

Radioclinical Characteristics, Diagnostic Approaches, and Clinical Outcomes of Abdominal Tuberculosis: A Six-Year Retrospective Study from a Tertiary Hospital in Somalia

Ahmed Adam Osman¹

fahadyare41@gmail.com

Mogadishu Somali-Turkish Training and Research Hospital

Ismail Mohamoud Abdullahi²

Mogadishu Somali-Turkish Training and Research Hospital

Mohamed Osman Dahir Alasow

Mogadishu Somali-Turkish Training and Research Hospital

Ahmed Abdirahman Hussein

Mogadishu Somali-Turkish Training and Research Hospital

Nor Abdi Yasin⁴

Mogadishu Somali-Turkish Training and Research Hospital

Ismail Gedi Ibrahim¹

Mogadishu Somali-Turkish Training and Research Hospital

Research Article

Keywords: Abdominal tuberculosis, Extrapulmonary tuberculosis, Computed tomography, Histopathology, GeneXpert, Diagnosis, Somalia, East Africa

Posted Date: October 5th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10754657/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.
[Read Full License](#)

Additional Declarations: No competing interests reported.

Abstract

Background

Abdominal tuberculosis (ATB) is one of the most challenging forms of extrapulmonary tuberculosis because of its nonspecific clinical presentation and radiological resemblance to gastrointestinal malignancies and inflammatory bowel diseases. We conducted a Six-year retrospective observational study to evaluate the radioclinical characteristics, diagnostic approaches, and clinical outcomes of patients with abdominal tuberculosis at a tertiary referral hospital in Somalia.

Methods

This retrospective study included 286 patients diagnosed with abdominal tuberculosis between January 2019 and December 2024. Patients were classified as confirmed ATB when diagnosis was established by histopathology, microbiological culture, GeneXpert MTB/RIF, or a combination of these methods, and as presumed ATB when diagnosis was based on compatible clinical presentation, characteristic radiological findings after exclusion of alternative diagnoses. Demographic characteristics, clinical manifestations, computed tomography (CT) findings, diagnostic procedures, treatment strategies, and clinical outcomes were analyzed using SPSS version 26. Associations between categorical variables were assessed using Pearson's chi-square test, with $P < 0.05$ considered statistically significant.

Results

Among the 286 patients, 226 (79.0%) had confirmed abdominal tuberculosis, while 60 (21.0%) were classified as presumed cases. The majority were young adults, with the highest proportion belonging to the 20–39-year age group. Multiple-site abdominal involvement was the predominant radiological pattern (236/286, 82.5%), followed by isolated peritoneal tuberculosis (47/286, 16.4%). Paracentesis was the most frequently performed diagnostic procedure (186/286, 65.0%). Initial radiological assessment correctly identified abdominal tuberculosis in 243 patients (85.0%), whereas 43 patients (15.0%) were initially misdiagnosed, including 39 (13.6%) as malignancy, and 4 (1.4%) as Crohn's disease, before microbiology-pathological confirmation. Most patients improved following anti-tuberculosis therapy (233/286, 81.5%), while 39 (13.6%) died and 14 (4.9%) were lost to follow-up. Prolonged symptom duration was significantly associated with the need for surgical intervention ($P < 0.05$).

Conclusions

Abdominal tuberculosis remains a major diagnostic challenge in tuberculosis-endemic, resource-limited settings because of its nonspecific clinical and radiological features. An integrated diagnostic approach combining clinical assessment, contrast-enhanced CT, histopathological examination, microbiological testing, and molecular diagnostics is essential for improving diagnostic accuracy and reducing unnecessary surgical intervention. These findings provide important evidence to strengthen the diagnosis and management of abdominal tuberculosis in Somalia and other high-burden settings.

Introduction

Tuberculosis (TB) remains one of the leading causes of morbidity and mortality from infectious diseases worldwide despite being a preventable and curable disease. According to the World Health Organization (WHO), approximately 10.8 million people developed tuberculosis and 1.25 million died from the disease in 2023, with low- and middle-income countries accounting for the overwhelming majority of cases. Although pulmonary tuberculosis represents the most common clinical manifestation, extrapulmonary tuberculosis (EPTB) constitutes approximately 15–20% of all tuberculosis cases in immunocompetent individuals and up to 50% among immunocompromised patients. [1]

Abdominal tuberculosis (ATB) is one of the most important forms of extrapulmonary tuberculosis and encompasses infection of the gastrointestinal tract, peritoneum, mesentery, omentum, abdominal lymph nodes, and solid abdominal organs, either individually or in combination. Although ATB accounts for only 1–3% of all tuberculosis cases, it represents a substantial proportion of extrapulmonary tuberculosis in countries where TB remains endemic. The disease may develop through hematogenous dissemination, ingestion of infected sputum, contiguous spread from adjacent organs, or lymphatic extension, resulting in diverse pathological and clinical manifestations. [2]

The diagnosis of abdominal tuberculosis remains particularly challenging because its clinical presentation is frequently nonspecific and often mimics numerous gastrointestinal disorders. Patients commonly present with chronic abdominal pain, abdominal distension, fever, weight loss, anorexia, altered bowel habits, or intestinal obstruction, symptoms that substantially overlap with those of Crohn's disease, colorectal cancer, lymphoma, peritoneal carcinomatosis, ovarian malignancy, and other chronic inflammatory conditions. Consequently, delayed diagnosis is common and may result in bowel perforation, intestinal strictures, obstruction, fistula formation, unnecessary surgery, and increased morbidity. [1]

Radiological imaging plays a pivotal role in the evaluation of suspected abdominal tuberculosis. Contrast-enhanced computed tomography (CT) is regarded as the imaging modality of choice because it provides comprehensive assessment of the gastrointestinal tract, peritoneum, mesentery, lymph nodes, and abdominal solid organs. Characteristic CT findings include high-density ascites, smooth or nodular peritoneal thickening, omental caking, necrotic mesenteric lymphadenopathy, ileocecal wall thickening, bowel strictures, and multisite abdominal involvement. However, no single radiological feature is pathognomonic, and substantial overlap exists with malignant and inflammatory diseases, often necessitating histopathological or microbiological confirmation. [3]

Despite advances in molecular diagnostics, establishing a definitive diagnosis remains difficult because abdominal tuberculosis is generally a paucibacillary disease, resulting in relatively low sensitivity of acid-fast bacilli (AFB) smear microscopy, mycobacterial culture, and nucleic acid amplification tests when used individually. Histopathological demonstration of caseating granulomatous inflammation, supported by GeneXpert MTB/RIF, culture, or polymerase chain reaction (PCR), remains the cornerstone of diagnosis. In many endemic settings, clinicians continue to rely on a combination of clinical findings,

imaging features, laboratory investigations, and therapeutic response because microbiological confirmation cannot always be achieved. [1]

Abdominal tuberculosis poses an even greater diagnostic challenge in low-resource countries, where access to advanced imaging, endoscopy, image-guided biopsy, molecular diagnostics, and specialist pathology services is often limited. Somalia remains one of the countries with a high tuberculosis burden, yet published data describing the epidemiology, radiological spectrum, diagnostic pathways, and clinical outcomes of abdominal tuberculosis are extremely limited. Most available evidence originates from South Asia, China, Europe, and the Middle East, while data from sub-Saharan Africa, particularly the Horn of Africa, remain scarce. Consequently, clinicians working in the region continue to depend largely on evidence generated from populations with different epidemiological characteristics and healthcare resources. [1, 4]

Although several review articles have summarized the diagnosis and management of abdominal tuberculosis, relatively few studies have comprehensively evaluated the integration of clinical presentation, cross-sectional imaging, pathological confirmation, microbiological diagnosis, treatment patterns, and factors associated with surgical intervention within a single African tertiary referral center. Such information is essential for improving diagnostic algorithms, facilitating early recognition, reducing unnecessary surgical procedures, and optimizing patient management in resource-constrained healthcare systems. [1]

Despite the high burden of tuberculosis in Somalia, published evidence describing the radiological characteristics, diagnostic approaches, and clinical outcomes of abdominal tuberculosis remains extremely limited. To our knowledge, this is the first comprehensive study from Somalia to integrate demographic characteristics, clinical presentation, computed tomography findings, microbiological investigations, histopathological confirmation, treatment strategies, and predictors of surgical intervention in a large cohort of patients with abdominal tuberculosis. The findings provide important baseline data to support evidence-based diagnosis and management of abdominal tuberculosis in Somalia and other resource-limited, tuberculosis-endemic settings.

Methods

Study design and setting

This retrospective observational study was conducted at the **Mogadishu Somali Türkiye Recep Tayyip Erdoğan Training and Research Hospital (MSTTRH)**, Mogadishu, Somalia, Country's largest tertiary referral and teaching hospitals. The hospital serves as a major referral center for patients with tuberculosis and other complex medical and surgical diseases from Mogadishu and surrounding regions. Comprehensive diagnostic services, including radiology, pathology, microbiology, endoscopy, and surgical care, are available at the institution. The study included all eligible patients diagnosed with abdominal tuberculosis between **January 1, 2019, and December 31, 2024**. The study was designed and

reported according to the **Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)** guidelines for observational studies.

Hospital electronic medical records were retrospectively reviewed to identify patients diagnosed with abdominal tuberculosis during the study period. Initially, **365** patient records were screened for eligibility. Patients were included if they had a diagnosis of abdominal tuberculosis established by microbiological, histopathological, or accepted clinical and radiological criteria, were managed at MSTTRH during the study period, and had complete demographic, clinical, radiological, laboratory, and treatment information available for analysis. Patients with incomplete medical records, missing imaging studies, duplicate records, uncertain diagnoses, or insufficient follow-up information were excluded. After applying the eligibility criteria, **286 patients** with complete datasets were included in the final analysis(Figure 1).

Definition of abdominal tuberculosis

Abdominal tuberculosis was defined as tuberculosis involving one or more abdominal organs, including the gastrointestinal tract, peritoneum, mesentery, omentum, abdominal lymph nodes, or solid abdominal organs. Patients were categorized as having **confirmed abdominal tuberculosis** when the diagnosis was established by histopathological evidence of granulomatous inflammation compatible with tuberculosis and/or microbiological confirmation using GeneXpert MTB/RIF, or mycobacterial culture identification. Patients without definitive laboratory confirmation but with characteristic clinical manifestations, compatible radiological findings, and exclusion of alternative diagnoses were classified as having **presumed abdominal tuberculosis**.

Data collection

Clinical information was extracted retrospectively from electronic hospital databases, inpatient records, outpatient clinic, operative reports, pathology reports, microbiology records, and radiology information systems using a standardized data collection form. Demographic variables included age, sex, and year of diagnosis. Clinical variables included duration of symptoms, abdominal pain, fever, abdominal distension, weight loss, intestinal obstruction, and HIV status. Diagnostic variables included chest radiography, abdominal ultrasonography, contrast-enhanced computed tomography (CT), sputum examination, cytology, histopathology, GeneXpert MTB/RIF, mycobacterial culture, and the final diagnostic method used to establish abdominal tuberculosis.

Radiological assessment

Radiological findings were obtained from official reports issued by consultant radiologists and were reviewed as part of the retrospective data collection process. CT imaging findings included the presence and characteristics of ascites, peritoneal thickening, peritoneal tuberculosis subtype (wet, fibrotic-fixed,

or dry type), omental thickening, omental caking, mesenteric and retroperitoneal lymphadenopathy, bowel wall thickening, ileocecal involvement, intestinal strictures, intestinal obstruction, hepatic, splenic, pancreatic, renal, and adrenal involvement, pleural effusion, pericardial effusion, hepatosplenomegaly, abdominal calcification, and the overall radiological distribution of abdominal tuberculosis. Chest radiographic findings and abdominal ultrasonography results were also recorded when available.

Diagnostic evaluation

The diagnosis of abdominal tuberculosis was established using a combination of clinical assessment, radiological imaging, microbiological investigations, cytological examination, histopathological evaluation, and molecular testing according to routine institutional practice. Histopathological examination of biopsy or surgical specimens or microbiological examination was considered confirmatory when correlated with clinical findings. GeneXpert MTB/RIF assay, and mycobacterial culture were used whenever appropriate specimens were available. In patients without definitive microbiological and pathological confirmation, the diagnosis was established on the basis of compatible clinical presentation, characteristic radiological findings, and exclusion of alternative diagnoses.

All patients received anti-tuberculosis treatment according to the Somalia National Tuberculosis Control Program and World Health Organization recommendations. Surgical intervention was performed in patients presenting with complications such as intestinal obstruction, bowel perforation, and fibrostenotic strictures (Figure 2).

Statistical analysis

Statistical analyses were performed using **IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA)**. Continuous variables were summarized as **mean $\pm$ standard deviation (SD)** or median with interquartile range (IQR), depending on data distribution, while categorical variables were expressed as frequencies and percentages. Associations between demographic and clinical variables and the requirement for surgical intervention were evaluated using the **Pearson chi-square test** or **Fisher's exact test**, as appropriate. All statistical tests were two-sided, and a **P-value < 0.05** was considered statistically significant.

Ethical considerations

Ethical approval for this study was obtained from the **Institutional Review Board of Mogadishu Somali Türkiye Recep Tayyip Erdoğan Training and Research Hospital** before commencement of the study. Approval number (MSTH/23634). Owing to the retrospective nature of the study and the use of anonymized routinely collected clinical data, the requirement for informed consent was waived by the Institutional Review Board. All patient information was de-identified before analysis to ensure

confidentiality, and the study was conducted in accordance with the ethical principles of the **Declaration of Helsinki** and relevant institutional regulations.

RESULTS

During the Six-year study period, 365 patients with suspected abdominal tuberculosis (ATB) were identified. After applying the inclusion and exclusion criteria, 286 patients (78.4%) with complete clinical, radiological, and diagnostic data were included in the final analysis, whereas 79 patients (21.6%) were excluded because of incomplete records and misdiagnosis. Of the included patients, 226 (79.0%) had confirmed abdominal tuberculosis and 60 (21.0%) were classified as presumed abdominal tuberculosis.

The mean age of the study population was 39.66 ± 16.43 years (range, 0–86 years). Female patients accounted for 161 (56.3%) of the study population, whereas 120 (41.9%) were male. No patient was HIV-positive. The annual number of diagnosed cases increased throughout the study period, with 73 patients (20.0%) diagnosed in 2023, 45 (12.3%) in 2020, and 44 (12.1%) in 2022.

The age distribution showed that abdominal tuberculosis predominantly affected young and middle-aged adults. The largest proportion of patients belonged to 20–39 (128 patients, 44.8%), followed by 40–59 (88 patients, 30.8%). 60–79 accounted for 41 patients (14.3%), whereas 26 patients (9.1%) were classified in age 0–19 years, and only 3 patients (1.0%) belonged to age > 80 years. (Table 1)

Table 1

Diagnostic procedures, radiological disease patterns, initial radiological diagnoses, clinical outcomes, and age distribution among patients with abdominal tuberculosis (N = 286)

Variable	Category	n	%
Diagnostic procedure	Paracentesis	186	65.0
	Image-guided biopsy	31	10.8
	Surgery	30	10.5
	None	35	12.2
	Endoscopy	4	2.8
Disease pattern on CT	Multiple-site involvement	236	82.5
	Peritoneal tuberculosis	47	16.4
	Gastrointestinal tuberculosis	3	1.0
Initial radiological diagnosis	Correctly diagnosed as abdominal tuberculosis	243	85.0
	Misdiagnosed as malignancy	39	13.6
	Misdiagnosed as Crohn's disease	4	1.4
Clinical outcome	Improved	233	81.5
	Deceased	39	13.6
	Lost to follow-up	14	4.9
Age group	0–19	26	9.1
	20–39	128	44.8
	40–59	88	30.8
	60–79	41	14.3
	> 80	3	1.0

Among the 286 patients, 271 (94.8%) presented with abdominal pain, while 15 (5.2%) had no abdominal pain. Abdominal distension was present in 250 patients (87.4%), and absent in 36 (12.6%). Weight loss was documented in 208 patients (72.7%), whereas 78 (27.3%) had no history of weight loss. Fever was reported in 135 patients (47.2%), while 151 (52.8%) were afebrile at presentation. Clinical intestinal obstruction was identified in 87 patients (30.4%), whereas 199 (69.6%) had no evidence of obstruction. Symptom duration ranged from 14 to 365 days, indicating considerable variation in the interval between symptom onset and diagnosis.

Radiological Findings

Chest radiography was performed in all 286 patients. Normal chest radiographs were observed in 188 patients (65.7%), whereas 98 (34.3%) demonstrated abnormal thoracic findings suggestive of active or previous pulmonary tuberculosis. Sputum examination was positive for pulmonary tuberculosis in 31 patients (10.8%) and negative in 255 (89.2%). (Table 1).

Despite characteristic imaging findings, radiological diagnosis remained challenging because of considerable overlap with other abdominal diseases. Initial radiological assessment correctly suggested abdominal tuberculosis in 243 patients (85.0%). However, 43 patients (15.0%) were initially misdiagnosed with alternative conditions, including malignancy in 39 patients (13.6%), Crohn's disease in 4 patients (1.4%). In all misdiagnosed cases, the final diagnosis of abdominal tuberculosis was subsequently confirmed by pathological and microbiological examination, emphasizing the limitations of imaging alone and the importance of histopathological and microbiological confirmation. (Table 1)

Radiologically, 219 patients (60.0%) demonstrated the wet type of peritoneal tuberculosis, 52 (14.2%) had the fibrotic-fixed type, and 15 (4.1%) had the dry type. Omental involvement was characterized by a smudged appearance in 130 patients (35.6%), omental caking in 120 (32.9%), and nodular omental lesions in 36 (9.9%). (Fig. 3,4).

Ileocecal involvement was identified in 134 patients (46.9%), while 152 (53.1%) showed no ileocecal disease. Symmetrical bowel wall thickening was observed in 102 patients (35.7%), asymmetrical thickening in 66 (23.1%), and no bowel wall thickening in 118 (41.3%). Intestinal strictures were present in 93 patients (32.5%), and CT evidence of intestinal obstruction was demonstrated in 97 patients (33.9%).

Solid organ involvement was less common. Hepatic lesions were identified in 28 patients (9.8%), splenic lesions in 20 (7.0%), renal involvement in 14 (4.9%), pancreatic involvement in 11 (3.8%), adrenal enlargement in 36 (12.6%), and intra-abdominal calcification in 63 (22.0%). Pleural effusion was detected in 117 patients (40.9%), pericardial effusion in 17 (5.9%), and hepatosplenomegaly in 59 (20.6%). Overall, 236 patients (82.5%) demonstrated multisite abdominal involvement, whereas 47 (16.4%) had isolated peritoneal disease and 3 (1.0%) had isolated gastrointestinal involvement.

Diagnostic Confirmation

Among the 286 patients, cytological examination confirmed abdominal tuberculosis in 130 patients (45.5%), histopathological examination in 53 (18.5%), combined GeneXpert and histopathology in 12 (4.2%), mycobacterial culture in 12 (4.2%), and GeneXpert alone in 19 (6.6%). The remaining 60 patients (21.0%) were diagnosed clinico-radiology alone. Overall, 226 patients (79.0%) had microbiologically or histopathologically confirmed disease, whereas 60 (21.0%) were managed as presumed abdominal tuberculosis. (Table 2).

Table 2
Methods used to establish the diagnosis of abdominal tuberculosis
(N = 286)

Diagnostic confirmation method	n	%
Cytology	130	45.5
Mycobacterial culture	12	4.2
Combined GeneXpert MTB/RIF + histopathology	12	4.2
Histopathology alone	53	18.5
GeneXpert MTB/RIF alone	19	6.6
Clinicoradiological only	60	21.0
Total	286	100.0

Of the 286 patients, 256 (89.5%) were managed without surgery, while 30 (10.5%) underwent operative intervention because of intestinal obstruction, strictures, perforation, or diagnostic uncertainty. Paracentesis was the most frequently performed procedure, undertaken in 186 patients (65.0%), followed by image-guided biopsy in 31 patients (10.8%) and surgical intervention in 30 patients (10.5%). Endoscopy was performed in 4 patients (1.4%), while the remaining patients (12.2%) did not undergo any invasive diagnostic procedure. These findings indicate that minimally invasive procedures, particularly paracentesis, constituted the primary diagnostic approach in the evaluation of patients with suspected abdominal tuberculosis. (Table 1).

Regarding treatment outcomes, 233 patients (81.5%) showed clinical improvement following anti-tuberculosis therapy, while 39 patients (13.6%) died during the study period. An additional 14 patients (4.9%) were lost to follow-up, precluding assessment of their final treatment outcomes. These findings demonstrate a generally favorable response to treatment among patients diagnosed early, although mortality remained substantial, reflecting the severity of disease and delayed presentation in a proportion of cases. (Table 1)

Chi-square analyses demonstrated no statistically significant association between surgical intervention and abdominal pain ($P = 0.812$), weight loss ($P = 0.344$), abdominal distension ($P = 0.255$), or intestinal obstruction at presentation ($P = 0.557$). Likewise, age, sex, diagnostic category, confirmation method, and year of diagnosis were not significantly associated with operative management (all $P > 0.05$). In contrast, symptom duration was significantly associated with the need for surgery ($P < 0.001$). Patients with longer symptom duration before diagnosis were more likely to require operative management than those presenting earlier, indicating that delayed diagnosis was associated with advanced fibrostenotic disease and surgical complications.

DISCUSSION

This study provides one of the largest contemporary hospital-based analyses of abdominal tuberculosis (ATB) from Somalia and contributes important evidence from a region where published data remain extremely limited. To our knowledge, this is the first study from Somalia to comprehensively evaluate the radiological spectrum, diagnostic approaches, and treatment outcomes of abdominal tuberculosis over a five-year period. The principal findings demonstrate that abdominal tuberculosis predominantly affected young adults, presented with chronic nonspecific gastrointestinal symptoms, and was characterized by extensive multisite intra-abdominal involvement on computed tomography (CT). Although most patients were successfully managed with anti-tuberculosis therapy alone, approximately one-quarter required surgical intervention, and prolonged symptom duration before diagnosis was the only factor significantly associated with operative management. These findings underscore that delayed diagnosis remains one of the major determinants of disease severity and adverse clinical outcomes in abdominal tuberculosis and highlight the importance of integrating clinical evaluation, cross-sectional imaging, microbiological testing, and histopathological examination for timely diagnosis [5, 6, 1].

Tuberculosis continues to represent a major public health challenge throughout East Africa, where countries such as Somalia, Ethiopia, Kenya, Uganda, Tanzania, and South Sudan remain among the regions with the highest tuberculosis incidence worldwide. According to the World Health Organization Global Tuberculosis Report 2025, the African Region continues to experience a disproportionate burden of tuberculosis because of poverty, malnutrition, population displacement, fragile healthcare systems, delayed diagnosis, and limited access to advanced diagnostic technologies. Although pulmonary tuberculosis accounts for most notified cases, extrapulmonary tuberculosis remains substantially underdiagnosed, particularly in low-resource settings where access to molecular diagnostics, interventional radiology, endoscopy, and pathology services is restricted. Consequently, abdominal tuberculosis frequently remains unrecognized until complications develop, contributing to preventable morbidity and increased healthcare utilization [7, 8, 9, 10].

Published literature describing abdominal tuberculosis from East Africa is remarkably scarce compared with evidence from South Asia. Most African studies have focused on the epidemiology and outcomes of extrapulmonary tuberculosis rather than organ-specific abdominal disease, reflecting both diagnostic limitations and the absence of specialized referral centers capable of comprehensive evaluation. Similar challenges exist in Somalia, where image-guided biopsy, advanced molecular testing, mycobacterial culture, and subspecialty pathology services remain unavailable in many healthcare facilities outside major urban hospitals. Therefore, many patients are diagnosed empirically or only after exploratory surgery. The present study helps address this important knowledge gap by providing detailed radiological, pathological, and clinical data from a tertiary referral hospital and offers one of the few comprehensive descriptions of abdominal tuberculosis from the Horn of Africa. These findings may contribute to improving regional diagnostic algorithms and informing future tuberculosis control strategies in similar resource-constrained settings [11, 12].

Our observation that abdominal tuberculosis predominantly affected young adults is consistent with the epidemiological profile reported across tuberculosis-endemic countries. Young adults represent the

economically productive segment of the population and account for the largest proportion of active tuberculosis cases globally. Similar age distributions have been reported from India, Pakistan, Bangladesh, China, and several African countries, where abdominal tuberculosis is most frequently diagnosed during the third and fourth decades of life. In contrast, studies from Europe and North America have reported relatively older patient populations because extrapulmonary tuberculosis in those settings is more commonly associated with migration, immunosuppressive therapy, chronic kidney disease, malignancy, and advanced age. The similarity between our findings and those reported from other endemic countries suggests that the epidemiology of abdominal tuberculosis in Somalia follows the typical pattern observed in regions with sustained community transmission of *Mycobacterium tuberculosis* [13, 10, 11, 2, 4].

The predominance of female patients observed in our cohort is also consistent with several reports describing a slight female predominance in peritoneal and abdominal tuberculosis, although the relationship between sex and disease occurrence remains inconsistent across published studies. Differences between regions may reflect variations in healthcare access, nutritional status, socioeconomic conditions, HIV prevalence, referral patterns, and study design rather than inherent biological susceptibility. Importantly, sex was not associated with the need for surgical intervention in our study, supporting previous investigations that demonstrated disease progression is more strongly influenced by delayed diagnosis and anatomical disease extent than by demographic characteristics [1, 6, 14].

The clinical manifestations observed in the present study closely resemble those reported throughout Sub-Saharan Africa and Asia, where abdominal pain, abdominal distension, weight loss, fever, anorexia, and altered bowel habits consistently represent the dominant presenting symptoms. However, these manifestations are inherently nonspecific and overlap extensively with Crohn's disease, colorectal carcinoma, intestinal lymphoma, ovarian malignancy, chronic liver disease, and peritoneal carcinomatosis. Consequently, abdominal tuberculosis continues to pose one of the greatest diagnostic challenges in gastroenterology and abdominal surgery. Recent systematic reviews emphasize that no individual symptom, laboratory test, or imaging finding possesses sufficient diagnostic accuracy to establish the diagnosis independently, necessitating integration of clinical assessment with radiological, microbiological, molecular, and histopathological investigations [5, 1, 6, 15].

Another clinically important observation from our study was the significant association between prolonged symptom duration and the need for surgery. This finding supports previous studies demonstrating that delayed diagnosis permits progressive transmural inflammation, fibrosis, intestinal strictures, adhesive disease, and bowel obstruction, ultimately increasing the likelihood of operative intervention [5, 6]. Similar observations have been reported from India, the Middle East, and Africa, where prolonged delays in diagnosis are consistently associated with increased surgical morbidity and poorer clinical outcomes. From a public health perspective, these findings reinforce the importance of strengthening clinician awareness, improving access to early CT imaging, expanding molecular

diagnostic capacity, and establishing multidisciplinary pathways for patients with suspected abdominal tuberculosis in tuberculosis-endemic countries [5, 6, 16].

One of the most important contributions of the present study is the comprehensive characterization of the radiological manifestations of abdominal tuberculosis in a Somali population. Computed tomography (CT) remains the cornerstone of imaging evaluation because of its ability to simultaneously assess the peritoneum, gastrointestinal tract, mesentery, lymph nodes, and solid abdominal organs, thereby providing a comprehensive assessment of disease extent. In our cohort, the majority of patients demonstrated multisite abdominal involvement, with characteristic abnormalities involving the peritoneum, bowel, mesentery, omentum, and abdominal lymph nodes (Fig. 5). These findings are consistent with current evidence indicating that abdominal tuberculosis is rarely confined to a single anatomical compartment and instead reflects widespread dissemination through hematogenous spread, lymphatic extension, ingestion of infected sputum, or direct extension from adjacent structures. Similar radiological patterns have been consistently reported from India, the Middle East, Europe, and other tuberculosis-endemic regions, confirming that multisystem involvement is one of the hallmarks of advanced abdominal tuberculosis [13, 14, 3, 5].

Peritoneal disease represented the dominant radiological manifestation in our study, with wet-type peritoneal tuberculosis accounting for the majority of cases. This observation closely parallels findings reported by Sharma and Bhatia, Jha et al., and Al-Zanbagi and Shariff, who demonstrated that the wet subtype is the most frequent form of tuberculous peritonitis, accounting for approximately one-half to two-thirds of all patients. The predominance of this subtype reflects diffuse granulomatous inflammation accompanied by protein-rich exudative ascites, smooth peritoneal thickening, and mesenteric inflammatory changes. From a diagnostic perspective, recognition of this characteristic imaging pattern is particularly important because patients frequently present with progressive abdominal distension and ascites, leading clinicians to initially suspect chronic liver disease, ovarian malignancy, or peritoneal carcinomatosis rather than tuberculosis. Consequently, awareness of the characteristic CT features is essential in tuberculosis-endemic regions such as Somalia, where delayed diagnosis remains common [17, 11, 13, 4, 1].

Our study also demonstrated frequent involvement of the ileocecal region, bowel wall, mesentery, and omentum, consistent with the well-recognized predilection of *Mycobacterium tuberculosis* for the terminal ileum and cecum. Several anatomical and physiological mechanisms have been proposed to explain this preference, including prolonged intestinal transit, abundant lymphoid tissue within Peyer's patches, neutral luminal pH, and increased physiological fluid absorption in the terminal ileum. Similar observations have been reported in numerous surgical and radiological studies, where the ileocecal region represents the single most common site of gastrointestinal tuberculosis. Chronic inflammation of this region frequently results in concentric bowel wall thickening, luminal narrowing, fibrotic strictures, and intestinal obstruction, particularly among patients presenting late in the disease course. These pathological changes explain the high frequency of bowel-related complications observed both in our study and throughout the international literature [18, 3, 5].

Another important radiological observation was the frequent presence of omental thickening, omental smudging, and omental caking. Although these findings are highly suggestive of tuberculous peritonitis in endemic regions, they also represent one of the greatest diagnostic challenges because similar appearances occur in metastatic ovarian carcinoma, gastric carcinoma, colorectal cancer, pancreatic malignancy, and diffuse peritoneal carcinomatosis. Likewise, diffuse peritoneal thickening accompanied by ascites may mimic advanced intra-abdominal malignancy or chronic inflammatory disorders. Consequently, CT findings should never be interpreted in isolation but rather integrated with clinical history, epidemiological risk factors, laboratory investigations, and tissue diagnosis whenever feasible. Previous reviews have consistently emphasized that although CT demonstrates excellent sensitivity for detecting abdominal abnormalities, its specificity remains limited because substantial overlap exists between abdominal tuberculosis and other chronic inflammatory or malignant diseases [19, 13, 14, 6].

Mesenteric and retroperitoneal lymphadenopathy constituted another characteristic imaging feature in our cohort. Tuberculous lymph nodes typically demonstrate central low attenuation due to caseous necrosis with peripheral rim enhancement following intravenous contrast administration. Although this appearance strongly favors tuberculosis, similar findings may occasionally occur in lymphoma, metastatic malignancy, fungal infections, and necrotic adenopathy associated with other infectious diseases. Therefore, image-guided biopsy of enlarged lymph nodes remains an important diagnostic procedure whenever uncertainty persists. In resource-limited settings such as Somalia, however, limited availability of interventional radiology may delay tissue confirmation, reinforcing the need for multidisciplinary collaboration between radiologists, surgeons, gastroenterologists, pathologists, and infectious disease specialists [20, 13, 3].

An important finding of this study was that 39 patients were initially suspected to have an intra-abdominal malignancy based on radiological assessment before abdominal tuberculosis was confirmed microbiologically and histopathologically. This observation highlights the considerable diagnostic overlap between abdominal tuberculosis and malignant diseases and reinforces previous reports demonstrating that abdominal tuberculosis is well-recognized as a great mimicker of gastrointestinal and peritoneal malignancies [21]. These findings emphasize the importance of obtaining confirmation whenever radiological findings are equivocal or malignancy cannot be confidently excluded.

Despite advances in molecular diagnostics, no single investigation currently demonstrates sufficient sensitivity to exclude disease with confidence. In our cohort, diagnosis was established through a combination of cytology, histopathology, microbiological investigations, molecular testing, radiological assessment, and clinical response to treatment. This multidisciplinary approach is strongly supported by recent international guidelines, which recommend integrating clinical, radiological, microbiological, histopathological, and molecular evidence rather than relying on any individual diagnostic modality. Such an approach is particularly important in extrapulmonary tuberculosis because the disease is typically paucibacillary, resulting in lower microbiological yields than pulmonary tuberculosis [5, 1, 7, 8].

A notable finding of our study was the prominent role of cytological examination in establishing the diagnosis. Fine-needle aspiration cytology (FNAC) and image-guided aspiration have become increasingly important in the evaluation of abdominal tuberculosis because they provide rapid, minimally invasive access to enlarged lymph nodes, omental lesions, and intra-abdominal masses while avoiding unnecessary laparotomy. Nevertheless, histopathological and microbiological examination remains the reference standard for diagnosis when interpreted together with clinical findings. However, even histopathology is not completely specific, as granulomatous inflammation may also occur in Crohn's disease, sarcoidosis, fungal infections, and *Yersinia enterocolitica*. Therefore, correlation with clinical and radiological findings remains essential before establishing the final diagnosis [21, 15, 11, 1].

The introduction of GeneXpert MTB/RIF and other nucleic acid amplification tests (NAATs) has significantly improved the diagnosis of extrapulmonary tuberculosis by providing rapid identification of *Mycobacterium tuberculosis* DNA and simultaneous detection of rifampicin resistance. Nevertheless, our findings and previous systematic reviews indicate that the diagnostic sensitivity of molecular assays for abdominal tuberculosis remains variable because of the low bacillary burden characteristic of extrapulmonary disease. Recent meta-analyses have shown that GeneXpert demonstrates excellent specificity but only moderate sensitivity for abdominal tuberculosis, particularly when performed on ascitic fluid. Conversely, tissue biopsy specimens generally provide substantially higher diagnostic yields. Consequently, a negative molecular test should not exclude abdominal tuberculosis when clinical suspicion remains high, and additional histopathological evaluation should be pursued whenever possible [22, 16, 17, 8].

One of the greatest clinical challenges highlighted by our study is the differentiation of abdominal tuberculosis from Crohn's disease, gastrointestinal malignancy, peritoneal carcinomatosis, and ovarian carcinoma. These conditions frequently present with remarkably similar clinical manifestations and radiological findings, including chronic abdominal pain, weight loss, bowel wall thickening, ascites, strictures, lymphadenopathy, and omental involvement. Misdiagnosis may have serious consequences, particularly when patients with undiagnosed tuberculosis receive corticosteroids or biological immunosuppressive therapy for presumed inflammatory bowel disease, potentially resulting in disseminated tuberculosis and severe complications. Conversely, patients with abdominal tuberculosis may undergo unnecessary extensive oncological surgery when the disease is mistaken for malignancy. Therefore, current international recommendations strongly advocate obtaining tissue confirmation whenever feasible before initiating immunosuppressive therapy or major abdominal surgery in patients from tuberculosis-endemic regions [23, 1, 2, 6].

The present study demonstrates that anti-tuberculosis therapy remains the cornerstone of treatment for abdominal tuberculosis, with the majority of patients responding successfully to medical management alone. Approximately three-quarters of patients in our cohort were treated conservatively, whereas nearly one-quarter required surgical intervention because of complications such as intestinal obstruction, fibrostenotic strictures, bowel perforation, or persistent diagnostic uncertainty. These findings are consistent with recent evidence indicating that surgery should be reserved for patients with

complications or when malignancy cannot be confidently excluded. Current international guidelines recommend prompt initiation of anti-tuberculosis therapy once the diagnosis is established, as early treatment effectively controls disease progression and reduces the incidence of irreversible intestinal damage requiring operative management [24, 5, 1, 8].

This study highlights that diagnostic delay, rather than disease phenotype alone, is the principal determinant of disease severity. Similar findings have been reported from India, the Middle East, and other tuberculosis-endemic regions, where delayed diagnosis allows chronic granulomatous inflammation to progress to transmural fibrosis, bowel strictures, adhesive disease, and intestinal obstruction. These findings reinforce the need for clinicians to maintain a high index of suspicion for abdominal tuberculosis in patients presenting with chronic unexplained abdominal symptoms, particularly in endemic settings, to facilitate earlier diagnosis and reduce preventable surgical complications [25, 4, 6, 11].

In many low-resource settings, delayed referral, limited availability of contrast-enhanced CT, restricted access to image-guided biopsy, inadequate pathology infrastructure, and limited use of molecular diagnostic assays continue to hinder timely diagnosis of extrapulmonary tuberculosis. Consequently, patients frequently present with advanced disease requiring hospitalization or surgical intervention. Strengthening diagnostic capacity through investment in radiological services, pathology laboratories, molecular diagnostics such as GeneXpert, and multidisciplinary clinical teams should therefore be considered a priority for national tuberculosis control programs. Furthermore, increasing clinician awareness of the diverse clinical and radiological manifestations of abdominal tuberculosis may contribute to earlier recognition and improved patient outcomes [26, 27, 18, 9, 10].

This study has several important strengths. It represents the first comprehensive radioclinical evaluation of abdominal tuberculosis from Somalia and one of the largest single-center cohorts reported from East Africa. The inclusion of consecutive patients over a six-year period minimized selection bias and allowed detailed evaluation of clinical presentation, imaging findings, pathological and microbiological confirmation, treatment patterns, and clinical outcomes. Furthermore, the integration of radiological, microbiological, histopathological, and clinical data provides a comprehensive assessment of abdominal tuberculosis in a resource-limited setting and contributes valuable evidence to the limited literature from Sub-Saharan Africa.

Several limitations were acknowledged. First, the retrospective design may have introduced selection bias. Second, this was a single-center study, limiting the generalizability of the findings to other healthcare settings. Third, microbiological confirmation was unavailable for all patients because of the paucibacillary nature of abdominal tuberculosis and restricted access to advanced diagnostic techniques. Finally, long-term follow-up data regarding recurrence, treatment adherence, and survival were not available. Nevertheless, the study reflects routine clinical practice within a major tertiary referral hospital and provides clinically relevant evidence from an underrepresented high tuberculosis-burden setting.

The challenges encountered in this study reflect the realities of tuberculosis diagnosis in many low- and middle-income countries. Limited access to advanced molecular diagnostics, image-guided biopsy, mycobacterial culture, and specialized pathology services may contribute to delayed diagnosis and increased disease severity. Strengthening diagnostic infrastructure and expanding multidisciplinary collaboration should therefore be considered priorities for national tuberculosis control programs.

Future multicenter prospective studies are needed to validate these findings across diverse healthcare settings in Somalia and Sub-Saharan Africa. Evaluation of standardized diagnostic algorithms incorporating contrast-enhanced CT, image-guided biopsy, histopathology, GeneXpert Ultra, mycobacterial culture, and emerging molecular diagnostics may further improve diagnostic accuracy. Long-term studies examining treatment outcomes, recurrence, antimicrobial resistance, and cost-effectiveness are also warranted to optimize evidence-based management of abdominal tuberculosis.

Conclusion

Abdominal tuberculosis remains a challenging diagnosis in tuberculosis-endemic settings because of its nonspecific clinical presentation and radiological resemblance to malignant and inflammatory abdominal diseases. Our findings demonstrate that an integrated diagnostic approach combining clinical assessment, contrast-enhanced CT, histopathology, microbiology, and molecular testing is essential for accurate diagnosis. Strengthening diagnostic capacity and promoting multidisciplinary collaboration may facilitate earlier diagnosis, reduce unnecessary surgical intervention, and improve clinical outcomes in Somalia and other high tuberculosis-burden countries.

Declarations

Ethics approval and consent to participate

Ethical approval for this study was obtained from the Ethical Review Board of Mogadishu Somali-Turkish Recep Tayyip Erdoğan Training and Research Hospital (Ref. No. MSTH/23634). The study was conducted in accordance with the ethical principles of the Declaration of Helsinki and applicable institutional guidelines.

Written informed consent was obtained from all participants prior to participation. For participants younger than 18 years, written informed consent was obtained from a parent or legal guardian.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

This research received no external funding.

Authors' contributions

Ahmed Adam Osman: Conceptualization, methodology, investigation, data curation, visualization, and writing original draft preparation. Ismail Mohamoud Abdullahi: Investigation, data curation, validation, and writing review and editing. Mohamed Osman Dahir Alasow: Investigation, data curation, visualization, and writing review and editing. Ahmed Abdirahman Hussein: Investigation, data curation, clinical interpretation, and writing review and editing. Nor Abdi Yasin: Conceptualization, investigation, data curation, and writing review and editing. Ismail Gedi Ibrahim: Investigation, data curation, visualization, and writing review and editing. All authors made substantial contributions to the conception and/or design of the study; acquisition, analysis, and interpretation of data; and drafting or critical revision of the manuscript. All authors read and approved the final manuscript and agree to be accountable for all aspects of the work.

Acknowledgements

The authors would like to express their sincere appreciation to the staff of Mogadishu Somali-Turkish Training and Research Hospital for their support and assistance during the conduct of this study.

Author Information

Authors and affiliations

Ahmed Adam Osman^{1*} Department of Radiology, Mogadishu Somali-Turkish Training and Research Hospital, Mogadishu, Somalia

Ismail Mohamoud Abdullahi² Department of Pathology, Mogadishu Somali-Turkish Training and Research Hospital, Mogadishu, Somalia

Mohamed Osman Dahir Alasow¹ Department of Radiology, Mogadishu Somali-Turkish Training and Research Hospital, Mogadishu, Somalia

Ahmed Abdirahman Hussein³ Department of Internal Medicine, Mogadishu Somali-Turkish Training and Research Hospital, Mogadishu, Somalia

Nor Abdi Yasin⁴ Department of General and Laparoscopic Surgery, Mogadishu Somali-Turkish Training and Research Hospital, Mogadishu, Somalia

Corresponding author

Correspondence to Ahmed Adam Osman^{1*}.

References

1. Jha DK, Pathiyil MM, Sharma V. Evidence-based approach to diagnosis and management of abdominal tuberculosis. *Indian J Gastroenterol*. 2023;42(1):17–31. 10.1007/s12664-023-01343-x. PMID: 36899289.
2. Tobin EH, Khatri AM. Abdominal Tuberculosis. *StatPearls Publishing*. PMID: 32310575.
3. Vanhoenacker FM, De Backer AI, Op de Beeck B, Maes M, Van Alena R, Van Beckevoort D, Kersemans P, De Schepper AM. Imaging of gastrointestinal and abdominal tuberculosis. *European Radiology Supplements*. 2004;14(3):E103-15. PMID: 14749955.
4. Al-Zanbagi AB, Shariff MK. Gastrointestinal tuberculosis: A systematic review of epidemiology, presentation, diagnosis and treatment. *Saudi J Gastroenterol*. 2021;27(5):261–74. PMID: 34213424.
5. Sampath A, Mani S. Diagnostic evaluation and management of abdominal tuberculosis. *Indian Journal of Tuberculosis*. 2025;72:S7-11. 10.1016/j.ijtb.2025.02.008. PMID: 40023548.
6. Abu-Zidan FM, Sheek-Hussein M. Diagnosis of abdominal tuberculosis: lessons learned over 30 years: pectoral assay. *World Journal of Emergency Surgery*. 2019;14(1):33. 10.1186/s13017-019-0252-3. PMID: 31338118.
7. World Health Organization. WHO consolidated guidelines on tuberculosis. Module 4: treatment. Tuberculosis care and support. World Health Organization; 2022 Apr. p. 30.
8. World Health Organization. WHO consolidated guidelines on tuberculosis. Module 5: management of tuberculosis in children and adolescents. World Health Organization; 2022 Mar. p. 21.
9. Lawn SD, Mwaba P, Bates M, Piatek A, Alexander H, Marais BJ, Cuevas LE, McHugh TD, Zijenah L, Kapata N, Abubakar I. Advances in tuberculosis diagnostics: the Xpert MTB/RIF assay and future prospects for a point-of-care test. *Lancet Infect Dis*. 2013;13(4):349–61.
10. Pai M, Behr MA, Dowdy D, Dheda K, Divangahi M, Boehme CC, Ginsberg A, Swaminathan S, Spigelman M, Getahun H, Menzies D. Tuberculosis Nat Rev Dis Primers, 2 (2016). View in Scopus. 2016;16076.
11. Sharma MP, Bhatia V. Abdominal tuberculosis. *Indian J Med Res*. 2004;120:305–15. PMID: 15520484.
12. Golden MP, Vikram HR. Extrapulmonary tuberculosis: an overview. *American family physician*. 2005;72(9):1761-8. PMID: 16300038.
13. Rodriguez-Takeuchi SY, Renjifo ME, Medina FJ. Extrapulmonary tuberculosis: pathophysiology and imaging findings. *Radiographics*. 2019;39(7):2023-37. *Radiographics*. 2019;39(7):2023–2037. PMID:

31697616.

14. Bomanji JB, Gupta N, Gulati P, Das CJ. Imaging in tuberculosis. *Cold Spring Harbor Perspect Med*. 2015;5(6):a017814.
15. Dasgupta A, Singh N, Bhatia A. Abdominal tuberculosis: a histopathological study with special reference to intestinal perforation and mesenteric vasculopathy. *J Lab physicians*. 2009;1(02):056–61.
16. Shen Y, Fang L, Ye B, Yu G. Meta-analysis of diagnostic accuracy of nucleic acid amplification tests for abdominal tuberculosis. *PLoS ONE*. 2023;18(11):e0289336. PMID: 38011098.
17. Mor P, Dahiya B, Parshad S, Gulati P, Mehta PK. Recent updates in diagnosis of abdominal tuberculosis with emphasis on nucleic acid amplification tests. *Expert Rev Gastroenterol Hepatol*. 2022;16(1):33–49. PMID: 34923892.
18. Chen Z, Wang T, Du J, Sun L, Wang G, Ni R, An Y, Fan X, Li Y, Guo R, Mao L. Decoding the WHO global tuberculosis report 2024: a critical analysis of global and Chinese key data. *Zoonoses*. 2025;5(1):999.
19. Choi EH, Coyle WJ. Gastrointestinal tuberculosis. *Microbiol Spectr*. 2016;4(6):10–128.
20. Roberts S, Newsholme W, Gibson T. Diagnosis and management of intra-abdominal tuberculosis. *Br J Hosp Med*. 2018;79(6):C86–9.
21. Ali AM, Mohamed YG, Mohamud AA, Mohamed AN, Ahmed MR, Abdullahi IM, Saydam T. Primary gastroduodenal tuberculosis presenting as gastric outlet obstruction: A case report and review of literature. *World J Clin Cases*. 2024;12(8):1536.
22. Gupta P, Kumar S, Sharma V, Mandavdhare H, Dhaka N, Sinha SK, Dutta U, Kochhar R. Common and uncommon imaging features of abdominal tuberculosis. *J Med Imaging Radiat Oncol*. 2019;63(3):329–39.
23. Donoghue HD, Spigelman M, Greenblatt CL, Lev-Maor G, Bar-Gal GK, Matheson C, Vernon K, Nerlich AG, Zink AR. Tuberculosis: from prehistory to Robert Koch, as revealed by ancient DNA. *Lancet Infect Dis*. 2004;4(9):584–92.
24. Lee H, Kim J, Kim J, Park YJ. Review of the global burden of tuberculosis in 2023: insights from the WHO Global Tuberculosis Report 2024. *Public Health Wkly Rep*. 2025;18(11 Suppl):55.
25. Sharma SK, Mohan A, Kohli M. Extrapulmonary tuberculosis. *Expert Rev Respir Med*. 2021;15(7):931–48.
26. Lee JY. Diagnosis and treatment of extrapulmonary tuberculosis. *Tuberc Respir Dis*. 2015;78(2):47.
27. Cherian JJ, Lobo I, Sukhlecha A, Chawan U, Kshirsagar NA, Nair BL, Sawardekar L. Treatment outcome of extrapulmonary tuberculosis under revised national tuberculosis control programme. *Indian J tuberculosis*. 2017;64(2):104–8.

Figures

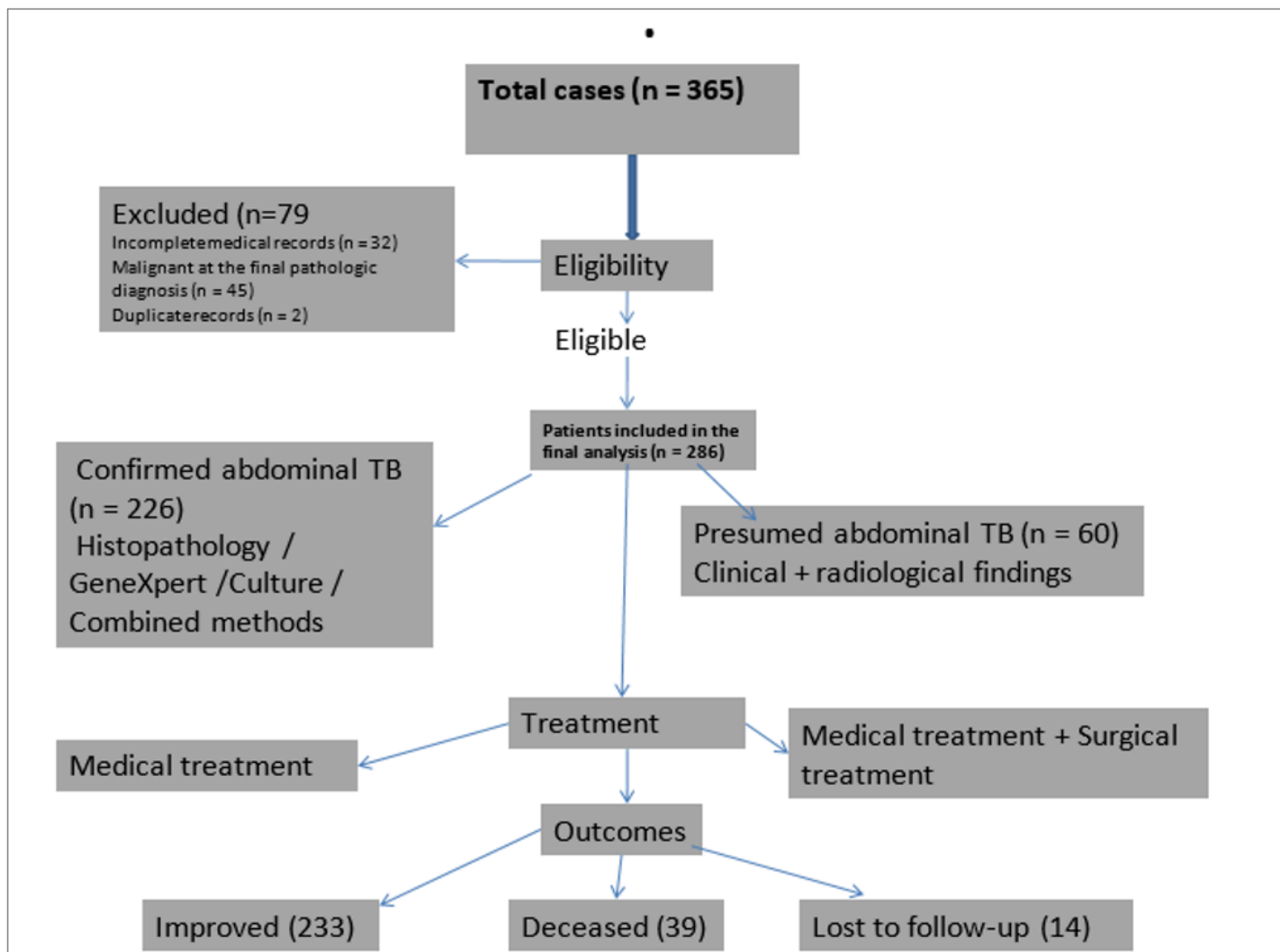


Figure 1

STROBE flow diagram illustrating patient selection, diagnostic classification, treatment, and clinical outcomes among patients with abdominal tuberculosis.

Figure 2. Diagnostic Pathway for Abdominal Tuberculosis

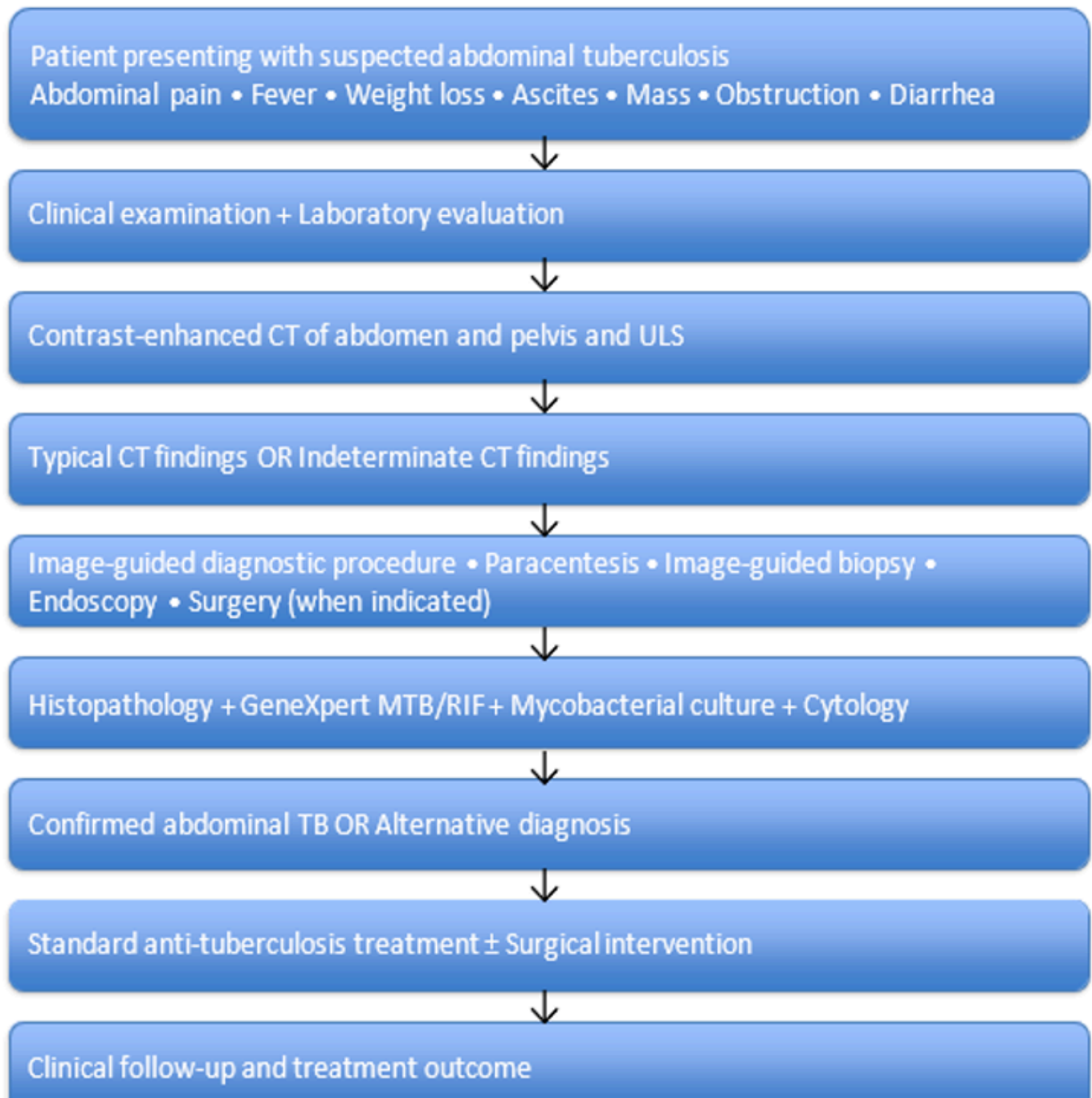


Figure 2

Proposed diagnostic algorithm for abdominal tuberculosis based on the diagnostic pathway used in the present study, integrating clinical assessment, contrast-enhanced CT, minimally invasive procedures, histopathological examination, microbiological testing, and molecular diagnostics.

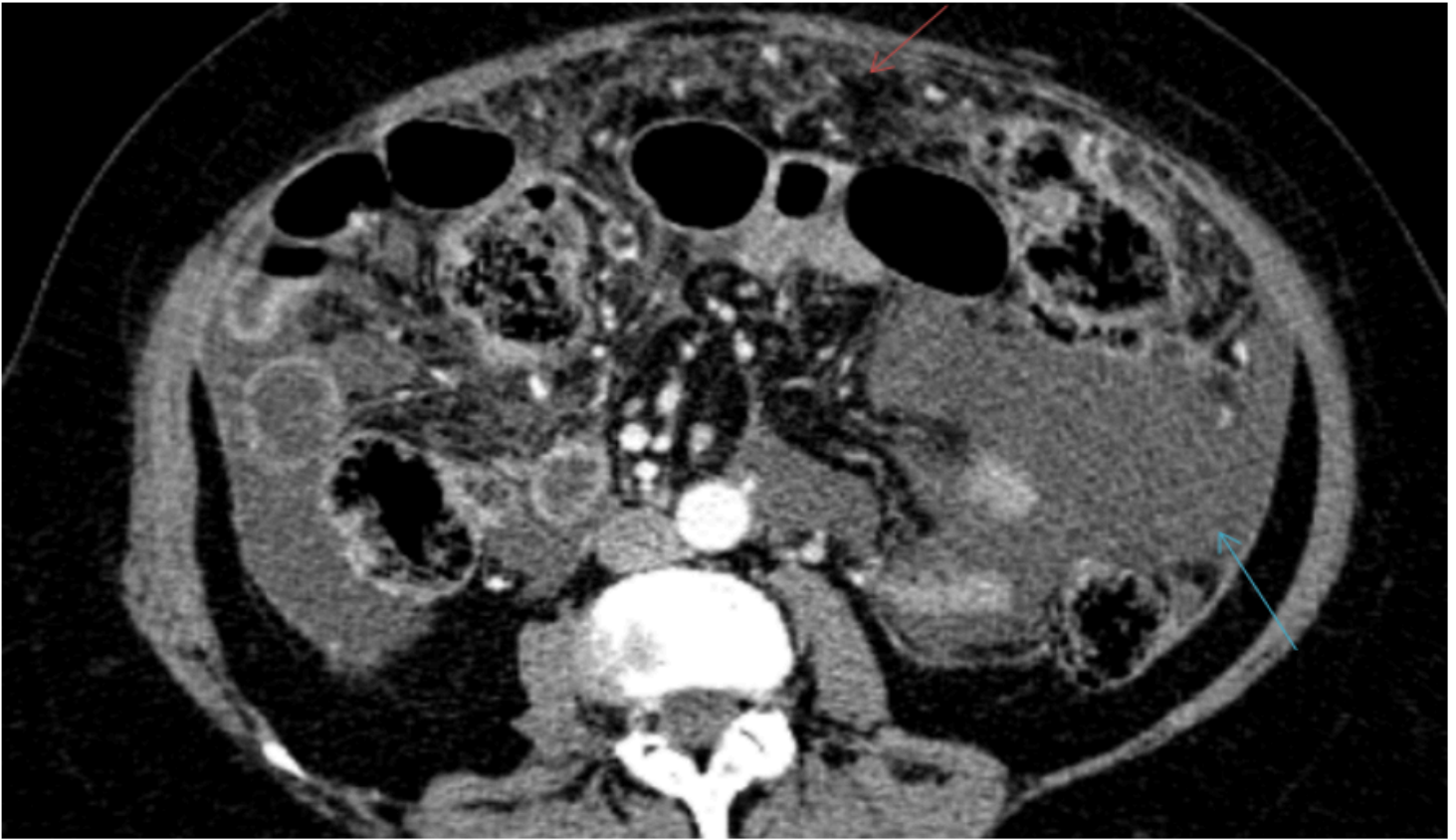


Figure 3

Omental caking and ascites in tuberculous peritonitis. Contrast-enhanced axial abdominal CT in a 65-year-old female demonstrates marked anterior abdominal wall omental caking with nodular enhancement (red arrowhead), associated with moderate-to-large volume ascites (blue arrowhead). These findings are characteristic of the wet type of tuberculous peritonitis.

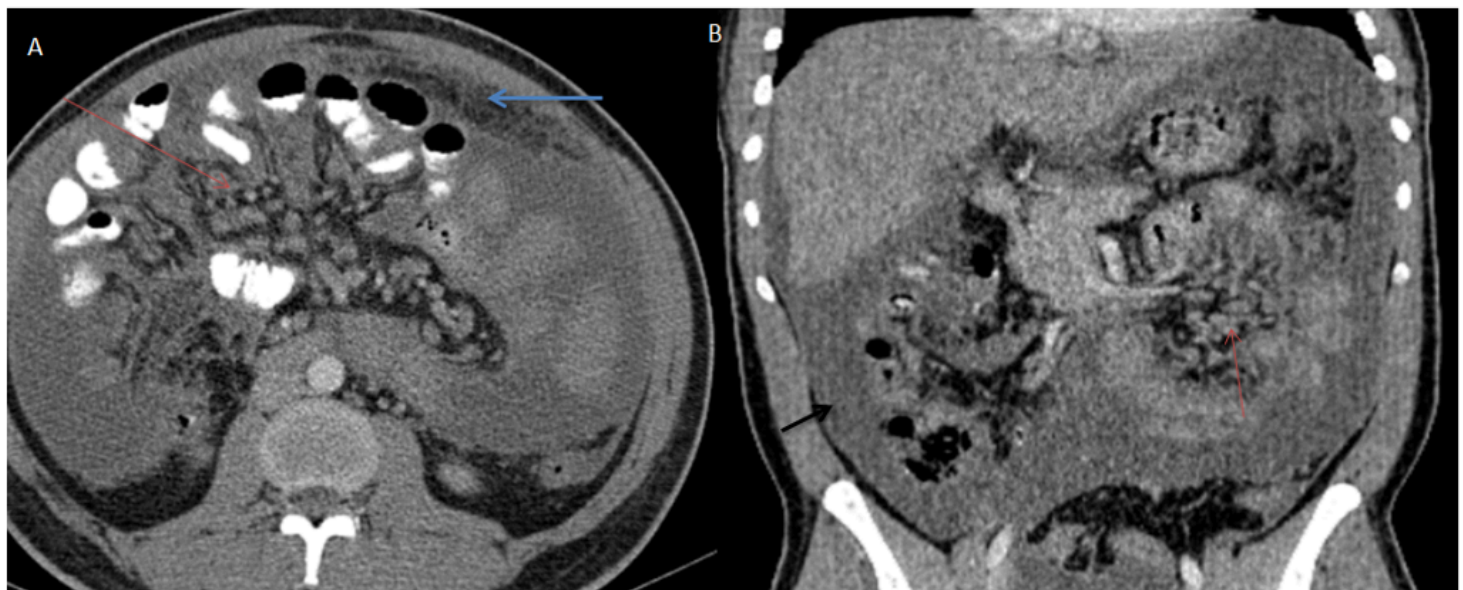


Figure 4

Omental caking and ascites in tuberculous peritonitis. Contrast-enhanced axial abdominal CT in a 65-year-old female demonstrates marked anterior abdominal wall omental caking with nodular enhancement (red arrowhead), associated with moderate-to-large volume ascites (blue arrowhead). These findings are characteristic of the wet type of tuberculous peritonitis.

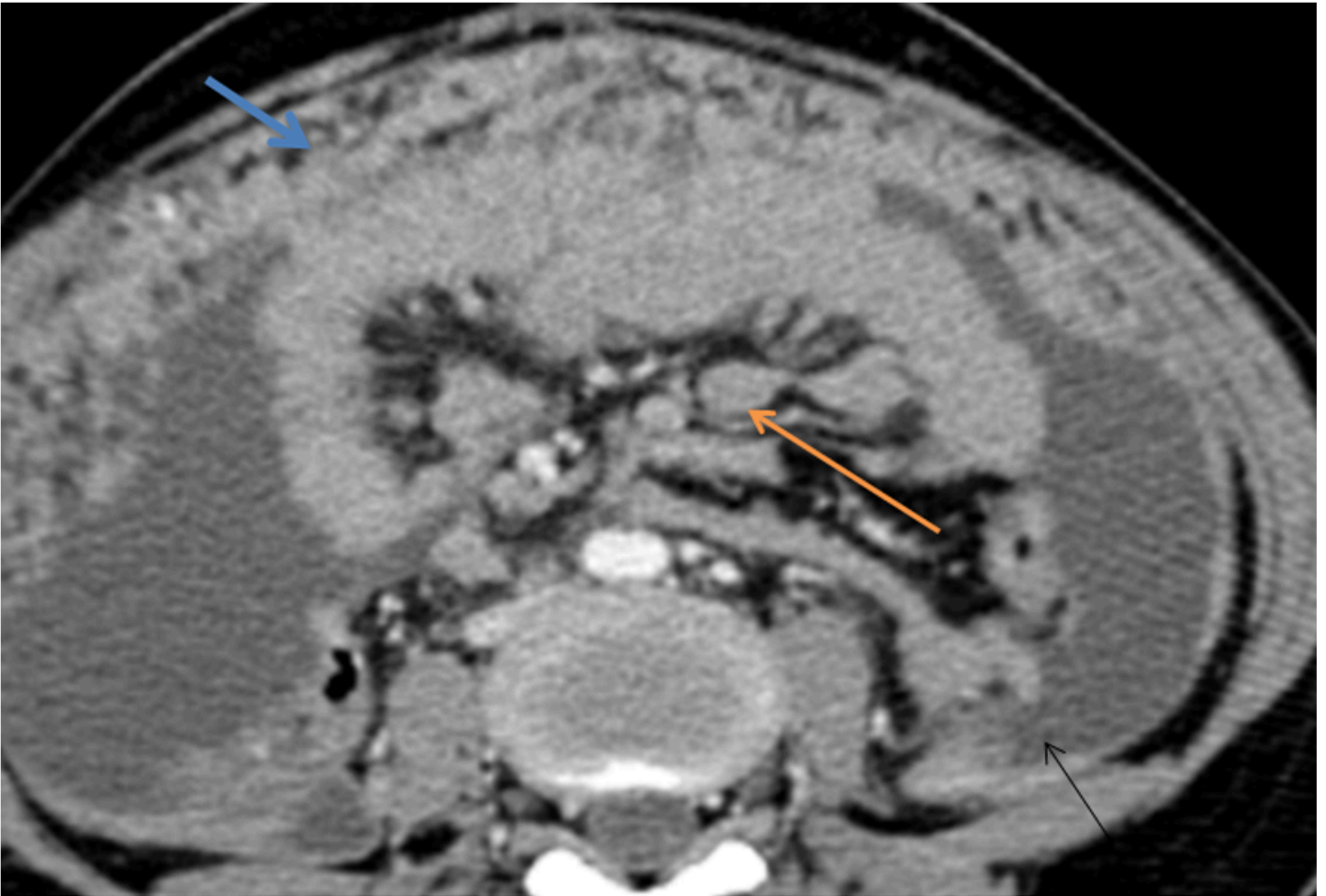


Figure 5

Mesenteric lymphadenopathy with enhancing omental nodularity. Contrast-enhanced axial abdominal CT in a 20-year-old female demonstrates multiple enhancing mesenteric lymph nodes (orange arrow), associated with irregular enhancing omental nodularity (blue arrowhead) and free intraperitoneal ascites (black arrowhead), consistent with active tuberculous peritonitis.