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ABDOMINAL TUBERCULOSIS AND MIMICKERS: A DIAGNOSTIC DILEMMA AND THE ROLE OF EARLY SURGICAL EXPLORATION IN AMBIGUOUS CASES

General Surgery

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ABSTRACT

This study evaluated the importance of early surgical exploration in suspected abdominal tuberculosis (ATB) cases lacking microbiological or histopathological confirmation. Surgery provided definitive diagnoses in all cases, identifying non-ATB and drug-resistant TB cases, despite empirical anti-tuberculosis therapy (ATT) initiation based on clinical suspicion. Shorter empirical ATT duration before surgery correlated with better outcomes. The study highlights the need for standardized diagnostic protocols prioritizing confirmatory testing, limiting empirical ATT to settings without such diagnostics. Improving ATB management requires multidisciplinary collaboration and increased use of minimally invasive techniques like laparoscopy. Early surgical exploration enables direct tissue sampling for histopathological confirmation, reducing reliance on empirical ATT and minimizing complications and mortality from inappropriate treatment. Integrating surgical diagnostics into a multidisciplinary approach ensures targeted treatments and reduces drug-resistant tuberculosis. Prioritizing definitive diagnosis before initiating ATT prevents misdiagnoses, optimizes patient care, and supports public health strategies for controlling and eliminating this infectious disease.

KEYWORDS

Abdominal tuberculosis, Diagnostic accuracy, Surgical exploration, Empirical anti-tuberculosis therapy, Histopathological confirmation, Multidisciplinary approach, Drug-resistant tuberculosis.

INTRODUCTION

Tuberculosis (TB) continues to be a major global health burden, with an estimated 10 million cases reported worldwide in 2022, of which 15% involved extra-pulmonary manifestations [1]. Abdominal tuberculosis (ATB), comprising approximately 11-13% of extra-pulmonary TB cases in India [2], primarily affects the intestines, peritoneum, mesenteric lymph nodes, and other abdominal structures. ATB often presents diagnostic challenges due to its nonspecific symptoms and clinical overlap with conditions such as Crohn's disease, malignancies, and other granulomatous disorders [3, 4].

Despite advances in diagnostic modalities, empirical anti-tubercular therapy (ATT) remains a frequent strategy in cases of diagnostic ambiguity [5]. Although potentially lifesaving in confirmed TB cases, empirical ATT may cause significant harm, particularly when initiated without microbiological or histopathological confirmation [5, 6, 7]. This practice runs counter to the guidelines of the National Tuberculosis Elimination Program (NTEP) in India, which advocates for microbiological confirmation but allows for clinical discretion in specific cases [2]. Such reliance on clinical judgment, when not aligned with standardised diagnostic workflows, can adversely affect patient outcomes and contribute to the development of drug resistance. This study evaluates the role of early surgical exploration in cases of suspected ATB, focusing on its role in enhancing diagnostic accuracy and mitigating the risks of inappropriate ATT. Furthermore, it discusses the implications of deviations from standardised diagnostic protocols and emphasises the importance of multidisciplinary care in managing patients with suspected ATB.

METHODS

This case series adhered to CARE reporting guidelines [8]. A retrospective analysis examined six patients with suspected abdominal tuberculosis (ATB) who underwent surgery at a tertiary care center between June 2022 and May 2024. The study aimed to assess the impact of early surgical intervention on diagnostic accuracy and patient outcomes in cases where ATB was clinically suspected but lacked microbiological or histopathological confirmation.

The analysis focused on patients aged 16 and older with a clinical diagnosis of ATB based on symptoms and radiological findings, all of whom were receiving empirical anti-tuberculosis therapy (ATT) and referred due to diagnostic uncertainty or clinical deterioration. Only HIV-negative individuals were included to ensure consistency in assessing ATB.

Exclusion criteria included confirmed pulmonary tuberculosis, regardless of abdominal involvement, and HIV-positive status to avoid confounding factors related to immunosuppression.

Details of ATT at presentation, including duration, dosage, and adverse effects, were recorded. Surgical findings, histopathological diagnoses, including biopsy results and acid-fast bacilli (AFB) staining, and postoperative recovery and complications were meticulously reviewed. Follow-up outcomes were evaluated over a median period of six months, focusing on persistent symptoms and survival status.

The primary outcome was the diagnostic accuracy achieved through surgical exploration and histopathological confirmation. Secondary measures included patient recovery, continuation of ATT, postoperative complications, and survival status at follow-up.

Written informed consent was obtained from all patients and/or guardians for participation and publication of relevant anonymized data.

RESULTS

The study cohort included six patients (four males, two females; age range 22-50 years, mean 38 years) with suspected abdominal tuberculosis (ATB). Three patients (Cases One, Two, Five) were referred from other hospitals and specialties, while the other three (Cases Three, Four and Six) presented from primary care centres. At the time of presentation, all six patients had been initiated on empirical anti-tuberculosis therapy (ATT) based on clinical suspicion of abdominal tuberculosis. All patients were confirmed to be HIV-negative through routine diagnostic testing (Table 1).

Table 1: Demographic profile, Referral Source, Duration of Empirical ATT & Symptoms at Presentation

Case	Age/Gender	Referral Source	Duration of Empirical ATT (weeks)	Symptoms at Presentation
1	28/M	Medical Specialty	2	Acute abdominal pain, vomiting, abdominal distension
2	24/F	Medical Specialty	4	Chronic abdominal pain, altered bowel habits, weight loss
3	40/F	Primary Care	6	Recurrent abdominal pain, diarrhoea, tenesmus, fever

4	50/M	Primary Care	18	Severe abdominal pain, vomiting, subacute obstruction
5	26/F	Medical Specialty	20	Abdominal pain, fever, weight loss
6	38/M	Primary Care	16	Subacute obstruction, abdominal distension

Primary Outcome (Diagnostic Accuracy):
Surgical exploration provided definitive histopathological or microbiological diagnoses for all six patients. Three patients (Cases One, Two, and Six) were ruled out for ATB and diagnosed with Crohn's disease or nonspecific granulomatous inflammation, leading to the cessation of ATT. Two patients (Cases Three and Four) had drug-resistant TB; one survived on appropriate therapy, while the other died from sepsis and multi-organ failure. One patient (Case Five) underwent extensive bowel resection without confirming ATB, with nonspecific histopathology. Despite initial ATB suspicion, post-surgical diagnoses guided proper management.

Secondary Outcomes (Patient Recovery, ATT Continuation, Complications, and Survival):
Recovery & ATT continuation: Two of the three favorable outcome patients (Cases One and Two) had ATT discontinued after alternative diagnoses, and one (Case Three) continued drug-resistant TB therapy, achieving symptom resolution.

Postoperative Complications: Case Two required surgery for an incisional hernia and stoma reversal; Case Five developed short-bowel syndrome and died postoperatively.

Survival Status: At six months, three patients (Cases One, Two, Three) were symptom-free or well-managed. Two (Cases Four and Five) died postoperatively, and one (Case Six) remained symptomatic despite discontinuing ATT and being treated for Crohn's disease.

Overall, patients with shorter empirical ATT before surgery (Cases One, Two, Three: mean 4 weeks) had better outcomes than those with longer preoperative ATT durations (Cases Four, Five, Six: mean 15 weeks) (Table 2).

Case Presentations
Case One: A 28-year-old male under medical gastroenterology care presented with acute abdominal pain, vomiting, and distension. He had been on two weeks of empirical preoperative anti-tuberculosis therapy (ATT). Referred for subacute intestinal obstruction unresponsive to medical therapy, intra-operative findings revealed ileal volvulus around an ileo-cecal junction mass (Fig 1, Panel a, b). A resection of the devitalized ileal segment was performed, creating an ileal stoma and caecal mucus fistula (Fig 1, Panel c). Histopathology showed cryptitis, crypt abscesses, and non-necrotizing epithelioid granulomas, indicative of Crohn's disease. Postoperative ATT was discontinued, and the patient remained asymptomatic at a six-month follow-up while continuing Crohn's disease treatment.

Case	Procedure Performed	Intraoperative Findings	Histopathological/Microbiological Diagnosis	Postoperative ATT	Follow-up/Outcome
1	Resection of devitalized segment; ileal stoma with caecal mucus fistula	Ileal volvulus around ileocecal junction mass	Cryptitis, crypt abscesses, non-necrotising epithelioid cell granulomas consistent with Crohn's disease; AFB negative	Discontinued	Symptom-free at 6 months; continuing Crohn's treatment
2	Biopsy of nodules and lymph nodes; resection; proximal/distal ends exteriorized	Multiple ileal strictures; peritoneal nodules; mesenteric lymphadenopathy	Non-caseating granulomas; AFB negative	Discontinued	Symptom-free at 6 months; required incisional hernia & stoma reversal surgery
3	Per-rectal drainage of abscess	Echogenic collection with debris in recto-uterine pouch (Pre-procedure USG)	GeneXpert MTB/RIF Ultra on pus showed growth of AFB	Continued	Symptom-free at follow-up; continuing treatment
4	Procedure aborted after obtaining multiple peritoneal biopsies	Extensive adhesions, matted bowel loops	Posthumous diagnosis of XDR-TB strain	Discontinued	Deceased (sepsis)
5	Extensive bowel resection	Multiple strictures	Ischemic changes, nonspecific chronic inflammation; AFB negative	Discontinued	Deceased (post-op day 18, short bowel syndrome)
6	Strictureplasty, adhesiolysis	Strictures, creeping fat	Non-caseating granulomas; Crohn's disease	Discontinued	Persistent symptoms; ongoing treatment

Table 2: Procedure, Intraoperative Findings, Diagnosis, and Outcomes [ATT: Anti-Tubercular Therapy, AFB: Acid-Fast Bacilli, MTB/RIF: Mycobacterium tuberculosis/Rifampicin Resistance Test (GeneXpert Ultra), XDR-TB: Extensively Drug-Resistant Tuberculos

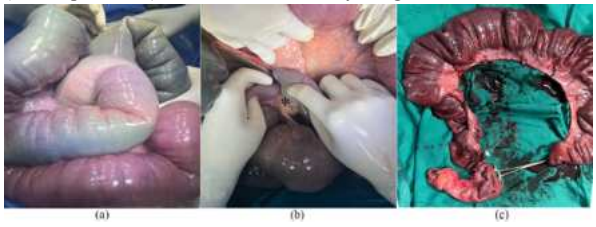

Figure 1: Case One

Panel (a) shows hugely distended small bowel loops with devitalised portions, panel (b) shows the rotation of small gut mesentery around the ileo-caecal junction (denoted by *), panel (c) shows the resected part of distal ileum, ileo-caecal junction (denoted by arrow) and the caecum with part of ascending colon.

Case Two: A 24-year-old female under internal medicine care presented with chronic abdominal pain, altered bowel habits, and weight loss after four weeks of empirical preoperative ATT. She was referred due to worsening symptoms, abdominal distension, and recurrent vomiting. Laparotomy revealed multiple distal ileal strictures, peritoneal nodules, and mesenteric lymphadenopathy. Biopsies and resection of the affected ileal segment were performed, with both ends exteriorized as stoma. Histopathology indicated non-caseating granulomas with AFB negative results, leading to the discontinuation of post-operative ATT. The patient remained symptom-free at six

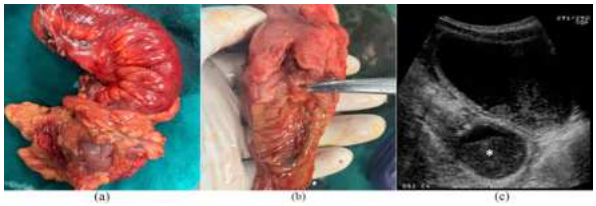

Figure 2: Case Two (Panels a, b) and Three (Panel c)

Panel (a) shows part of resected ileum with stricture with mesenteric lymph nodes; Panel (b) shows gross specimen laid open to demonstrate stricture site. Panel (c) USG shows echogenic collection in recto-uterine pouch marked with asterisk, with some echogenic debris in bladder.months but required follow-up surgery for an incisional hernia and stoma reversal.

Case Three: A 40-year-old woman, on empirical ATT from her

primary care center, presented to the Emergency Department with recurrent abdominal pain, diarrhea, tenesmus, and fever. Imaging indicated an echogenic collection with debris in the recto-uterine pouch (Fig. 2, Panel c), which was drained per rectally. GeneXpert MTB/RIF Ultra (Cepheid, Sunnyvale, CA, USA) performed on the pus identified a drug-resistant Mycobacterium tuberculosis strain, prompting appropriate ATT. At six-month follow-up, the patient was symptom-free and continued treatment for drug-resistant tuberculosis.

Case Four: A 50-year-old male presented to the Emergency Department with severe abdominal pain, vomiting, and subacute obstruction after 18 weeks of empirical preoperative ATT initiated at his local hospital. Intra-operative findings showed extensive adhesions and matted bowel loops (Fig 3, Panel a). Multiple peritoneal biopsies were taken, but no definitive surgical intervention was possible due to his critical condition. ATT was discontinued due to his worsening clinical profile, and the patient succumbed to sepsis and multi-organ failure on day six postoperatively. The biopsy specimen showed growth of Mycobacterium tuberculosis, identified as an XDR (extensively drug-resistant) strain (report received post-mortem).

Case Five: A 26-year-old female, under the care of internal medicine specialists, initially presented with abdominal pain, fever, and weight loss. Despite lacking microbiological or histopathological confirmation, she was clinically diagnosed with abdominal tuberculosis (ATB) and began empirical ATT for 20 weeks. Due to recurrent obstructive symptoms, she was later referred to us. Intra-operatively, multiple strictures were observed, requiring extensive bowel resection (Fig 3, Panel b). Histopathology revealed ischemic changes with nonspecific chronic inflammation and AFB negative results. Postoperatively, she developed short bowel syndrome and succumbed to her illness on postoperative day 18, despite all efforts.

Case Six: A 38-year-old male on empirical ATT presented with subacute obstruction and abdominal distension after 16 weeks of therapy. Laparotomy revealed strictures, adhesions, and creeping fat (Fig 3, Panel c), necessitating strictureplasty and adhesiolysis. Histopathology confirmed non-caseating granulomas consistent with Crohn's disease. Despite discontinuing ATT post-operatively, the patient experienced persistent symptoms and remained under treatment for Crohn's disease at six-month follow-up.

DISCUSSION

Diagnosing abdominal tuberculosis (ATB) is challenging due to its resemblance to other intra-abdominal conditions. Empirical anti-tuberculosis therapy (ATT) without microbiological or histopathological confirmation often results in poor outcomes. The National Tuberculosis Elimination Programme (NTEP) emphasizes a structured diagnostic approach, prioritizing microbiological or histopathological

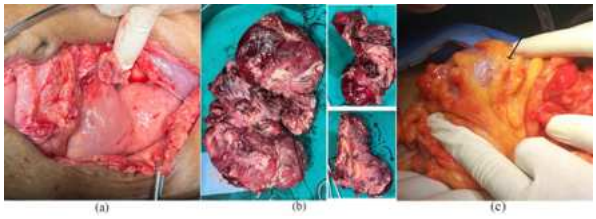

Figure 3: Case Four (Panel a), Five (Panel b) and Six (Panel c)

Panel (a) shows cocooned abdomen with dense adhesions and matted gut loops; Panel (b) shows resected small bowel segment with dense adhesions and strictures, top right inset shows a separately resected small bowel segment, bottom right inset shows this segment laid open to demonstrate the stricture and multiple ulcerations; Panel (c) shows 'creeping fat' appearance (marked with arrow) over the small intestine.
confirmation [2].

Confirmatory Diagnosis:

NTEP mandates microbiological or histopathological evidence to confirm ATB. Recommended diagnostics include NAAT (e.g., GeneXpert) and biopsied tissue histopathology to improve accuracy and identify drug resistance for tailored therapy.

Invasive Procedures for Sample Collection:

When non-invasive methods fail, guidelines recommend peritoneal fluid aspiration, laparoscopic or open biopsies, and guided fine needle aspiration cytology (FNAC) for adequate specimen collection.

Empirical Therapy as a Last Resort:

Empirical ATT is permitted in specific cases, especially in resource-limited or emergency settings, with close monitoring and plans for confirmatory testing when feasible.

Multidisciplinary Approach:

A multidisciplinary team, including Surgery, Gastroenterology, Radiology, and Infectious Disease specialists, is recommended to guide diagnostic and therapeutic decisions, balancing risks and benefits.

Fallback in Resource-Limited Settings:

In the absence of confirmatory diagnostics, empirical therapy based on clinical judgment and supportive findings (e.g., imaging or elevated ADA levels) requires strict monitoring and re-evaluation when possible.

NTEP guidelines aim to reduce misdiagnosis, inappropriate ATT use, and drug-resistant tuberculosis by prioritizing definitive diagnostic methods and allowing flexibility in resource-limited settings [2].

Impact Of Clinical Discretion And Empirical ATT

This review underscores the dangers of empirical ATT without diagnostic confirmation, linking delayed surgical exploration and prolonged empirical ATT to significant morbidity and occasional mortality. In Cases Four and Five, advanced disease rendered surgical management ineffective. Conversely, Cases One, Two, and Three, with earlier surgical exploration and shorter empirical ATT, had better outcomes. Early surgery facilitated accurate diagnoses, timely cessation of unnecessary ATT, and appropriate management. These findings support existing literature, emphasizing surgical biopsies for definitive diagnoses in ambiguous ATB cases to reduce misdiagnosis and inappropriate treatment risks [5, 9, 10].

Public Health Implications

Unwarranted ATT use poses significant public health risks, increasing the likelihood of multi-drug-resistant tuberculosis due to reliance on clinical discretion without confirmatory diagnostics. This misuse distorts epidemiological data, misallocates healthcare resources, and hampers TB control efforts [1, 7]. Addressing these issues is paramount, especially in LMICs like India, and requires adherence to evidence-based diagnostics and minimizing empirical therapy.

Current Perspectives On Early Surgical Interventions

CT scans, MRI, and ascitic fluid ADA levels often lack specificity in distinguishing ATB from Crohn's disease or intra-abdominal malignancies [4, 10, 11]. Laparoscopy is effective when non-invasive methods are insufficient, allowing direct visualisation and tissue biopsy, offering high sensitivity and specificity in diagnosing ATB [12, 13]. In this review, surgical intervention confirmed histopathology in five of six cases, with most patients showing improved outcomes, underscoring the importance of surgical methods in managing complications and serving as critical diagnostic tools for uncertain ATB cases [9, 12, 13].

Key Insights And Takeaways

Key takeaways for clinicians in managing abdominal tuberculosis are:

1. **Adherence to Diagnostic Protocols:**
Strict adherence to NTEP diagnostic protocols is essential. Empirical ATT should be restricted to settings without confirmatory diagnostics, with close patient monitoring for re-evaluation [2].

2. **Multidisciplinary Collaboration:**
Effective management requires gastroenterologists, surgeons, radiologists, and infectious disease specialists. Early surgical consultation is advised if non-invasive diagnostics are inconclusive [9, 11].

3. **Training and Awareness:**
Clinicians should be aware of the limitations of empirical ATT and the risks of misdiagnosis. Understanding public health issues like drug resistance and resource misallocation is crucial for adhering to evidence-based guidelines [2, 7, 14].

4. **Minimally Invasive Techniques:**

Emphasizing minimally invasive techniques, such as laparoscopy, is advantageous for diagnosis and treatment. These methods can prevent diagnostic delays, reduce unnecessary ATT, and improve patient outcomes [5, 9, 13].

CONCLUSIONS

Abdominal tuberculosis is difficult to diagnose due to nonspecific symptoms and its resemblance to other abdominal conditions. This study shows that early surgical exploration improves diagnostic accuracy and patient outcomes when non-invasive methods fail. It allows direct tissue sampling for histopathological confirmation, reducing reliance on empirical anti-tuberculosis therapy and lowering the risk of complications and mortality from inappropriate ATT use. Incorporating surgical diagnostics into a multidisciplinary approach ensures more targeted treatments and reduces drug-resistant tuberculosis. Prioritizing microbiological and histopathological confirmation before starting ATT helps prevent misdiagnoses, optimizes patient care, and supports public health strategies to control and eliminate this infectious disease.

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