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Original Research Article

Frequency of Intestinal Tuberculosis Among the Cases of Intestinal Perforation Presenting at Ayub Teaching Hospital

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Abstract: *Intestinal tuberculosis (ITB) remains a diagnostic challenge due to its nonspecific presentation and overlap with other abdominal pathologies. Among patients presenting with intestinal perforation, recognizing ITB is essential for prompt treatment, especially in regions with high tuberculosis prevalence.* ***Objective:*** *To evaluate the frequency of intestinal tuberculosis (ITB) among patients presenting with intestinal perforation and to explore its association with comorbid conditions such as malnutrition and cirrhosis.* ***Methods:*** *A cross-sectional study was conducted from January 2023 to December 2024, involving 157 patients diagnosed with intestinal perforation based on computed tomography (CT) findings at a tertiary care hospital. Patients aged 18 to 75 years of either gender were included. All patients underwent laparotomy, and tissue specimens from perforation sites were collected for histopathological evaluation to confirm ITB. Demographic and clinical data were recorded, including nutritional status and comorbid liver disease. Data were analyzed using SPSS version 25. Categorical variables were expressed as percentages, and associations were evaluated using the chi-square test with a significance level set at $p < 0.05$.* ***Results:*** *Among the 157 patients, 57.3% were male. Histopathological analysis confirmed ITB in 9.6% of cases. A statistically significant association was observed between ITB and cirrhosis (26.7%, $p = 0.01$) as well as malnutrition (53.3%, $p = 0.002$), suggesting these comorbidities may be risk factors for ITB-related intestinal perforation.* ***Conclusion:*** *Although infrequent, intestinal tuberculosis accounts for a notable proportion of intestinal perforations. The findings highlight the need for heightened clinical suspicion and early histopathological evaluation, especially in malnourished patients and those with cirrhosis, to improve diagnostic accuracy and clinical outcomes.*

Keywords: Intestinal tuberculosis, intestinal perforation, cirrhosis, malnutrition

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Introduction

Intestinal perforation, which refers to a disruption in the continuity of bowel wall, represents a serious complication that can arise from numerous underlying conditions. Patients who present with abdominal pain as well as distension, particularly within the relevant historical context, require a thorough test for this condition, as a delayed diagnosis may lead to serious consequences, including the potential for infections like peritonitis. Management consists of stabilizing the patient prior to obtaining a surgical consultation. Even with proper management, bowel perforation can result in heightened mortality and morbidity due to post-repair complications, including adhesions as well as fistula formation (1). The etiology of perforated viscus is influenced by both the patient's age as well as geographic location. One example of a prevalent condition in premature babies is necrotizing enterocolitis (2).

Appendicitis as well as diverticulitis are the most prevalent infectious causes of perforation. Appendicitis can occur at any age, while diverticulitis is more frequently observed in individuals across middle age (3). The two disease processes are typically considered to arise from the entrapment of fecal material within a blind-ending structure. This condition results in raised intraluminal pressure, stasis, as well as infection, which can subsequently lead to the formation of a localized abscess or a complete perforation. Inflammatory bowel diseases have the potential to result in perforation (4-6).

Intestinal tuberculosis is a rare clinical presentation of tuberculosis, accounting for approximately five percent of extra-pulmonary cases documented in the United States (7, 8). The potential pathophysiological mechanisms may involve ingesting of sputum leading to direct seeding, hematogenous dissemination, or the intake of milk from cattle infected with bovine tuberculosis, predominantly observed in developing countries (9). The terminal ileum as well as cecum are the most frequently impacted regions of the intestine. The distinction between Crohn's disease as well as intestinal tuberculosis can be challenging due to significant overlap in their characteristics, especially with cases lacking clear risk factors for tuberculosis (10, 11). The treatment strategy for intestinal tuberculosis corresponds to that of pulmonary TB overall (12). A study observed the frequency of intestinal tuberculosis was 17.92% in patients with intestinal perforation (13).

Despite improvements in diagnostic imaging, patients with abdominal tuberculosis often come with advanced stages of the disease. Due to the limited availability of material on this subject, this study's goal is to find out the frequency of intestinal tuberculosis in cases with intestinal perforation who presented to the surgical emergency. The outcome of this study will emphasize on early identification and prompt treatment, which can greatly reduce the likelihood of potentially deadly consequences.

Methodology

We conducted this cross sectional study at the department of Surgery, Ayub Teaching Hopsital, Abbottabad 03-June-2024 to 03-December-2024. Our sample consisted of 157 patients whose inclusion was based on the previous frequency of intestinal TB which was 17.92%[13] in intestinal perforation cases with margin of error of 6% and confidence level of 95%. We selected patients aged having age 18 and 75 years both male and female diagnosed with intestinal perforation on the basis of CT scan findings. Those excluded were patients with a history of recent abdominal

surgery, lactating or pregnant women and blunt or penetrating abdominal trauma survivors.

Consent was acquired from all the patients. We noted their demographic information such as age, gender, socio-economic status, and medical history. Each patient went through a physical examination and their relevant clinical details were noted. For the confirmation of ITB we collected tissue samples from the intestinal region during laparotomy for histopathological evaluation. The procedures were supervised by a specialist with significant experience.

Analysis of the data was performed by SPSS 21. Age, weight, height along with BMI were calculated using mean and standard deviations. Clinical and comorbidity profile, intestinal TB and demographic details were calculated using frequencies and percentages. Intestinal TB was further stratified with various demographic and clinical/comorbidities variables using Chi Square test while keeping significance of P value at < 0.05.

Results

The study included 157 participants with a mean age being 43.84±13.39 years. The average body mass index (BMI) was 26.61±2.08 kg/m². Among the participants 90 (57.3%) were male while 67 (42.7%) were female (Table 1).

The clinical profiles and comorbidities were assessed, cirrhosis was present in 13 (8.3%) patients while malnutrition was observed in 23 (14.6%). Diabetes and hypertension were present in 56 (35.7%) and 76 (48.4%) participants respectively (Table 2).

Intestinal tuberculosis was seen in 15 (9.6%) patients (Figure 1). We observed that intestinal tuberculosis was present in 4 (26.7%) patients with cirrhosis (p=0.007). Similarly malnutrition was observed in the intestinal tuberculosis group with 8 (53.3%) affected (p=0.0001) (Table 3). There was no notable association of intestinal tuberculosis with age (P > 0.05), gender (P > 0.05), BMI, (P > 0.05), diabetes (P > 0.05), hypertension, (P > 0.05), employment status (P > 0.05), residence (P > 0.05), socioeconomic status (P > 0.05) and education status (P > 0.05).

Figure 1 Intestinal tuberculosis.

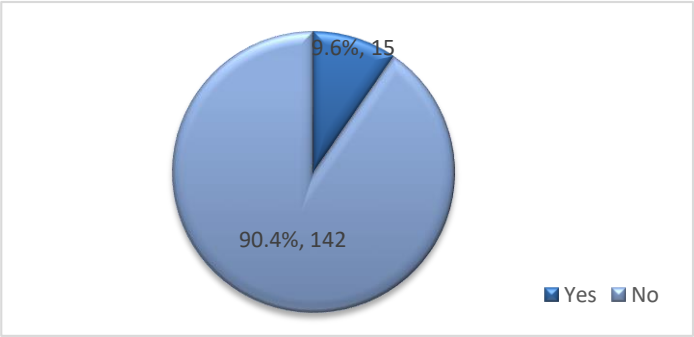

Table 1 Demographics of the patients

Demographics		Frequency	Percentage
Gender	Male	90	57.3%
	Female	67	42.7%
Employment status	Employed	80	51.0%
	Unemployed	77	49.0%
Education status	Educated	67	42.7%
	Uneducated	90	57.3%
Socioeconomic background	Upper-Class > 100000 Rs/Month	19	12.1%
	Middle-Class > 50000 Rs/Month	86	54.8%
	Lower Class < 50000 Rs/Month	52	33.1%
Residence area	Urban	65	41.4%
	Rural	92	58.6%

Table 2 Clinical profile and comorbidities

Clinical profile and comorbidities		Frequency	Percentage
Cirrhosis	Yes	13	8.3%
	No	144	91.7%
Malnutrition	Yes	23	14.6%
	No	134	85.4%
Diabetes	Yes	56	35.7%
	No	101	64.3%
Hypertension	Yes	76	48.4%
	No	81	51.6%

Table 3 Stratification of intestinal tuberculosis with clinical parameters

Clinical parameters		Intestinal tuberculosis				P value
		Yes		No		
		Frequency	Percent	Frequency	Percent	
Cirrhosis	Yes	4	26.7%	9	6.3%	0.007
	No	11	73.3%	133	93.7%	
Malnutrition	Yes	8	53.3%	15	10.6%	0.0001
	No	7	46.7%	127	89.4%	

Discussion

In this study 157 participants were assessed having a mean age 43.84±13.39 years and among them 15 (9.6%) cases of ITB were seen. The data also suggest a link between comorbid conditions such as cirrhosis and malnutrition with ITB being more prevalent among those suffering from these conditions.

In terms of demographic data the participants were majority male (57.3%) with a BMI averaging 26.61±2.08 kg/m². Of the cases identified of ITB around 26.7% had a history of cirrhosis and 53.3% were malnutrition

which indicates a possible association between these factors and the occurrence of ITB-related intestinal perforation. It is important to note that cirrhosis and malnutrition are known risk factors for the development of complications like perforation in ITB patients. A study has reported that malnutrition and immunocompromised states including cirrhosis exacerbate the severity of abdominal TB and increase the likelihood of perforations and other complications (13).

In a study by Vargas et al. they highlighted ITB was as a rare condition with an incidence of around 2% in patients with abdominal tuberculosis (14). Similarly Ben et al. had also discussed the relatively uncommon incidence of ITB particularly in immunocompetent individuals although the prevalence in patients with other risk factors such immunosuppression is more notable (15). Ju et al. had reported that ITB represents about 10% of all tuberculosis cases in their casse study, the case that they presented, the patient was malnourished which further affirms our link between ITB and malnourishment (16). The prevalence of ITB has also been linked to geographic and socio-economic factors with higher rates observed in regions where tuberculosis is endemic. The aforementioned studies collectively suggest that while ITB remains relatively rare its prevalence is marked by several factors such as nutritional status, immune function and the presence of other comorbidities which can indicate the need for greater clinical awareness especially in at-risk populations.

Our study's findings on the link between malnutrition and ITB-related perforations are consistent with existing literature. Malnutrition which is a frequent condition in patients with chronic illnesses can weaken the immune response making it more difficult for the body to control the spread of infection. As a result the spread of Mycobacterium tuberculosis often leads to severe complications including perforations. In the case of cirrhosis the compromised immune system and liver function can further complicate the disease's progression and treatment (14, 15).

In terms of clinical implications our findings underscore the need for sharp awareness and early identification of ITB particularly in patients presenting with cirrhosis or malnutrition. The diagnostic challenge posed by ITB which can mimic other conditions such as Crohn's disease or malignancies calls for a comprehensive approach that includes clinical radiological and microbiological investigations.

Considering the complexity and diagnostic challenges which are presented by ITB especially in the presence of comorbidities like cirrhosis and malnutrition we suggest that it is essential to maintain a high index of suspicion when dealing with such patients who are exhibiting gastrointestinal symptoms. Early intervention both surgical and pharmacological is critical in preventing the development of life-threatening complications such as bowel perforation.

Conclusion

We conclude that intestinal TB was found in 9.6% cases of intestinal perforation, which is a rare but an alarming condition. We found a notable link between malnutrition and cirrhosis with intestinal TB, assessment of these conditions can results in better outcomes.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (IRBEC-AYUBMC-23-24)

Consent for publication

Approved

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Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

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Review of Literature, Data entry, Data analysis, and drafting article.
NA (Trainee Medical Officer)
Conception of Study, Development of Research Methodology Design,
KR (Associate Professor)
Study Design, manuscript review, critical input.

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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