately 96% and both; sensitivity and specificity increased with histopathology.[22] In our series, none of the patients underwent for laparoscopy because of presentation.

Malabsorption is a common complication of abdominal TB. It occurs because of bacterial overgrowth in stagnant loops, bile salt deconjugation, diminished absorptive surface due to ulceration and lymphatic obstruction.[23,24] Tandon *et al.*[23] reported that approximately 75% patients with intestinal obstruction and 40% of those without intestinal obstruction develop malnutrition and most of them belong to <2 years age groups.[24] Patients of our series were related with family of lower or lower middle socioeconomic status and were malnourished because of prolonged illness. Perioperative nutrition was essential. We used total parenteral nutrition (TPN) and partial TPN with/without enteral feeding through distal stoma in 9 patient having low serum albumin and high stoma output.

Two reports suggest that obstructing intestinal lesions may relieve with ATT alone without surgery.[25,26] Anand *et al.*[25] reported the clinical (91%) and radiological (70%) resolution of tuberculous strictures with drug therapy only even in patients with subacute intestinal obstruction. Surgery needed in only 8% of cases in his series. The predictors of need for surgery are long strictures (>12 cm) and multiple areas of involvement. According to Balasubramanian *et al.*;[26] the mean time interval required for the relief of obstructive symptoms was 6 months from initiation of drug therapy. We also agree with this interference that's why we prefer ATT for 9–12 months. In our series, almost all patients had disseminated abdominal TB. In spite of regular ATT, 3 patients who initially responded well-needed laparotomy for bowel obstruction within 4 months. We interfere that not only stricture length and multiple area involvement but also the duration of illness and abdominal collection (ascites) are important factors that necessitate surgery in spite of adequate ATT.

This study has limitations because of its retrospective nature, small number and spectrum of presentations of patients, but we can conclude that abdominal TB is a major cause of acute abdomen in children, especially in endemic areas. In acute crisis, diagnosis is almost always delayed. It should be always considered in differential diagnosis in children presenting with abdominal pain/distension, fever, ascites and abdominopelvic mass. Recurrent bowel obstruction or anastomotic disruptions also give clues of its diagnosis. A careful history of illness, high index of suspicion, ascitic fluid ADA or PCR are needed for early diagnosis. Prompt minimal surgical interventions preferred diversion over primary anastomosis, algorithmic vigilant post-operative care and early ATT required for success in acute crisis. ATT can be started without tissue diagnosis or isolation of bacteria in cases of high clinical suspicion. Malnutrition and malabsorption are important issues to be addressed well in post-operative period, and it needs multidisciplinary approach. Control of sepsis, correction of malnutrition and early initiation of enteral feeds are the key factors for better results.

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Conflicts of interest

There are no conflicts of interest.

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