A Ten-year Review of Peritoneal Tuberculosis in Children at a Government Tertiary Hospital

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ABSTRACT

Background. Peritoneal tuberculosis comprises 5% of all forms of tuberculosis in children. There are limited reports of peritoneal TB in children.

Objective. To determine the clinical, biochemical, radiologic, histologic, and microbiologic features and outcome of pediatric patients diagnosed with peritoneal tuberculosis.

Methods. Review of medical records from 2011-2020 of patients fulfilling diagnostic criteria of peritoneal TB. Patient was considered as bacteriologically-confirmed if with positive AFB smear, culture, or PCR on peritoneal or omental tissue; and clinically-diagnosed if with clinical findings AND presence of histologic and/or radiologic evidence of extra-pulmonary TB. Data was presented as mean (SD) or n (%), as appropriate.

Results. Eighteen patients [Mean (SD) age: 14.27 (± 4.1) years old, 56% males] were included. All had disseminated TB with peritoneal involvement. One case was bacteriologically-confirmed (TB PCR positive omental tissue); 17 were clinically-diagnosed. Most common presentation was abdominal distention (83%) and abdominal pain (61%). Most common physical finding was abdominal distention (83%) and abdominal tenderness (44%). Seven patients (39%) had anemia, 11 (61%) had leukocytosis, and three (17%) had thrombocytosis. Thirteen (72%) had hypoalbuminemia. Ten (56%) were positive on AFB smear, TB culture, and PCR of various specimens. Fourteen of sixteen (88%) with abdominal CT scan had ascites and intrabdominal lymphadenopathy. Nine of 12 tissue samples from seven patients demonstrated chronic granulomatous inflammation. Seventeen were given quadruple anti-TB. Six also had surgery. Overall, 15 were discharge improved after mean of 4.2 weeks of hospital stay, while three died of sepsis. Eleven of the 15 were well one month after discharge.

Conclusion. Peritoneal TB presents with non-specific clinical and laboratory features. Radiologic and histologic findings increase the likelihood of diagnosis. The prognosis is favorable for patients who are diagnosed and treated with anti-TB drugs.

Keywords: peritonitis, disseminated tuberculosis, ascites, intraabdominal lymphadenopathy

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INTRODUCTION

Tuberculosis (TB) is a major cause of mortality worldwide and the leading cause of death from a single infectious agent, the *Mycobacterium tuberculosis*. Globally, an estimated 10 million TB cases were diagnosed in 2018.[1] The disease affects people of all age groups with 11% of cases occurring in children aged 14 years and below. In the Philippines, a total of 371,668 new and relapse cases were noted in 2018, with 98% of the cases from a pulmonary source.[1] Extra-pulmonary sites of TB infection include the lymph node, brain, skeletal system such as Pott's disease, renal and abdomen.

TB of the abdomen ranked sixth among the most frequent form of extra-pulmonary site.[2] Abdominal TB may involve the liver and hepatobiliary tract, intestine, or peritoneum, to which the latter is the most difficult to diagnose due to non-specific signs and symptoms. In a systematic review[3] of three case series and 11 case reports, 19 of 45 (42%) children with abdominal TB were diagnosed to have peritoneal TB, most (73%) of whom more than 10 years of age. However, in two local studies[4,5], only six (12%) of 50 children with abdominal TB were diagnosed to have peritoneal involvement. Peritoneal TB results from hematogenous spread or contagious extension from an abdominal focus or mesenteric lymph node. There has been no local study that reported on the features and outcome of patients with peritoneal TB, both in adults and children, as these patients are only collectively included in studies of abdominal TB. A search of the Philippine Pediatric Society Registry of diseases from 2006 up to December 2022 showed that out of 5,144,874 cases, only 661 (0.013%) were diagnosed to have tuberculosis of the intestine, peritoneum, and mesenteric glands (A18.3).

Peritoneal TB is uncommon and the diagnosis is often not considered due to non-specific signs and symptoms of abdominal pain, abdominal distention, fever, and weight loss, and difficulty of confirming the diagnosis. Defining the features and outcome of the disease is important to avoid delay in the diagnosis and treatment of the disease. The present study determined the clinical, biochemical, radiologic, microbiologic, and histologic features and the outcome of pediatric patients diagnosed with peritoneal tuberculosis.

METHODS

This is a retrospective cohort study conducted at the Division of Pediatric Gastroenterology, Hepatology and Nutrition of the University of the Philippines Manila-Philippine General Hospital from 2011 to 2020. All patients below 19 years referred from 2011 to 2020 who fulfilled the criteria for diagnosis of peritoneal tuberculosis were included. This paper received ethical approval of its conduct from the ethics committee of the said institution.

The diagnosis of peritoneal TB was made in the presence of clinical signs (abdominal mass, ascites, abdominal tenderness, ileus) and symptoms (abdominal distention, abdominal pain, weight loss, anorexia, and fever) of peritonitis PLUS the presence of any of the following: (1) positive AFB smear, PCR or culture of ascitic fluid or tissue (peritoneum, mesentery or omental) biopsy; (2) radiologic findings of nodular or thickening or fat stranding in the peritoneum, mesentery, and omentum with ascites and enlarged hypodense lymph nodes; or (3) histologic features of granulomatous inflammation with or without caseation, presence of Langhans giant cells. Patients were classified as either bacteriologically-confirmed if the peritoneal, omental, or mesenteric tissues were positive on acid fast bacilli smear, culture, or TB PCR; or clinically-diagnosed in the presence of signs and symptoms AND, if with histologic, and/or radiologic findings of peritoneal TB.

The manual database of patients from the Divisions of Pediatric Gastroenterology, Hepatology and Nutrition, Infectious and Tropical Diseases in Pediatrics and Pediatric Surgery were reviewed and patients with a discharge or final diagnosis of either abdominal, gastrointestinal, intestinal, military, or disseminated tuberculosis with associated ascites and/or ileus were noted. Based on the data files, patients with signs and symptoms suggestive of peritoneal TB and with available imaging or organ tissue biopsy of the abdomen were considered for the study. The medical records of these patients were retrieved and those who fulfilled the inclusion criteria were included. The age and sex of the patient, onset of illness and associated symptoms of fever, abdominal pain, abdominal distention, anorexia, and weight loss were noted. The nutritional status was recorded as well as the presence or absence of a BCG scar, abdominal mass, abdominal tenderness, or ascites. History of treatment for TB and history of exposure to tuberculosis were logged. The outcome of a PPD test, if done, was noted.

The results of the various investigations were verified, including the complete blood count; serum albumin, liver enzymes (aspartate aminotransferase and alanine aminotransferase), total and direct bilirubin, C – reactive protein (CRP), procalcitonin, alpha-fetoprotein (AFP), and beta – human chorionic gonadotropin (B-hCG). The number of patients with abnormal results were accounted. Microbiologic studies of AFB stain, TB culture, TB – PCR and gene expert of different specimen (sputum, gastric, urine, stool, and peritoneal fluid) were recorded. Imaging findings of the chest and abdomen, and the results of the abdominal ultrasound and computerized tomography (CT) scan were documented. Histologic studies of any tissue and results of any tissue AFB stain or TB culture were also considered.

We also reviewed the patient's duration of treatment and any adverse effect encountered. Any surgical intervention was noted. The outcome of the patient was described as alive, alive with sequalae or died. If the patient died, the cause of death was determined. The duration of follow up was ascertained.

RESULTS

During the 10-year study period, a total of 333 cases were referred to the Division of Pediatric Gastroenterology, Hepatology and Nutrition with a final diagnosis of abdominal, gastrointestinal, intestinal, military or disseminated tuberculosis. Of these, majority (76%) had a diagnosis of Disseminated TB (Table 1), most of which involves the liver (108 cases) and intestines (112 cases). There were three reported cases that manifested with peritoneal involvement.

The data files of 333 patients were reviewed and 188 cases showed clinical features compatible with peritoneal TB. Of these, 18 were included in the final study based on

the results obtained from abdominal imaging studies or from tissue biopsies of selected abdominal organs. (Table 1)

One case was bacteriologically confirmed as Peritoneal TB, based on a positive omental tissue TB-PCR. Seventeen patients were classified as clinically diagnosed based on positive signs and symptoms with radiological evidence and/or histologic findings. Specifically, 11 patients had radiologic features of peritoneal involvement on abdominal CT scan; four had radiologic and histologic findings; and two had only histologic findings with no radiologic evidence as they immediately underwent surgical intervention. All 18 patients included in this study were diagnosed with Disseminated tuberculosis and only one case did not have any pulmonary or intestinal involvement but had TB of the liver, omentum, and lymph node. Overall, peritoneal tuberculosis comprised 18 out of 333 (5%) pediatric cases with abdominal TB referred to the institution in the last 10 years.

Table 1. Distribution of 333 Patients with a Final Diagnosis of Abdominal, Gastrointestinal, or Disseminated Tuberculosis Cases Referred from 2011 to 2020

	Patients	%
Final Diagnosis		
Intestinal tuberculosis	33	9.9
Hepatic tuberculosis	44	13.2
Disseminated tuberculosis	256	76.8
Intestine involvement – 112 cases Liver involvement – 108 cases Peritoneal – 3 cases		
Total	333	100
Cases clinically compatible with Peritoneal TB		
Disseminated tuberculosis	160	85.1
Intestinal tuberculosis	18	9.6
Hepatic tuberculosis	10	5.3
Total	188	100
Cases fulfilling inclusion criteria		
Disseminated tuberculosis	18	100

Table 2. Demographic and Clinical Profile of the 18 Patients with Peritoneal Tuberculosis, n (%)

	n (%)
Age (years)	
<5	1 (6)
5–10	2 (11)
11–14	4 (22)
15–18	11 (61)
Sex	
Male	10 (56)
Female	8 (44)
Clinical presentation	
Abdominal distention	15 (83)
Abdominal pain	11 (61)
Fever	8 (44)
Vomiting	8 (44)
Anorexia	7 (39)
Weight loss	6 (33)
Physical examination	
Abdominal distention/ascites	15 (83)
Abdominal tenderness	8 (44)
Jaundice	5 (28)
Lymphadenopathy	5 (28)
Abdominal mass	4 (22)

Clinical features (Table 2)

The mean (SD) age of the patients was 14.27 (± 4.13) years old, with the youngest at four and the oldest at 18 years. Majority (56%) were males and in the age group of 11-18 years. Three had a past history of TB treatment and five (28%) had positive exposure to a family member or relative. Of the 18, 11 cases had BCG scars. The mean (SD) duration of symptoms before diagnosis was 2.8 (± 2.5) months, as early as two weeks to as long as nine months. The most common presenting symptoms were abdominal distention (83%) and abdominal pain (61%). On physical examination, majority had abdominal distention (83%). Four (22%) patients had a suspicious palpable abdominal mass. Associated malnutrition was seen in five patients (two classified as moderate and three as severe), two of whom also had severe stunting.

Biochemical features

Seven (39%) had anemia (hemoglobin <10 g/L), 11 (61%) had leukocytosis (white cell count of >10 x 10^9/L), and 3 (17%) had thrombocytosis (platelet count >450 x 10^9/L) while the rest had normal platelet count. Majority (72%) have hypoalbuminemia (Albumin <30 g/L). Hypoprothrombinemia was seen in four cases. Increased aspartate aminotransferase, alanine transferase, and bilirubin were noted in five (28%), three (17%) and six (33%) patients, respectively. The increase in the liver enzymes were only mildly elevated (AST range of 1.1 – 2.6x and ALT range 1.3 – 3.1x above the upper limit of normal values) and these cases had concomitant liver or kidney involvement, while subjects with cholestasis also have hepatic TB. Elevated CRP level was noted in all five patients who had the test done. Only one of the five patients with procalcitonin determination had increased result. The tumor markers of AFP and beta-hCG were done on seven patients and all had normal levels.

Peritoneal studies (Table 3)

Paracentesis was performed in three cases and peritoneal fluid samples were sent for analysis. All the ascitic fluid studies showed elevated WBC with lymphocytic predominance. However, all cases did not detect *Mycobacteria* in their ascitic fluid AFB smear, culture, and TB PCR studies. Only patient #6 had a serum-ascites albumin gradient (SAAG) below 1.1 g/dL.

Microbiologic features (Table 4)

Majority of the subjects (10 cases, 56%) have positive microbiologic evidence for tuberculosis. Seventy-one TB

Table 3. Peritoneal Fluid Studies of Three Patients with Peritoneal Tuberculosis

	Patient #4	Patient #6	Patient #7
Peritoneal fluid			
WBC	298	102	460
PMN	39%	11%	30%
Lymphocytes	61%	89%	70%
LDH (IU/L)	125	349	277
Total Protein (g/L)	22.30 ↑	61.59 ↑	121 ↑
Albumin (g/L)	<10	21	33
Glucose (mg/dL)	107.14	63.64	101.45
Bacterial Culture	No growth	No growth	No growth
AFB stain	No AFB seen	No AFB seen	No AFB seen
TB Culture	No growth	No growth	No growth
TB PCR	Negative	Negative	Negative
Serum Chemistry			
Serum Albumin (g/L)	25	30	45
SAAG (g/dL)*	> 1.5	0.9	1.2

** SAAG: Serum to Ascitic fluid Albumin Gradient – obtained by subtracting the ascitic fluid albumin from the serum albumin*

Table 4. Results of AFB stain, TB culture, TB PCR and GeneXpert MTB of 18 Patients with Peritoneal Tuberculosis

	AFB stain	TB Culture	TB PCR	GeneXpert MTB
Pulmonary				
Sputum	2/16	1/2	0/2	3/3
Gastric	1/6	0	0/1	0
ETA	0/1	0	0	0
Extra pulmonary				
Stool	4/10	0	0	0
Urine	2/15	0	0	0
Peritoneum	0/4	0/3	0/3	0
Omentum	0/1	0	1/1	0
Colon tissue	0/1	0/1	1/1	0
Liver tissue	0/1	0	0	0
JP drain	0/1	0	0/1	0
Total number done	56	6	9	3

microbiologic tests were done from specimen coming from various sites. Positive TB PCR analyses were obtained from the omentum of a 14-year-old boy who underwent exploratory laparotomy and another from the colon of an 18-year-old male who had colonoscopy. Sputum TB GeneXpert were positive in three cases whose signs and symptoms were highly suggestive of tuberculosis but their standard TB microbiologic studies (AFB smears, TB PCR or TB cultures) were negative.

Radiologic features (Table 5, Figures 1 and 2)

A total of 17 patients had ultrasound and/or CT scan of the abdomen. Sixteen (88%) had an abdominal CT scan done on admission while two had none as they immediately underwent surgical intervention for an assessment of acute appendicitis. The most common ultrasound and CT scan finding was ascites (15/17, 88%), 14 on CT scans and in one case was documented on ultrasound only. On CT scans, other frequent findings were intrabdominal lymphadenopathy (88%), omental (63%) and mesenteric thickening (38%). The ascites was described as lobulated/complicated ascites in five cases (33%) while the rest were free floating.

Only one of 18 patients had a normal chest Xray result. The most common chest Xray findings were pleural effusion (61%), reticulonodular opacities (33%), and parenchymal infiltrates (22%).

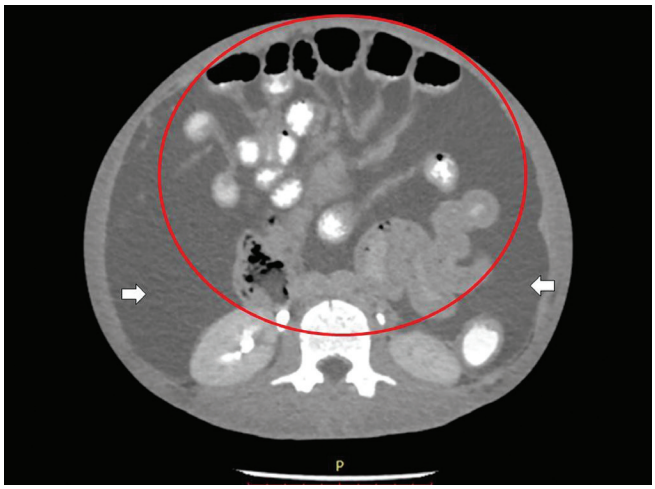

Figure 1. CT Scan of the abdomen demonstrating massive ascites *(white arrows)* with central displacement of the bowel loops and mesentery with loculations *(red circle)*.

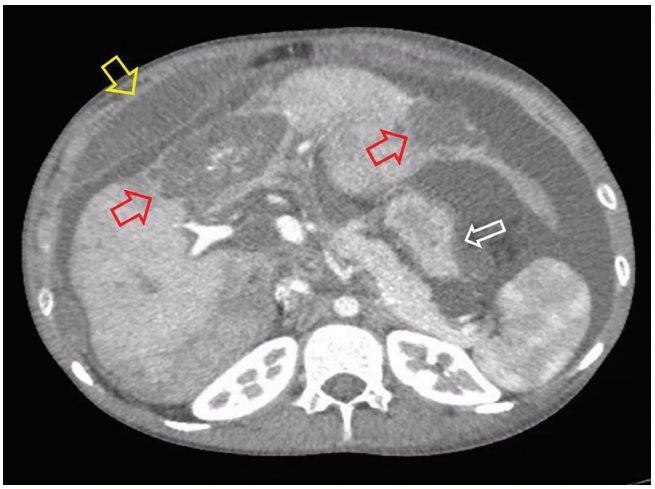

Figure 2. CT Scan of an 18-year-old male patient with massive ascites with peritoneal thickening *(white arrow)* associated hepatic *(red arrows)* and intramuscular abscess formation *(yellow arrow)*.

Table 5. Abdominal Ultrasound and CT Scan Findings of 17 Cases with Peritoneal Tuberculosis, n (%)*

	Abdominal Ultrasound (n=13)	Abdominal CT scan (n=16)
Ascites	12 (92)	14 (88)
Intra-abdominal lymphadenopathy	-	14 (88)
Omental thickening or fat stranding	1	10 (63)
Mesenteric thickening or fat stranding	-	6 (38)
Bowel wall thickening	2	5 (31)
Central pooling of bowels	-	5 (31)
Hepatomegaly	3	5 (31)
Mesenteric nodularity	-	4 (25)
Peritoneal nodularity	-	4 (25)
Peritoneal thickening	-	3 (19)

** Some patients may have more than one finding*

Table 6. Histologic Findings of 12 Tissue Samples from Seven Patients with Peritoneal Tuberculosis

Tissue Sample (N)	Histopathology results
Omentum (3)	• Chronic granulomatous inflammation with giant cells and caseation necrosis • Chronic granulomatous inflammation with calcified nodules • Result not known
Terminal ileum (2)	• Chronic ileitis with granulomatous inflammation • Chronic ileitis with granulomatous inflammation
Peritoneal fluid (2)	• Acute and chronic inflammatory cells • Negative for malignant cells
Descending colon	• Chronic colitis with granulomatous inflammation
Liver seedings	• Chronic granulomatous inflammation with Langhans giant cells and caseation necrosis
Omental seedings	• Chronic granulomatous inflammation with Langhans giant cells and caseation necrosis
Ascending colon	• Chronic colitis with granulomatous inflammation
Appendix	• Chronic granulomatous inflammation and caseation necrosis

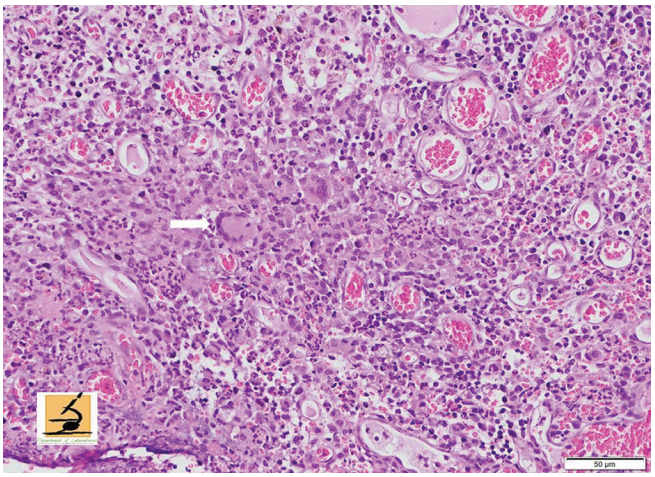

Figure 3. Omental biopsy of a 5-year-old female obtained during exploratory laparotomy showing chronic granulomatous inflammation with Langhans-type giant cell *(white arrow). (Photo courtesy of the Department of Laboratories of the Philippine General Hospital).*

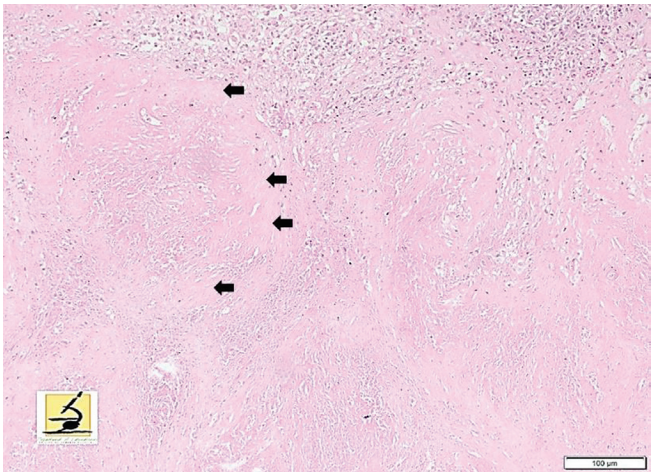

Figure 4. Area of caseation necrosis seen on omental tissue biopsy *(black arrows). (Photo courtesy of the Department of Laboratories of the Philippine General Hospital).*

Histological features (Table 6, Figures 3 and 4)

A total of 12 tissue samples were obtained from seven patients but only 11 were reported as one omental tissue was lost. These specimens were obtained at different sites of the abdomen either during the surgery (six patients) or colonoscopy (one). Of these, nine samples had histologic findings of chronic granulomatous inflammation of which four had concomitant caseation necrosis. Two peritoneal fluid samples showed acute and chronic inflammation with the absence of malignant cells.

Treatment (Figure 5)

Seventeen patients received medical treatment while one died of sepsis even before treatment could be started. Of the 17 cases, 15 were treated with the first line quadruple treatment with two receiving also an additional Streptomycin for a previous failed response with the first line drug. One patient was started on 2nd line anti-tuberculosis due to the consideration of multi-drug resistance tuberculosis and concomitant liver parenchymal involvement. Another was given Azithromycin, Ethambutol, Rifampicin on the basis of a positive non-MTB test.

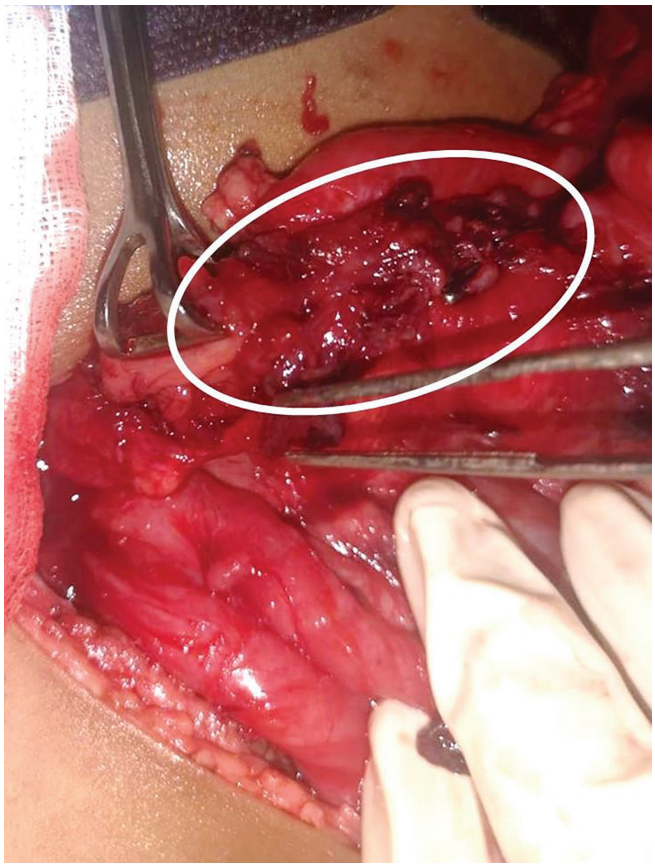

Figure 5. Exploratory laparotomy of a 4-year-old female with acute severe cholangitis showing matted omentum over the bowels *(white circle)* with dense adhesions between bowel loops.

Six subjects (33%) underwent surgical intervention for an assessment of acute appendicitis (2), acute severe cholangitis (2) and for an abdominal abscess requiring drainage and lavage (1). A diagnostic laparoscopy was also done on a 17-year-old with persistent vomiting and abdominal distention from ascites but with no signs of bowel dilatation on imaging. The findings showed nodular whitish mass on the omentum which on histology was read as chronic granulomatous inflammation with calcified nodules. Moreover, a diagnostic colonoscopy was also performed in an 18-year-old who presented with abdominal distention with CT scan findings of massive ascites, omental thickening, and central pooling of bowel loops.

Outcome

Fifteen patients were discharged improved after a mean (SD) length of hospital stay of 4.2 weeks (± 1.9) while three died due to septic shock from nosocomial sepsis. Eleven of the 15 patients were followed up after one month and then continued their treatment with the local hospital. Four patients were lost to follow up.

DISCUSSION

Our present study showed that peritoneal TB is a rare disease and was only noted in 5% of all pediatric abdominal tuberculosis referred in a tertiary government hospital in the last 10 years. It presents with non-specific clinical and laboratory features and is diagnosed as part of disseminated tuberculosis. Radiologic and/or histologic findings increased the likelihood of diagnosis in patients with the presence of clinical signs and symptoms.

Our data confirmed that peritoneal TB is usually seen in older children. The mean age of our patients at diagnosis was 14 years, akin to the mean age in a case series of nine children with TB peritonitis in Turkey.[6] TB usually spreads by close contact, however, only 28% of our patients had a family history of TB and infection might have been acquired in the community. Similarly, only 1 of 13 children diagnosed to have abdominal TB (nine of whom with peritoneal involvement) in Tunisia[7] had a family history of PTB and it was surmised that infection was from *Mycobacterium bovis* from drinking of unpasteurized milk. The BCG vaccination is supposed to prevent development of TB meningitis and disseminated TB and yet 68% of our patients had BCG vaccination, as evidence by the presence of a scar, and four of the nine Turkish[6] children as well, eventually developed TB peritonitis.

The clinical presentation of peritoneal TB is usually insidious and the signs and symptoms maybe non-specific including abdominal distention, abdominal pain, fever, and weight loss. The mean duration of symptoms before diagnosis in our patients was three months, as early as two weeks to as long as nine months while in the nine children reported from Turkey, it was at 41 days. The majority of patients will present with abdominal distention secondary to the ascites, as observed in 83% of our cases and in 31 to 100% in other studies.[6,8-10] Rarely, the presentation of peritoneal TB is an acute abdomen resulting in surgery. Two of our patients were initially diagnosed to have acute appendicitis before the exploratory laparotomy. A similar report of a patient who presented with acute abdomen and fever was noted on laparotomy to have caseating granuloma of the lymph nodes.[11] Fever was observed in only eight of our 18 (44%) patients, in agreement with previous findings that an associated fever maybe present in only 40 to 60% of cases.[6,8-10]

The biochemical indices are usually non-specific and of little diagnostic yield. Anemia was observed in 40% of our patients, which was lower than a previous report of 60% in 145 adults from South Africa[12] and in 75 to 90% of adult patients with TB peritonitis with or without chronic liver disease[13]. Sixty percent of our cases had leukocytosis but only three had thrombocytosis. In adult studies, leukocytosis is reported in 10 to 30% of adult cases and reactive thrombocytosis in 45%.[8] The analysis of ascitic fluid may assist in the diagnosis which normally has exudative features with serum albumin to ascites gradient <1.1. g/dL.[8] The ascites samples acquired from three of our patients were considered exudative based

on the pleocytosis with lymphocytic predominance and high total protein. However, the serum-ascites albumin gradient was <1.1 g/dL in only one patient. The other two had a high SAAG value due to presence of chronic liver disease secondary to hepatic TB which decreased serum albumin levels (patient #4) and the other who had an albumin transfusion before the paracentesis (patient #7) giving a falsely high serum albumin result.

In 2013, WHO introduced the use of the GeneXpert MTB/RIF assay on pulmonary samples, where it has high sensitivity and specificity, and has been recommended for national TB programs in developing countries.[14] The test is aimed at detecting specific regions of bacterial DNA or RNA and have been shown to have a 95% sensitivity in sputum smear positive patients. However, its validity in diagnosis of peritoneal TB is unknown. Among 21 patients with biopsy proven intestinal TB who had peritoneal fluid analysis, only six (28.6%) were positive on GeneXpert while 15 were negative giving a low diagnostic accuracy. DNA amplification has been reported as a diagnostic tool in the diagnosis of peritoneal TB in two patients on continuous ambulatory peritoneal dialysis[15], however, peritoneal TB based on clinical and radiologic findings with negative ascitic fluid TB PCR has also been reported[16].

In all but one of our patients, the diagnosis of TB peritonitis was made based on clinical findings and the presence of any radiologic and or histologic involvement of the peritoneum. Computed tomography with contrast media administration, which was done in 16 of our patients, remains the imaging modality of choice to document both the peritoneal, omental, and mesenteric changes. The most common peritoneal involvement in our patients was ascites or fluid infiltration which was documented in 15 of 17 cases (88%) on abdominal imaging. The ascites was both free and loculated with typically higher attenuation values relative to water due to its high protein and cellular content. Peritoneal TB has been classified as "wet" type, if there is abundant ascites; "fibrotic" if peritoneal or mesenteric thickening is observed with loculated ascites; and "dry" if with mesenteric thickening and fibrous adhesions in the peritoneum that can appear as an "omental cake".[7] Two of our patients had no ascites on CT scan but it is still difficult to classify them as "dry" type as they were seen to have mesenteric and peritoneal thickening and nodularity, thus the overlap on the features of the dry and fibrotic types. Other findings suggestive of peritoneal tuberculosis on CT scan included intraabdominal lymphadenopathy, observed in the majority (77%) of our patients. However, this finding should not be confused with other medical conditions that may present similarly with peritoneal TB including peritoneal lymphoma, carcinomatosis, and metastases from other abdominal tumors.

In terms of histology, the hallmark of Mycobacterium tuberculosis infected tissue is necrotizing granulomatous inflammation, composed of epithelioid histiocytes surrounding a central necrotic zone, and can be accompanied by a variable number of multinucleated giant cells and lymphocytes. Chronic granulomatous inflammation was seen on nine of 12 tissue samples from seven of our patients, four of which had caseation necrosis. Similarly, among 91 Chinese adults with peritoneal TB, the most common pathologic findings were granulomatous inflammation (78%) and caseous necrosis (42%). Langhans giant cells were also observed in 25 Chinese patients, and was found to be more common in the wet-ascitic type (20/48, 42%) than in the fibrotic or dry type of peritoneal TB (5/43, 11.6%).[11]

The treatment of peritoneal tuberculosis is mainly medical and surgery is reserved for patients whose signs and symptoms may mimic an acute abdomen. In our study, 17 patients were treated with HRZE or a second line drug, depending on the indications and an improvement was seen in eleven patients with resolution of symptoms, weight gain, and disappearance of ascites after one month of treatment. Surgery was done in only six of our patients, four of whom mimicked an acute abdomen, one for an abscess drainage and another as a diagnostic laparoscopy. In other centers, laparoscopy has been advocated for children with relevant history for the diagnosis of peritoneal TB as this will allow you to retrieve tissue of histopathological diagnosis. This procedure was done in seven of nine children from Turkey[6] and in two of nine from Tunisia[10]. Laparoscopy was done in only one of our patients with persistent vomiting and ascites but with no bowel dilatation on imaging.

Results of this study is limited by its retrospective nature done in a tertiary government medical center in whom the worst patients are referred. There were only three patients who had Gene Expert studies of the sputum as specimen for those requiring the test was sent in another institution. There was also limited duration of follow up as these patients were from different regions of the country and had opted to follow up locally after discharge.

CONCLUSION

Peritoneal tuberculosis presents with non-specific clinical and laboratory features. Characteristic radiologic and histologic findings increase the likelihood of diagnosis. The prognosis is favorable for patients who are diagnosed and treated with anti-TB drugs. Surgery is reserved for patients whose presentation may mimic an acute abdomen or for diagnostic indications.

Statement of Authorship

Both authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

Both authors declared no conflicts of interest.

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REFERENCES

1. World Health Organization, Global tuberculosis report 2019 [Internet]. 2019 [cited 2019 Oct]. Available from: https://apps.who.int/iris/handle/10665/329368.
2. Sharma MP, Bhatia V. Abdominal tuberculosis. Indian J Med Res. 2004 Oct; 120(4):305-15.
3. Delisle M, Seguin J, Zeilinski D, Moore DL. Paediatric abdominal tuberculosis in developed countries: case series and literature review. Arch Dis Child. 2016 Mar;101(3):253-8. doi: 10.1136/archdischild-2015-308720.
4. De Castro SV. Clinical profile and factors associated with gastrointestinal tuberculosis among Filipino children. Int J Gastroenterol Hepatol Transpl Nutr 2016;1(2):41-9.
5. Avendano A, Cua L, Villabroza M, Santos J, Sadang S. Clinical profile and outcome of patients with abdominal tuberculosis, a 20-year PCMC experience. PCMC J. 2004 Dec;5(1):2-9.
6. Suntur BM, Kuşçu F. Pooled analysis of 163 published tuberculous peritonitis cases from Turkey. Turk J Med Sci. 2018 Apr;48(2):311-7. doi: 10.3906/sag-1701-32.
7. Tinsa F, Essaddam L, Fitouri Z, Brini I, Douira W, Ben Becher S, et al. Abdominal tuberculosis in children. J Pediatr Gastroenterol Nutr. 2010 Jun;50(6):634-8. doi: 10.1097/MPG.0b013e3181b6a57b.
8. Sanai FM, Bzeizi KI. Systematic review: tuberculous peritonitis--presenting features, diagnostic strategies and treatment. Aliment Pharmacol Ther. 2005 Oct; 22(8):685-700. doi: 10.1111/j.1365-2036.2005.02645.x.
9. Dinler G, Sensoy G, Helek D, Kalayci AG. Tuberculous peritonitis in children: report of nine patients and review of the literature. World J Gastroenterol. 2008 Dec;14(47):7235-9. doi: 10.3748/wjg.14.7235.
10. Zhu C, Liu S, Zhai J, Chen Z, Wu K, Li N. Clinical and pathological features of three types of peritoneal tuberculosis: a single centre in China. Biomed Res. 2016;27(4):1302-8
11. Kılıç Ö, Somer A, Hançerli Törün S, Keser Emiroğlu M, Salman N, Salman T, et al. Assessment of 35 children with abdominal tuberculosis. Turk J Gastroenterol. 2015 Mar;26(2):128-32. doi: 10.5152/tjg.2015.6123.
12. Shakil AO, Korula J, Kanel GC, Murray NG, Reynolds TB. Diagnostic features of tuberculous peritonitis in the absence and presence of chronic liver disease: a case control study. Am J Med. 1996 Feb;100(2):179–85. doi: 10.1016/s0002-9343(97)89456-9.
13. Manohar A, Simjee AE, Haffejee AA, Pettengell KE. Symptoms and investigative findings in 145 patients with tuberculous peritonitis diagnosed by peritoneoscopy and biopsy over a five year period. Gut. 1990 Oct;31(10):1130–2. doi: 10.1136/gut.31.10.1130.
14. Ahmad R, Changeez M, Khan JS, Qureshi U, Tariq M, Malik S, et al. Diagnostic accuracy of peritoneal fluid GeneXpert in the diagnosis of intestinal tuberculosis, keeping histopathology as the gold standard. Cureus. 2018 Oct;10(10):e3451. doi: 10.7759/cureus.3451.
15. Lye WC. Rapid diagnosis of Mycobacterium tuberculous peritonitis in two continuous ambulatory peritoneal dialysis patients, using DNA amplification by polymerase chain reaction. Adv Perit Dial 2002;18:154–7.
16. Schwake L, von Herbay A, Junghanss T, Stremmel W, Mueller M. Peritoneal tuberculosis with negative polymerase chain reaction results: report of two cases. Scand J Gastroenterol. 2003 Feb;38(2):221-4.