Abdominal tuberculosis: Is there a role for surgery?

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INTRODUCTION

It is important that surgeons are familiar with the various manifestations of tuberculosis (TB). Although TB has been declining in incidence in the developed world, it remains an important problem in endemic areas of the developing world. The aim of the review was to elucidate the natural history and characteristics of abdominal TB and ascertain the indications for surgery. TB can affect the intestine as well as the peritoneum and the most important aspect of abdominal TB is to bear in mind the diagnosis and obtain histological evidence. Abdominal TB is generally responsive to medical treatment, and early diagnosis and management can prevent unnecessary surgical intervention. Due to the challenges of early diagnosis, patients should be managed in collaboration with a physician familiar with anti-tuberculous therapy. An international expert consensus should determine an algorithm for the diagnosis and multidisciplinary management of abdominal TB.

Key words: Tuberculosis; Peritoneal; Intestinal; Surgery; Anti-tuberculous therapy

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Core tip: It is important to bear in mind the non-specific manifestations of abdominal tuberculosis. There is no gold standard for the diagnosis and high clinical suspicion is required. Diagnostic laparoscopy is increasingly useful but joint decision making with physician familiar with anti-tuberculose therapy is important. Surgery is reserved for abdominal complications.

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accounts for between 5% and 10% of TB notifications in the United Kingdom. Greater than 75% of cases occur in immigrants, with most coming from the Indian sub-continent\[^2,3\]. There is a slight male predominance in abdominal TB with a peak incidence in the 4\(^{th}\) and 5\(^{th}\) decades in the immigrant population, and in the elderly in the United Kingdom\[^3,4\]. In the United States, among native-born white Americans, abdominal TB is primarily a disseminated disease of elderly, debilitated patients with chronic illnesses. Among foreign-born individuals, abdominal TB occurs in the young, immunocompetent patients from endemic areas\[^5\]. The diagnosis is thus difficult and often delayed\[^6\]. Surgeons must be aware of the wide clinical spectrum of abdominal TB and have a high index of suspicion when confronted with patients from an endemic area presenting with unclear abdominal symptoms\[^2,6\]. The aim of the review is to offer an opinion on the role of surgery in abdominal TB and stimulate debate in an area of ongoing interest.

**PATHOGENESIS AND PATHOLOGY**

The principal forms of abdominal TB are intestinal and peritoneal but a third form - nodal - is also recognized. In practice, the various forms may coexist\[^6,7\]. In the past, many cases of abdominal TB occurred as a direct result of the ingestion of *Mycobacterium bovis* in unpasteurized milk. In most cases today intestinal TB is due to reactivation of primary disease caused by *Mycobacterium tuberculosis*. The reactivation of *Mycobacterium tuberculosis* and the atypical opportunistic *Mycobacterium avium* intracellular infection in the acquired immune deficiency syndrome have a poor prognosis because of immunosuppression\[^9-11\]. TB bacteria reach the gastrointestinal tract via haematogenous spread (from a pulmonary focus acquired during primary infection in childhood), ingestion of infected sputum, or direct spread from infected contiguous lymph nodes and fallopian tubes. Swallowed bacilli pass through the Peyer's patches of the intestinal mucosa and are transported by macrophages through the lymphatics to the mesenteric lymph nodes where they remain dormant. Reactivation of disease in these nodes especially in the immunocompromised including diabetes, renal failure and malignancy may lead to abdominal TB, with the spread of the bacteria to the peritoneum or intestine\[^4\].

Intestinal TB can involve any part of the alimentary tract (from oesophagus to the anus)\[^2,11\]. Gastro-duodenal TB is uncommon (1%) due to the bactericidal properties of gastric acid, scarcity of lymphoid tissue in the mucosa and rapid emptying of gastric contents\[^12\]. The ileocaecal region is the most common site of involvement (75%) because of increased physiological stasis, fluid and electrolyte absorption, minimal digestive activity and abundance of lymphoid tissue (Peyer's patches)\[^12\]. TB of the ileocaecum presents usually with a palpable mass in the right iliac fossa. Perianal disease with abscesses and fistulas can occur, but is uncommon\[^5,7\]. The naked eye appearance of intestinal TB may resemble Crohn's disease, with skip lesions. The gross pathology is characterized by transverse ulcers, fibrosis, thickening and strictureting of the bowel wall, enlarged and matted mesenteric lymph nodes, omental thickening, and peritoneal tuberculosis (Figure 1). The histology shows numerous granulomas which are not always caseating, and, often, acid-fast bacilli cannot be found if there is low mycobacterial load (Figure 2)\[^7,13,14\]. Tuberculous peritonitis is usually due to reactivation of a tuberculous focus in the peritoneum with concurrent pulmonary, intestinal or genital TB (especially from the fallopian tubes). This is usually seen in debilitated patients and alcoholics\[^6,7\]. Peritoneal TB occur in three forms: Wet type with ascites, dry type with adhesions, and fibrotic type with omental thickening and loculated ascites\[^14\]. Peritoneal TB is characterized by tubercles that appear as white "seedlings" on the parietal and visceral surfaces of the peritoneum. Inflammation and exudation leads to the formation of straw-coloured ascites (Figure 3). When there is associated infiltration and thickening of the omentum, intestinal walls, and formation of caseous masses it is referred to as "plastic" peritonitis\[^15,17\]. *Mycobacterium tuberculosis* can spread to the genital tract via the blood or lymphatics. Granulomata develop in the tubes and subsequently the other genital organs. The endometrium is involved.
in up to 80% of cases and the ovaries in 20%-30%.[15]. Fillion et al.[11] reported in a low incidence country that the main organs involved were the peritoneum (66%), the mesenteric lymph nodes (62%), and the bowel (33%). Atypical presentation of peritoneal TB such as portal vein thrombosis from encasement, with splenomegaly and ascites can delay diagnosis or result in misdiagnosis.[14]. Half (50%) of HIV patients with TB have extrapulmonary involvement, compared with only 10%-15% of TB patients who are not infected with HIV.[17]. In HIV-infected patients abdominal TB is of a rapidly progressive nature, often fatal though usually treatable.

**CLINICAL FEATURES**

The clinical symptoms and signs of abdominal TB are non-specific and the diagnosis may be overlooked or mistaken for other disease processes.[21]. The clinical picture is different in children to that in adults. About 90% of the features of abdominal TB in children are due to involvement of the peritoneum and lymph nodes and 10% related to intestinal lesions.[4,6]. Abdominal pain is common, accompanied by ascites (75%) or an abdominal mass caused by an inflamed mesentery (30%).[2,3]. The most common signs are abdominal tenderness and hepatosplenomegaly. Patients with the “plastic” type of peritoneal TB may have a characteristic “doughy” abdomen but this form is, however, uncommon today.[16,17]. Usually the onset of tuberculous peritonitis is insidious with fever, anorexia and weight loss. In a high prevalent area in sub-Saharan Africa, the common presenting symptoms and signs were abdominal pain 76.6%; ascites 59.6%; weight loss 53.2% and fever 29.8%. The average duration of symptoms before presentation was 3 mo and 13% of patients had earlier been treated for pulmonary TB.[10].

Intestinal TB presents in a variety of ways. Up to 30% of cases may present as an acute abdomen, either with acute intestinal obstruction or with symptoms and signs suggestive of an acute appendicitis from an obstructing TB lymphadenopathy.[11]. Hypertrophic ileocaecal TB is particularly common in the Indian subcontinent as a cause of intestinal obstruction. It must be distinguished from Crohn’s disease which is rare in most tropical countries.[14]. Tuberculous enteritis may, if the patient recovers, lead tostenotic lesions causing small bowel obstruction.[18]. Intestinal perforation and acute bleeds do occur, but are unusual. Classically malabsorption from strictures and sometimes with steatorrhea, can result from TB of the small intestine, and occasionally when the terminal ileum is involved, patients present with anaemia due to vitamin B12 deficiency.[14]. Some cases present with disturbance of bowel habit, usually diarrhoea. The remainder of patients with intestinal TB have vaguer symptoms and signs, such as weight loss, malaise and abdominal tenderness. A few patients with only nodal disease present with an abdominal mass consisting of enlarged mesenteric lymph nodes.[12,15]. As many as 60% of patients with abdominal TB have evidence of TB elsewhere. Chest X-ray, however, show evidence of concomitant pulmonary lesions in less than 25% of cases.[10,11,19,20]. Genitourinary TB may present in a similar manner to pelvic inflammatory disease (PID), with chronic low-grade pelvic pain and ultimately with amenorrhoea and infertility. Abnormal uterine bleeding is a presenting symptom in 10%-40% of patients.[15]. Examination is normal in many women but an adnexal mass or fixing of the pelvic organs may be detected.[21]. It should be noted that the human immunodeficiency virus (HIV) may alter the manifestations of, and host susceptibility to, other infections.[9,15,21]. Other rare clinical presentations include dysphagia, odynophagia and a mid oesophageal ulcer due to oesophageal TB; dyspepsia and gastric outlet obstruction due to gastroduodenal TB; lower abdominal pain and rectal bleeding due to colonic TB; and annular rectal stricture and multiple perianal fistulae due to rectal and anal involvement.[2,6].

**INVESTIGATIONS**

Neither clinical signs, laboratory, radiological and endoscopic methods nor bacteriological and histopathological findings provide a gold standard by themselves in the diagnosis of abdominal TB.[10]. The clinical awareness is thus primary.[10,22]. Most laboratory tests are unhelpful. The erythrocyte sedimentation rate (ESR) is often moderately raised in 79% of patients, and although there may be a mild normochromic, normocytic anaemia, a leucocytosis is uncommon. Hypoalbuninaemia is not uncommon but liver function tests are usually normal.[11,23]. Abdominal TB has a multitude of possible presentations and requires a diagnostic approach adjusted to the individual presentation. This approach should be as little invasive as possible and be based on the best available imaging. Ultrasound scans of abdomen were abnormal in 68%, showing ascites, hepatomegaly and or enlarged nodes. Computed tomography (CT) was the most frequent imaging modality (88%) in the United States. The
findings suggestive of abdominal TB were mesenteric/omental stranding (50%), ascites (37%), and retroperitoneal lymphadenopathy (31%). Seventeen of 18 patients required operative intervention, and one patient underwent CT-guided drainage of a psoas abscess. Mantoux test was positive in 33% and ascitic fluid was diagnostic for TB in 29%. Thus, a positive tuberculin skin test (e.g., Mantoux) may be helpful, though some series have found less than 50% of the cases of proven abdominal TB to be tuberculin positive. Chest X-ray showed abnormal findings in 25% of the patients suggesting past or present pulmonary TB and sputum was positive for acid-fast bacilli (AFB) in 14.3%. A high index of suspicion is required for the diagnosis of peritoneal TB as the analysis of peritoneal fluid for tuberculous bacilli is often ineffective and may cause mortality due to delayed diagnosis. Examination of the ascitic fluid usually reveals an exudate (protein > 25 g/L) and a raised white blood cell count (WBC) > 0.1 × 10^9/L consisting principally of lymphocytes. A direct stain for acid-fast bacilli is positive in less than 5% of cases, though up to 40% will be positive if the ascitic fluid is cultured. By centrifuging large volumes of ascitic fluid and culturing the sediment, the diagnostic yield may be increased to up to 80%. However, tuberculous peritonitis-associated mortality is high among patients waiting for the results of mycobacterial culture of ascitic fluid samples. Direct stains and culture of stool specimens may sometimes be positive, but the yield is generally low. Barium studies may show some abnormality in about 50% of patients with intestinal TB but are not diagnostic. To confirm the diagnosis, it is important to try to obtain material for culture and histology. As culture may take up to 6 wk, the histological evidence is important. There are a variety of ways of obtaining tissue for histology. Colonoscopy may be useful. Biopsy specimens obtained during colonoscopy of the terminal ileum and ileocaecal valve may show active chronic ileocolitis with ulceration and granuloma formation. Invasive procedures are frequently necessary to obtain samples but also for the treatment of digestive involvement. In light of new evidence, peritoneal biopsy through laparoscopy has emerged as the gold standard for diagnosis and both lymphoma and carcinomatosis can be excluded by this means. Laparoscopy is most reliable as it is minimally-invasive effective modality for diagnosis of peritoneal TB, and can be performed under local anaesthesia. It is rapid, safe, greater than 75% accuracy in diagnosis and spares the patient the discomfort of a laparotomy. It allows the biopsy of the typical studded tubercles of the peritoneum and other organs which are sent for culture and histology. However, laparoscopy is costly and is not available in many of the poorer areas of the world. Blind percutaneous peritoneal biopsy with an Abrams or Cope needle biopsy usually in the left lower quadrant just lateral to the rectus muscle is diagnostic in up to 75% of cases of peritoneal TB. The complications of the procedure albeit uncommon include intestinal perforation, bleeding and infection. Thus, for this to be safe, the patient must have clinically detectable ascites. The diagnostic yield can be increased if the peritoneum is exposed by dissection under local anaesthesia. Some patients with abdominal TB without ascites have the diagnosis confirmed indirectly by culture and histology of percutaneously biopsied liver tissue with hepatic TB. Diagnostic laparotomy may be resorted to where endoscopic procedures are not available or when they fail to give a definite histopathological diagnosis or for an undiagnosed abdominal mass. While laparotomy will reveal the diagnosis in patients with abdominal TB who present with an acute abdomen, the procedure may be hazardous in sick, emaciated patients with malabsorptive syndrome. It is also not always accurate for the “cold” cases and laparotomy should, thus, essentially be performed only when complications of abdominal TB develop. The suspicion of genitourinary TB in a woman from an endemic area with bilateral tubal calcification from chronic infection seen on abdominal X-ray or radiographic evidence of pulmonary TB should be confirmed if possible, by positive culture of the organisms in endometrial tissue obtained from biopsy or dilatation and curettage. Endometrial biopsy does not have 100% sensitivity but the detection rate is greatest towards the end of the menstrual cycle. A Mantoux or Heaf test should be reactive in a woman with active TB unless she is immunosuppressed. The enzyme-linked immunoabsorbent assay (ELISA) using mycobacteria saline-extracted antigen for the serodiagnosis of abdominal TB gives a diagnostic accuracy of 84%. Another test for early diagnosis of tuberculous peritonitis is the determination of adenosine deaminase activity (ADA) in the peritoneal fluid. New diagnostic procedures, and especially molecular biology-polymerase chain reaction (PCR), may help diagnose unusual clinical presentations of TB and should at least be attempted before more invasive interventions.

**DIFFERENTIAL DIAGNOSIS**

Abdominal TB, with its vague symptoms and signs and non-specific laboratory investigations, can mimic many other diseases (Table 1). The main differential diagnosis to consider with intestinal TB is Crohn’s disease. Crohn’s disease is uncommon in the immigrant population at risk for TB, and in Caucasians its peak incidence occurs in the 20–40 age group, while that of intestinal TB is in the older age group (50–70 years). Although perianal disease and enteric fistulas can be due to TB, this is uncommon in comparison with Crohn’s disease. Distinguishing between these two entities is a challenge because there is marked overlap in the clinical presentation and the radiographic, laboratory, and endoscopic findings, as well as in the
Some patients may therefore warrant a laparoscopy or may not have the characteristics of an exudate ascites may coexist with peritoneal TB and the ascites of abdominal TB in alcoholics, and that liver disease with important to realize that there is an increased incidence due to cardiac failure is usually easy to distinguish, it is to heart failure or liver disease (Table 1). Although ascites talc peritonitis, bacterial peritonitis, and from ascites due to infections and, in some parts of the world, amoeboma developed a scoring system for differentiation of CD and the diagnostic yield as PCR assays of fresh biopsy specimens, can improve the classic extraintestinal manifestations of Crohn’s disease, such as reactive arthritis, erythema nodosum, and uveitis. Ascites and fever are more commonly seen in patients with intestinal TB. Both diseases involve the ileum and colonic segments of the bowel. Isolated involvement of the terminal ileum is commonly seen in patients with Crohn’s disease (terminal ileitis), whereas involvement of the ileocaecal area and a patulous ileocecal valve is seen in patients with intestinal TB (ileo-caecal TB). In patients with Crohn’s disease, mucosal injury has a cobblestone appearance with aphthous and longitudinal rake ulcers, whereas in patients with intestinal TB, the ulcers are transverse in orientation. Furthermore, the granulomas associated with intestinal TB are more frequent and confluent and larger than those associated with Crohn’s disease. As tissue samples are more frequent and confluent and larger than those associated with Crohn’s disease. As tissue samples are positive for acid-fast bacilli in only 25% to 30% of cases of intestinal TB, the use of molecular techniques such as PCR assays of fresh biopsy specimens, can improve the diagnostic yield. Makharia et al. interestingly developed a scoring system for differentiation of CD and intestinal TB based on clinical endoscopy and histology using the findings of sigmoid colon involvement, blood in stools, weight loss and focally enlarged colitis. Other differential diagnoses are carcinoma, lymphoma, Yersinia infections and, in some parts of the world, amoeboma. Peritoneal TB must be differentiated from carcinomatosis, talar peritonitis, bacterial peritonitis, and from ascites due to heart failure or liver disease (Table 1). Although ascites due to cardiac failure is usually easy to distinguish, it is important to realize that there is an increased incidence of abdominal TB in alcoholics, and that liver disease with ascites may coexist with peritoneal TB and the ascites may not have the characteristics of an exudate.

Some patients may therefore warrant a laparotomy for atypical diagnostic problems especially as diseases such as CD, lymphoma and malignancy can mimic TB in every way.

### MANAGEMENT

Most patients with abdominal TB respond to medical treatment with standard anti-tuberculous chemotherapy and carries good prognosis if promptly diagnosed and treated. The drug treatment is identical to pulmonary TB with conventional chemotherapy for at least 6 mo. Rifampicin and isoniazid are given for 6 mo, with two additional drugs- pyrazinamide and streptomycin (given at a dose of 0.75-1.0 g daily depending on body weight, age and renal function) for the first 2 mo. The main cause of failure in medical treatment in the endemic and developing countries is patient defection or poor compliance. Shorter and more effective regimes, based on rifampicin that can be completed in 6 mo have increased patient compliance. For patients in whom the diagnosis is strongly suspected, but for whom the histological proof is unobtainable or inconclusive, it is justifiable to undertake a trial of anti-tuberculous therapy. Akinkuolie et al., reported that 85.1% of patients with clinically diagnosed abdominal TB in a high prevalent area recovered after receiving anti-tuberculous therapy for a period of 9-12 mo. However, all those with HIV infection and not on antiretroviral treatment died from immunosuppression. A few patients who developed adhesions, obstruction or perforation at some time following chemotherapy required surgery. Intravenous anti-TB therapy in combination with surgery may be needed for severe forms of TB with extensive gastrointestinal involvement.

### ROLE OF SURGERY

Surgery is especially reserved for those with acute surgical complications including free perforation, confined perforation with abscess or fistula, massive bleeding, complete obstruction, or obstruction not responding to medical management. Obstruction is the most common complication with multiple and/or long strictures less likely to respond to medical therapy. The obstruction may also be exacerbated during anti-tuberculous therapy due to healing by cicatrization. About 20%-40% of patients with abdominal TB present with an acute abdomen and need surgical management. Chronic patients with subacute obstruction are managed conservatively and surgery is planned after suitable work-up. Being a systemic disease surgical resection should be conservative. Multiple small bowel strictures may be treated by strictureplasty to avoid major resection. An alternative is colonoscopic balloon dilatation of readily accessible, short and fibrous tuberculous ileal strictures causing subacute obstructive symptoms. Although the experience is very limited, this technique appears safe and may obviate the need for surgery in this setting. Acute tubercular peritonitis

### Table 1  Differential diagnosis of abdominal tuberculosis

| Intestinal TB | Peritoneal TB |
|---------------|--------------|
| Crohn’s disease | Carcinomatosis |
| Intestinal lymphoma | Bacterial peritonitis |
| Carcinoma | Talc peritonitis |
| Yersinia infections | Chronic liver diseases |
| Amoeboma | |

TB: Tuberculosis.

The presence of granulomas on histological examination. Misdiagnosis of Crohn’s disease in a patient with intestinal TB would result in treatment with steroids and biologic agents, which then has the potential to cause disease progression that leads to increased morbidity and mortality. Misdiagnosis of intestinal TB in a patient with Crohn’s disease would lead to prolonged anti-tuberculous therapy and delay the necessary immunosuppression required to induce disease remission. Both diseases have an insidious onset but diarrhea, rectal bleeding and extraintestinal manifestations are more common in patients with Crohn’s disease. Intestinal TB can target extraluminal sites in a manner that resembles the classic extraintestinal manifestations of Crohn’s disease, as well as reactive arthritis, erythema nodosum, and uveitis. Ascites and fever are more commonly seen in patients with intestinal TB. Both diseases involve the ileum and colonic segments of the bowel. Isolated involvement of the terminal ileum is commonly seen in patients with Crohn’s disease (terminal ileitis), whereas involvement of the ileocaecal area and a patulous ileocaecal valve is seen in patients with intestinal TB (ileo-caecal TB). In patients with Crohn’s disease, mucosal injury has a cobblestone appearance with aphthous and longitudinal rake ulcers, whereas in patients with intestinal TB, the ulcers are transverse in orientation. Furthermore, the granulomas associated with intestinal TB are more frequent and confluent and larger than those associated with Crohn’s disease. As tissue samples are positive for acid-fast bacilli in only 25% to 30% of cases of intestinal TB, the use of molecular techniques such as PCR assays of fresh biopsy specimens, can improve the diagnostic yield. Makharia et al. interestingly developed a scoring system for differentiation of CD and intestinal TB based on clinical endoscopy and histology using the findings of sigmoid colon involvement, blood in stools, weight loss and focally enlarged colitis. Other differential diagnoses are carcinoma, lymphoma, Yersinia infections and, in some parts of the world, amoeboma. Peritoneal TB must be differentiated from carcinomatosis, talar peritonitis, bacterial peritonitis, and from ascites due to heart failure or liver disease (Table 1). Although ascites due to cardiac failure is usually easy to distinguish, it is important to realize that there is an increased incidence of abdominal TB in alcoholics, and that liver disease with ascites may coexist with peritoneal TB and the ascites may not have the characteristics of an exudate.

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and mesenteric lymphadenitis need to be managed with caution. If a laparotomy is carried out only a biopsy needs to be performed with peri toneal toilet and the abdomen closed without a drain [50].

The surgery performed in gastrointestinal TB are essentially of three types [14]. The first type is the surgery which is done to bypass the involved segments of bowel such as an enteroc stomy or an ileo-transverse colectomy. As in Crohn's disease, these surgeries are usually complicated by blind loop syndrome, fistula formation and recurrent disease in the remaining segments and hence usually not performed routinely. The second type are segmental resections such as the limited ileo-cæcal resection for obstructing ileo-cæcal TB with adjuvant anti-tuberculous therapy to eradicate the disease completely [47,53]. However, these surgeries are hindered by the malnourished status of most of the patients which make them poor surgical candidates. Also the lesions can be widely placed and extensive resection may not be possible in all the cases. Postoperative complications include anastomotic leak, faecal fistula, peritonitis, intraabdominal sepsis, persistent obstruction, wound infection and dehiscence [47,48,52]. Re-operation may be required for recurrent obstruction. The third type of surgery is bowel conserving strictureplasty of those stenotic lesions with obstructive symptoms [48,47].

Strictureplasty for cases with multiple strictures was introduced as a better technique than multiple resections and enter anastomoses, as it does not sacrifice any part of the small bowel and avoids the risk of short-bowel syndrome or blind loops [53]. Long strictures with active inflammation or multiple strictures in a segment may require resection unless there is concern about bowel length [14]. With adjuvant anti-tuberculous therapy, microscopic disease at the resection margin should not influence recurrence of disease [14,18,20,50]. The Heineke-Mikulicz pyloroplasty technique is usually used. In a small number of cases with longer strictures where bowel conservation is required, a Finney or a Jaboulay strictureplasty may be used [17-19].

Strictures of recent onset that are not very tight may be left alone, or dilated via an enterotomy [53,54]. Tubercular perforations are mostly ileal and proximal to a stricture. If they are close to one another, resection of the segment is performed. If the stricture is not close, the perforation can be closed in layers and the stricture dealt with by strictureplasty or resection, depending on the length of the narrowed segment. Delayed diagnosis and injudicious treatment are responsible for the mortality rate of 4%-12% [50]. The high mortality was partly associated with malnutrition, anaemia and hypoalbuminaemia, the mortality being higher (12%-25%) in the presence of acute complication [47].

Fillion et al [11]'s study in a low prevalence country reported that out of 86% presenting with abdominal symptoms, 76% underwent surgery, with 10% in an emergency setting. 81% of patients received six months or more of anti-TB treatment. Seventy-six percent had a positive outcome. Wani et al [30] reported a study on surgical emergencies of tubercular abdomen in developing countries. Abdominal pain, vomiting, and constipation were commonest presenting symptoms. About 20% patients had history of pulmonary TB and 16% patients presented with ascites. PCR for blood and ascitic fluid was positive in 72% and 87.5% patients, respectively. As in the low prevalence developed country, the indications and principles of management were the same. About 24% of patients were managed non-operatively and responded to anti-tuberculous therapy. Seventy-six percent needed surgery among which 20% were operated as emergency. Adhesiolysis of gut (47.3%), strictureplasty (10.5%), resection anastomosis (5.2%), right hemicolectomy (5.2%), and ileo-transverse anastomosis (7.8%) were performed and peritoneal biopsy and lymph node biopsy in 21% of patients. The tuberculous bowel perforations were usually treated with resection of involved segments with primary anastomosis [17,18]. Generally, emergency surgery in those severely ill patients presenting late carried high mortality from toxae mia, hypoproteinaemia, anaemia and immunosuppression. The mortality rate ranged between 14%-50% in developing countries [10,30], and 6%-37% in developed countries [11,16]. Morbidity included delayed wound healing with occurrence of incisio nal haemia, recurrent obstruction and faecal fistula [14,47]. Both medically and surgically managed patients responded dramatically to anti-tuberculous therapy with increase in haemoglobin level and fall in ESR [28-30].

**CONCLUSION**

Abdominal TB is generally responsive to medical treatment, and early diagnosis and management can prevent unnecessary surgical intervention. However, abdominal TB should be considered a surgical problem in the acute and chronic abdomen. Laparoscopy is emerging as the gold standard for diagnosis since diseases such as Crohn’s disease, lymphoma and malignancy can mimic TB. Due to the challenges of early diagnosis, patients should be managed in collaboration with a physician familiar with anti-tuberculous therapy. An international expert consensus should recommend an algorithm for the diagnosis and multidisciplinary management of abdominal TB.

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