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Original Research Article

Study of Intestinal Obstruction due to Tuberculosis

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Abstract

Objective: Intestinal tuberculosis (TB) is a significant cause of intestinal obstruction in developing countries, particularly in regions with high TB burden. Abdominal tuberculosis frequently mimics other surgical emergencies, making early diagnosis challenging. In India, abdominal TB contributes substantially to surgical morbidity and mortality.

Aim: To study the clinical presentation, operative findings, surgical management, and postoperative outcomes in patients presenting with intestinal obstruction due to tuberculosis.

Methods: A prospective observational study was conducted over two years (January 2022 to December 2023) at the Department of General Surgery, Government Medical College & Hospital, Purnea, Bihar. Sixty patients with intestinal obstruction due to tuberculosis, confirmed by histopathology and/or AFB culture, were included. Clinical data, laboratory parameters, operative findings, and follow-up outcomes were systematically recorded and analysed using SPSS version 26.0.

Results: The study included 60 patients with a mean age of 38.2 ± 12.4 years; male predominance was noted (63.3%). The most common presenting symptom was abdominal pain (100%), followed by abdominal distension (90%) and vomiting (80%). The ileocaecal region was the most common site of obstruction (50%). Ileocaecal resection with anastomosis was the most frequently performed procedure (43.3%). Postoperative wound infection (20%) was the commonest complication. Overall mortality was 6.7%.

Conclusion: Intestinal tuberculosis causing obstruction remains a formidable surgical challenge in endemic regions. Early diagnosis, timely surgical intervention, and rigorous antitubercular therapy compliance are key determinants of favourable outcomes.

Keywords: Intestinal tuberculosis, Intestinal obstruction, Ileocaecal TB, Abdominal tuberculosis, Antitubercular therapy, Surgical management.

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Introduction

Tuberculosis (TB) remains one of the most significant infectious diseases globally, with an estimated 10.6 million new cases reported annually according to the World Health Organization (WHO) in 2022. India alone accounts for approximately 26% of the global TB burden, making it the country with the highest TB incidence in the world.[1] While pulmonary tuberculosis remains the most common manifestation, extrapulmonary tuberculosis constitutes 15-20% of all TB cases in immunocompetent patients and up to 50% in HIV-positive individuals. [2] Abdominal tuberculosis, which includes involvement of the gastrointestinal tract, peritoneum, mesenteric lymph nodes, and solid abdominal organs, represents 11-16% of extrapulmonary TB cases.[3] Intestinal TB specifically may present in several morphological forms including ulcerative, hypertrophic, and ulcerohypertrophic variants, with the hypertrophic and fibrous forms predominantly leading to mechanical intestinal obstruction. [4] The ileocaecal region is preferentially affected due to its abundant lymphoid tissue (Peyer's patches), slower intestinal transit, and the relative alkalinity of the distal ileum — all factors that facilitate bacillary implantation. [5] Intestinal obstruction secondary to tuberculosis can arise due to multiple mechanisms: stricture formation from fibrosis during healing, adhesive obstruction from peritoneal involvement,

compression from enlarged mesenteric lymph nodes, or formation of inflammatory masses and matted loops.[6] The clinical presentation is often insidious and non-specific, posing a diagnostic challenge that frequently results in delayed diagnosis and surgical intervention.[7] The condition disproportionately affects young adults in their economically productive years, further amplifying the socioeconomic impact.[8] Despite advances in diagnostic imaging and molecular diagnostics such as GeneXpert MTB/RIF assay, computed tomography (CT) enterography, and laparoscopy with targeted biopsy, the preoperative diagnosis of intestinal TB remains elusive in a significant proportion of patients. Many cases are diagnosed incidentally at the time of emergency laparotomy performed for acute abdomen.[9] The overlap of clinical and radiological features with Crohn's disease, carcinoma caecum, and other conditions further confounds preoperative diagnosis. [10] Surgical management of intestinal TB-related obstruction has evolved over the decades. While conservative management with antitubercular therapy (ATT) is the cornerstone of treatment, surgical intervention becomes imperative in cases of mechanical obstruction, perforation, haemorrhage, or failure of medical management.[11]

The choice of surgical procedure — ranging from adhesiolysis and stricturoplasty to segmental resection and stoma formation — is governed by the intraoperative findings, extent of disease, and general condition of the patient. [12] Studies from various Indian tertiary care centres have reported a varied incidence of complications and mortality, reflecting differences in patient demographics, nutritional status, comorbidities, disease stage at presentation, and institutional resources.[13] Understanding the local epidemiology, clinical profile, surgical spectrum, and outcomes of this disease is essential for formulating evidence-based management protocols tailored to the specific healthcare context. There is a paucity of prospective data from Bihar, a state with one of the highest TB burdens in India. This study aims to bridge this knowledge gap by systematically documenting the clinical presentation, investigations, operative findings, surgical procedures, and postoperative outcomes in patients with intestinal obstruction due to tuberculosis at a tertiary care centre in Bihar. The findings are expected to contribute to the existing literature and aid in the formulation of region-specific management guidelines. [14]

Materials and Methods

Study Design and Setting: This was a prospective observational study conducted in the Department of General Surgery, Government Medical College & Hospital, Purnea, Bihar, India, over a period of two years from January 2022 to December 2023. The study was approved by the Institutional Ethics Committee, and written informed consent was obtained from all participants prior to enrolment.

Study Population: All patients aged 11 years and above who were admitted to the surgical ward with a clinical and/or operative diagnosis of intestinal obstruction attributable to tuberculosis were eligible for inclusion. Patients with prior diagnosis of abdominal TB on antitubercular therapy, those with incomplete records, and those who did not provide informed consent were excluded from the study. A total of 60 patients fulfilling the inclusion criteria were enrolled.

Diagnostic Criteria: The diagnosis of intestinal tuberculosis was established on the basis of one or more of the following criteria: (1) histopathological examination of resected bowel or biopsy specimens demonstrating caseating granulomas with or without Langhans giant cells; (2) positive Ziehl-Neelsen (ZN) stain for acid-fast bacilli (AFB) in tissue sections; (3) positive mycobacterial culture from tissue or ascitic fluid; (4) positive GeneXpert MTB/RIF assay on tissue specimen; and (5) a combination of characteristic operative findings with supportive radiological and biochemical evidence in the clinical context of endemic TB.

Data Collection: A structured proforma was used to collect data including demographic details (age, sex, residence, socioeconomic status, BMI), duration and nature of symptoms, clinical examination findings, laboratory investigations (complete blood count, liver function tests, serum albumin, Erythrocyte Sedimentation Rate, Mantoux test, and AFB sputum smear), radiological findings (plain X-ray abdomen, ultrasound abdomen, CT scan abdomen and pelvis), operative details (site of obstruction, type, surgical procedure, and intraoperative findings), histopathological reports, and postoperative course including complications, hospital stay, ATT compliance, and mortality.

Operative Management: All patients underwent exploratory laparotomy under general anaesthesia. The choice of surgical procedure was dictated by the intraoperative findings and the surgeon's assessment. Procedures performed included ileocaecal resection with primary anastomosis, stricturoplasty (Heineke-Mikulicz technique), adhesiolysis, right hemicolectomy, and stoma formation. All patients with confirmed TB were initiated or continued on standard four-drug ATT comprising isoniazid, rifampicin, pyrazinamide, and ethambutol as per national guidelines.

Statistical Analysis: Data were entered and analysed using the Statistical Package for the Social Sciences (SPSS) version 26.0 (IBM Corp., Armonk, NY). Categorical variables were expressed as frequencies and percentages.

Continuous variables were expressed as mean ± standard deviation (SD). Chi-square test was used

to assess associations between categorical variables. A p-value of less than 0.05 was considered statistically significant.

Results

=A total of 60 patients with intestinal obstruction due to tuberculosis were studied over the two-year period. The results are presented systematically under demographic characteristics, clinical features, operative findings, and postoperative outcomes.

Table 1: Demographic and Clinical Characteristics of Study Patients (n=60)

Variable	Number (n)	Percentage (%)	p-value
Age Group (Years)			
11 – 20	4	6.7	
21 – 30	12	20.0	
31 – 40	18	30.0	
41 – 50	14	23.3	
51 – 60	8	13.3	
> 60	4	6.7	
Mean Age ± SD (years)	38.2 ± 12.4		
Gender			0.042
Male	38	63.3	
Female	22	36.7	
Residence			0.218
Rural	42	70.0	
Urban	18	30.0	
Nutritional Status (BMI)			<0.001
Normal BMI (18.5-24.9)	14	23.3	
Underweight (BMI <18.5)	38	63.3	
Overweight (BMI ≥25)	8	13.3	
Socioeconomic Status			0.036
Low	36	60.0	
Middle	20	33.3	
High	4	6.7	

Table 1 shows the demographic profile of the study population. The mean age was 38.2 ± 12.4 years with the highest proportion of patients in the 31-40 year age group (30%). Male patients constituted 63.3% of the cohort. A significant majority (63.3%) were underweight (BMI <18.5), and 60% belonged to the low socioeconomic stratum. Rural residence was reported by 70% of patients. The association of nutritional status with the occurrence of TB-related obstruction was statistically highly significant ($p<0.001$).

Table 2: Clinical Features and Presenting Symptoms (n=60)

Clinical Feature / Symptom	Number (n)	Percentage (%)	Mean Duration (weeks)
Presenting Symptoms			
Abdominal Pain	60	100.0	8.4 ± 3.2
Abdominal Distension	54	90.0	5.6 ± 2.8
Vomiting	48	80.0	4.2 ± 1.9
Constipation / Obstipation	45	75.0	3.8 ± 1.6
Weight Loss	39	65.0	12.4 ± 4.6
Fever	27	45.0	6.8 ± 3.1
Anorexia	33	55.0	9.2 ± 3.7
Night Sweats	18	30.0	7.6 ± 2.4
Associated Comorbidities			
Pulmonary Tuberculosis	18	30.0	-
HIV Co-infection	6	10.0	-
Diabetes Mellitus	8	13.3	-
Anaemia (Hb <10 g/dL)	42	70.0	-
Hypoalbuminaemia (<3.5 g/dL)	36	60.0	-
Radiological Findings			
Air-fluid levels on X-ray	54	90.0	-
CT scan findings consistent	48	80.0	-
Ascites on imaging	24	40.0	-

Table 2 demonstrates that abdominal pain was universal (100%), followed by abdominal distension (90%), vomiting (80%), and constipation (75%). Constitutional symptoms such as weight loss and fever were present in 65% and 45% of patients respectively.

Anaemia was present in 70% and hypoalbuminaemia in 60% of the study cohort, reflecting the chronic debilitating nature of the disease. Air-fluid levels on plain X-ray were evident in 90% of cases and CT findings were consistent with TB in 80%.

Table 3: Operative Findings and Surgical Procedures Performed (n=60)

Parameter	Number (n)	Percentage (%)	p-value
Site of Obstruction			0.031
Ileocaecal Region	30	50.0	
Terminal Ileum	18	30.0	
Jejunum	6	10.0	
Colon	4	6.7	
Multiple Sites	2	3.3	
Type of Obstruction			0.047
Adhesive / Fibrous Band	22	36.7	
Stricture Formation	24	40.0	
Matted / Inflamed Loops	10	16.7	
Intraluminal Obstruction	4	6.7	
Surgical Procedure			<0.001
Ileocaecal Resection + Anastomosis	26	43.3	
Stricturoplasty	14	23.3	
Adhesiolysis	10	16.7	
Right Hemicolectomy	6	10.0	
Stoma Formation	4	6.7	
Perioperative Findings			
Ascites	22	36.7	
Peritoneal Nodules	18	30.0	
Intra-abdominal Lymphadenopathy	28	46.7	
Bowel Perforation	8	13.3	

Table 3 reveals that the ileocaecal region was the most common site of obstruction (50%), followed by the terminal ileum (30%). Stricture formation was the predominant mechanism of obstruction (40%), followed by adhesive/fibrous bands (36.7%).

The most commonly performed operation was ileocaecalresection with anastomosis (43.3%), followed by stricturoplasty (23.3%) and adhesiolysis (16.7%). Intraoperative lymphadenopathy was noted in 46.7%, and peritoneal nodules in 30% of cases.

Table 4: Postoperative Complications and Outcome Analysis (n=60)

Outcome Parameter	Number (n)	Percentage (%)	p-value	Significance
Postoperative Complications				
Wound Infection	12	20.0	0.048	Sig.
Anastomotic Leak	4	6.7	0.031	Sig.
Enterocutaneous Fistula	2	3.3	0.212	NS
Intra-abdominal Abscess	4	6.7	0.041	Sig.
Pulmonary Complications	6	10.0	0.036	Sig.
Prolonged Ileus (>5 days)	8	13.3	0.072	NS
Urinary Tract Infection	4	6.7	0.184	NS
Septicaemia	2	3.3	0.028	Sig.
Hospital Stay (days)				
Mean duration ± SD	14.6 ± 6.2			
< 10 days	14	23.3		
10 - 20 days	36	60.0		
> 20 days	10	16.7		
Mortality				
Total Deaths	4	6.7	0.019	Sig.
ATT Compliance (Post-operative)				
Completed full course	48	80.0	0.004	H. Sig.
Defaulted / Lost to follow-up	8	13.3		
Drug resistance suspected	4	6.7		

Table 4 summarises the postoperative course. Wound infection was the most common complication (20%), followed by prolonged ileus (13.3%) and pulmonary complications (10%). Anastomotic leak occurred in 6.7% of cases. The mean hospital stay was 14.6 ± 6.2 days. Overall mortality was 6.7% (4 patients). ATT compliance with full course completion was achieved in 80% of patients, and this was statistically highly significant (p=0.004).

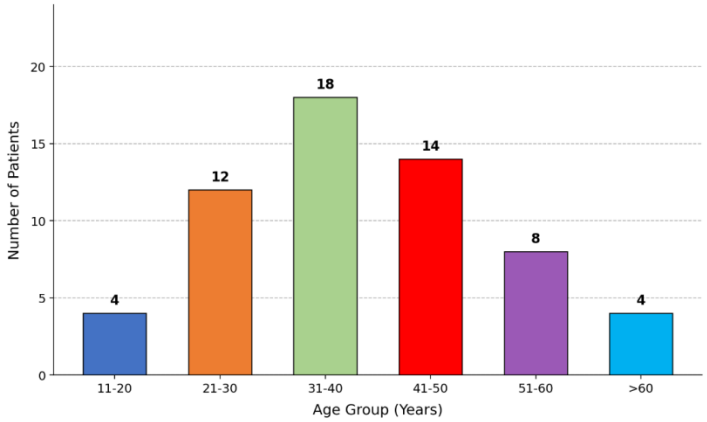

Figure 1: Age Distribution of Patients with Intestinal Obstruction due to Tuberculosis

Figure 1 illustrates the age distribution of the 60 study patients. The bar chart shows that the 31-40 year age group was most heavily affected (n=18, 30%), followed by the 41-50 year group (n=14, 23.3%). This bimodal-skewed distribution emphasises the disease's predilection for young adults in their economically active years. The relatively lower representation at extreme age groups is consistent with published literature from India.

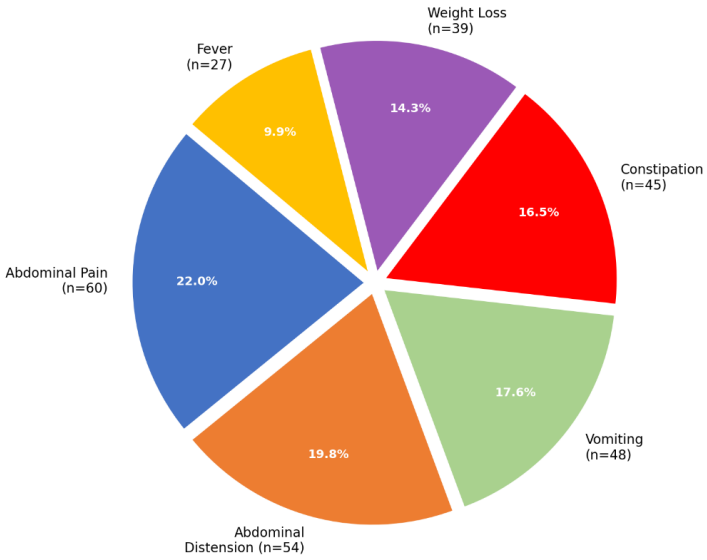

Figure 2: Distribution of Clinical Presentations among Study Patients (n=60)

Figure 2 presents a proportional pie chart of the clinical presentations at the time of admission. Abdominal pain, being universal (100%), forms the largest segment. Abdominal distension (90%) and vomiting (80%) are the next most prominent features. Weight loss, while present in 65% of patients, reflects the chronic and nutritionally depleting nature of the disease. The diverse symptom profile underscores the protean manifestations of intestinal tuberculosis, necessitating a high index of clinical suspicion in endemic regions.

Discussion

This prospective study of 60 patients with intestinal obstruction due to tuberculosis at a tertiary care centre in Bihar provides valuable insights into the clinicopathological spectrum of this condition in an endemic region. The results affirm several established epidemiological and clinical tenets while also offering region-specific data that can inform local management protocols.The mean age of presentation in this study was 38.2 ± 12.4 years, with the highest prevalence in the 31-40 year age group. This is consistent with reports from Mehta

et al.15, who documented a mean age of 35.4 years in their series from a North Indian tertiary centre, and with the findings of Singh et al.16, who noted a similar age distribution in patients with abdominal TB from Bihar. The male predominance (63.3%) observed in our study aligns with global TB epidemiology wherein males are disproportionately affected, attributed to differences in healthcare-seeking behaviour, occupational exposure, and social determinants.[17]

A striking finding was the high prevalence of undernutrition, with 63.3% of patients having a BMI below 18.5. This is consistent with the recognized association between malnutrition and susceptibility to tuberculosis. Kumar et al.18 reported comparable rates of undernutrition (58.6%) in abdominal TB patients in their study from Eastern India. Hypoalbuminaemia was documented in 60% of our patients, a finding with significant prognostic implications for postoperative healing and anastomotic integrity. Notably, 70% of patients were from rural backgrounds and 60% from low socioeconomic strata, reiterating the strong socioeconomic determinants of TB in India. [19]

The clinical presentation in our study was dominated by abdominal pain (100%), abdominal distension (90%), and vomiting (80%), consistent with the syndromic features of mechanical intestinal obstruction. Constitutional symptoms such as weight loss (65%) and fever (45%) were also prevalent, highlighting the dual acute surgical and chronic systemic nature of the disease. These findings are comparable to those reported by Sharma et al.[20], who documented abdominal pain in 94%, distension in 88%, and weight loss in 62% of patients in their prospective series. The mean symptom duration of 8.4 weeks for abdominal pain underscores the insidious onset and subacute progression typical of intestinal TB. The ileocaecal region was the most common site of obstruction in 50% of cases, a finding consistently reported across multiple series from India and other endemic countries.[21] The predilection of Mycobacterium tuberculosis for the ileocaecal region is attributed to its rich lymphoid tissue, slower intestinal transit allowing prolonged bacillary exposure, and the relatively alkaline environment of the terminal ileum.4 Stricture formation was the predominant mechanism of obstruction (40%), followed by adhesive/fibrous bands (36.7%), consistent with the pathological healing response that characterises the hypertrophic and fibrous forms of intestinal TB.

Ileocaecal resection with primary anastomosis was the most frequently performed procedure in 43.3% of cases, followed by stricturoplasty (23.3%) and adhesiolysis (16.7%). This operative distribution mirrors findings from Anand et al.[22], who reported ileocaecal resection in 45% of their 80-patient series. Stricturoplasty, as advocated by several authors for short segment strictures in patients with no active sepsis or significant nutritional deficits, was employed judiciously in our series.[23] The decision to perform primary anastomosis versus stoma formation was guided by intraoperative factors including bowel viability, peritoneal contamination, and patient nutritional status.

The overall complication rate in our study was 46.7%, with wound infection being the most common complication (20%). This rate is consistent with reports from other resource-limited settings where malnutrition, immunosuppression, and delayed presentation collectively impair wound healing. Anastomotic leak occurred in 6.7% of cases, comparable to the 5-8% rates reported in the literature for TB-related bowel resections.[24] Pulmonary complications (10%) in the postoperative period likely reflect pre-existing pulmonary disease and impaired respiratory reserve in these nutritionally compromised patients. The mean hospital stay of 14.6 ± 6.2 days reflects the complex postoperative course often encountered in this patient population.The overall mortality rate in this study was 6.7% (n=4). Three of the four deaths were associated with postoperative complications, particularly septicaemia and anastomotic failure in malnourished patients. A similar mortality range of 5-8% has been reported by Pujara et al. [25] in their large series from Western India, and by Debi et al. [26] from North India. The independent predictors of mortality in these studies included delayed presentation, perforation at laparotomy, severe hypoalbuminaemia, and HIV co-infection — all of which were also relevant in our series.

A notable aspect of our study is the 80% ATT compliance rate following surgery. While this is encouraging, the 13.3% default rate remains a public health concern, as interrupted ATT therapy is a major driver of drug resistance. This underscores the importance of structured post-discharge follow-up, direct observed therapy (DOT) linkage, and nutritional support programmes for surgical TB patients. The role of the RNTCP (Revised National Tuberculosis Control Programme, now Ni-kshay Poshan Yojana) in ensuring drug supply and patient support must be leveraged effectively.[27] Comparing our results with the recent study by Patel et al.[28] (2022) from Western India, which reported a mean age of 36.8 years, ileocaecal involvement in 52%, and wound infection in 18%, there is strong concordance across multiple parameters, lending credibility to the generalisability of our findings within the Indian subcontinent context. Our mortality rate of 6.7% is slightly lower than that reported by Negi et al.[29] (8.2%) from a predominantly urban cohort, which may reflect

differences in patient selection and surgical expertise. The slightly higher complication rate compared to some studies may be attributed to the greater proportion of nutritionally compromised patients from rural and low socioeconomic backgrounds in our cohort.

The limitations of this study include its single-centre design, which may limit generalisability to centres with different patient profiles and resources. The relatively small sample size of 60 patients, though prospectively collected, limits the statistical power for multivariate analysis of prognostic factors. Additionally, long-term follow-up beyond the immediate postoperative period was not uniformly available for all patients, precluding robust assessment of recurrence rates and long-term ATT outcomes. Future multicentre prospective studies with larger sample sizes and extended follow-up periods are warranted.

Conclusion

Intestinal obstruction due to tuberculosis continues to be an important surgical entity in endemic regions such as Bihar. The disease predominantly affects young, malnourished adults from rural and low socioeconomic backgrounds. The ileocaecal region is the most common site of involvement, with stricture formation being the dominant obstructive mechanism. Ileocaecal resection with primary anastomosis is the most frequently required operative procedure. Wound infection remains the most common postoperative complication, and mortality is primarily attributable to septicaemia in malnourished patients. Early clinical suspicion, prompt surgical intervention, nutritional optimisation, and strict post-operative ATT compliance are the key determinants of improved outcomes. Public health measures targeting TB control, early case detection, and uninterrupted ATT delivery remain essential for reducing the surgical burden of this preventable disease.

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