



Surgical Treatment and Clinicopathological Profile among Patients diagnosed with Abdominal Tuberculosis: A Hospital-Centered Study

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A B S T R A C T

Background: A prevalent and serious health issue is tuberculosis (TB), particularly in developing nations where Malnutrition, poverty, congestion, and inadequate sanitation are common. Among TB, Abdominal Tuberculosis is still a major concern worldwide along with its therapeutical and diagnostic challenges especially in developing countries. In the study area very less were known about this issue so this study was conducted.

Objective: We aim to determine the surgical treatment outcome and the patients' clinicopathological profiles, who were diagnosed with abdominal tuberculosis compared with the previous reported studies.

Methodology: A prospective descriptive study among patients diagnosed with abdominal tuberculosis was conducted in the hospital from January 2018 to February 2023. Ethical approval was taken followed by the informed consent from the patients. SPSS version 17.0 was used for statistical data analysis.

Results: Total of 250 patients were included in this study. Their ages ranged from 19 to 65 years old. About 75.6% patients were diagnosed with primary abdominal tuberculosis. Among the patients, 52.8% patients had intestinal obstruction, 39.2% peritonitis, multiple fistulae (in ano) in 2.8% and abdominal masses 5.2%. About 18% of the patients were tested positive for HIV. A total of 12.4% patients undergone conservative anti-tuberculosis therapy and 87.6% underwent surgery. In patients 55.8%, the most common bowel was ileo-caecal region. Out of 250 patients, 32.4% patients experienced post-operative complications and the rate of mortality was 18.8%.

Conclusion: There is a diagnostic challenge in the case of abdominal tuberculosis requiring a clinical suspicion of high index. The factors that contribute in the survival are the early diagnosis, early surgery treatment and anti-tuberculosis therapy.

Keywords: Abdominal Tuberculosis; Clinicopathogenesis; Surgical Treatment.

Introduction

A prevalent and serious health issue is tuberculosis (TB), particularly in developing nations where Malnutrition, poverty, congestion, and inadequate sanitation are common.¹ It is the most significant communicable illness in the world and the World Health Organization (WHO) has declared it a global emergency.^{2,3} Roughly a third of the world's people around three million people die from TB each year. There has been an improvement in the health standards but there is an increase in the risk of tuberculosis reported in the developed nations due to immigrants from nondeveloping countries, medications that are immunosuppressants and alcoholism.^{4,5} Humans with active TB serve as the reservoir of infection for M. Tuberculosis, which is responsible for the majority of TB cases. The majority of TB cases are pulmonary and spread from person to person through airborne droplets of microorganisms.⁶

Any area of the body can be affected by tuberculosis, but the abdomen is where the disease is most frequently seen after the lungs.⁷ The gastro-intestinal tract, peritoneum, lymph nodes, and solid viscera may all be impacted by tuberculosis in the abdomen. Extrapulmonary TB cases make up between 1% and 3% of all TB cases,^{8,9} with abdominal tuberculosis (ATB) making up 11% to 16% of these cases. Up to 50% of HIV-positive people have extra pulmonary TB.^{1,10}

While there are three main forms of intestinal (enteric) tuberculosis, fibrous stricturing form, ulcerative and ulcerohypertrophic or hypertrophic and there are four main forms of peritoneal involvement (TB peritonitis), including plastic (fibrous), ascitic, purulent forms and loculated (encysted). It has also been reported that disseminated abdominal tuberculosis can affect the peritoneum, lymph nodes, solid viscera, and gastrointestinal system.¹¹⁻¹³

Since the clinical symptoms of abdominal TB are ambiguous and varied and there is no definitive diagnostic test, the diagnosis of the disease is challenging in its early stages. The condition can mimic many gastrointestinal disorders, including inflammatory bowel disease, colonic cancer, or other gastrointestinal infections, making it difficult to diagnose.^{7,12-14} The nature and location of involvement affect the clinical presentation. Tuberculoma caused acute or subacute intestinal blockage also caused by stricture formation in the small intestine and ileocaecal region, or gut perforation resulting in peritonitis are the most common consequences.¹⁵ It typically has an indolent course and appears late.

General surgeons working in resource-constrained nations have diagnostic and therapeutic problems when treating abdominal TB. One of the characteristics of the disease in these countries is its late presentation, which is accompanied by illiteracy, poverty, malnutrition, and a

lack of contemporary therapeutic and diagnostic facilities.

The early diagnosis of abdominal tuberculosis is still a challenge, and patients typically present after problems have already occurred, despite advances in medical imaging. Anti-tuberculous medicine is the mainstay of treatment for abdominal tuberculosis; surgery is only used to treat complications including intestinal blockage and intestine perforation with peritonitis.^{12,16}

Although abdominal TB and its consequences are common in our environment, little research has been done on this topic in Pakistan. This research was done to evaluate what was published in the literature with our clinicopathological profile and the results of surgically treating abdominal TB in our environment.

Objective

This study was conducted with the aims to determine the surgical treatment outcome and the patients' clinicopathological profiles, who were diagnosed with abdominal tuberculosis compared with the previous reported studies.

Methodology

Between January 2018 and February 2023, a descriptive analysis of patients, who visited hospital with the abdominal tuberculosis clinical diagnosis. They were sequentially included into the study after providing written informed consent to take part and were tested for HIV. M. tuberculosis that infects gastrointestinal system or intraabdominal solid organs were referred to as abdominal tuberculosis [8,9]. Patients were not included in the study, who failed to provide a complete medical history or wholacked the agreement of their next of kin. Patients who refused to give their consent for testing for HIV were also not included in the analysis.

Clinical suspicion, test results, surgical results, histological confirmation, AFB demonstration, and medication response were required for the diagnosis of abdominal tuberculosis. Assessments were made in each case after thorough history-taking, physical examinations, and pertinent research. Packed cell volume, hemoglobin levels, urea and creatinine, serum electrolytes, blood grouping and cross-matching, and ESR were among the pertinent preoperative examinations. The HIV Rapid Test Algorithm¹⁷ and the CD4+ count utilizing FACS or FACSCALIBUR from BD Biosciences USA were also used to screen patients.

Only individuals who tested positive for HIV had their CD 4 count measured. Abdomen ultrasonography, chest X-rays, and other radiological tests were performed. Primary abdominal TB is defined as the presence of abdominal tuberculosis in patients with normal results of chest Xrays but abdominal tuberculosis signs and

symptoms.

Some patients who had abdominal collections or masses were also given a CT scan and an abdominal ultrasound. All patients received anti-tuberculosis therapy, either surgically or non-surgically. Either a senior resident working under the direct supervision of a consultant surgeon, or a consultant surgeon, performed the surgeries.

For histopathological analyses, an intraoperative tissue biopsy was collected; a piece of the tissue was preserved in formalin (10%); routine processing was carried out in accordance with standard operating procedures; and the tissue was stained with haematoxylin and eosin. A tuberculosis diagnosis required the caseating granulomas presence surrounded by plasma cells, lymphocytes, and giant cells [18, 19]. Following surgery, patients were kept nauseous until their bowel sounds returned; at that point, the nasogastric tubes were withdrawn. The operation results and histological confirmation determined the final diagnosis and postoperative management. Those who tested positive for tuberculosis began receiving anti-tuberculosis treatment. Isoniazid, Rifampicin, Pyrazinamide, Ethambutol, and Streptomycin were among the antituberculosis medications administered. Medical and surgical teams have been in charge of managing each patient.

A proforma created for the study was filled out with information regarding each patient. The variables for the study included sociodemographic information (such as gender and age, occupation, qualification and residence), HIV diagnosis status, clinical presentation, radiological findings, scheduling of the surgical procedure, results of the operation, and the procedure of surgery carried out. Duration of hospital stay, postoperative complications, and mortality were the postoperative period's research factors. Patients were followed up with for a year, or until they passed away, whichever came first.

Statistical program for social sciences (SPSS version 17.0) was used to conduct the statistical analysis. While, frequency tables and proportions were used to describe categorical variables, the median, Interquartile Range (IQR) to determine continuous variables. Chi square test was used to determine the significance of the relationship between predictor (the independent) and outcome (dependent) variables in the categorical variables. The threshold for significance was set at $p < 0.05$.

Results

In the study, there were 250 patients, 138 (55.2%) men, and 112 (44.8%) women. (Figure 1) The patients' ages ranged from 19 to 65. 218 patients, or 87.2% of the total, had only a primary education or none at all, and more than 80% of them were unemployed. The largest number of patients, 189 (75.6%), were from lowincome households living in rural areas far from the research area.

In this study, the median length of illness previous to admission was 7 (IQR = 4 to 10) months, ranging from days to years generally. At the time of presentation, 142 patients (56.8%) reported symptoms that had lasted longer than seven months. In 235 (94%) of the patients, stomach discomfort was the most prevalent presenting symptom. Acute presentation was the most frequent kind, accounting for 178 (71.2%) patients, followed by subacute (15.2%) and chronic (13.6%) appearance in 38 and 34 patients, respectively. Intestinal obstruction was seen in 132 (52.8%) patients, peritonitis in 98 (39.2%), abdominal tumors in 13 (5.2%), and numerous fistulae in ano in 7 (2.8%) patients (Figure 2).

A combined medical condition affected 17 (6.8%) of the participants. This included four individuals with diabetes mellitus, two with liver cirrhosis, three each with malignancy, hypertension, and chronic renal failure, and two with toxic goiter. 45 patients (18%) tested positive for HIV. Of these, 31 (68.8%) were newly diagnosed patients,

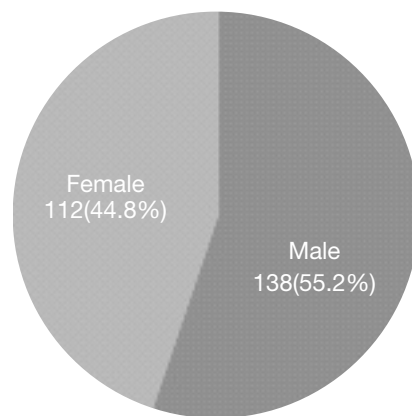


Figure 1. Gender distribution of study cases

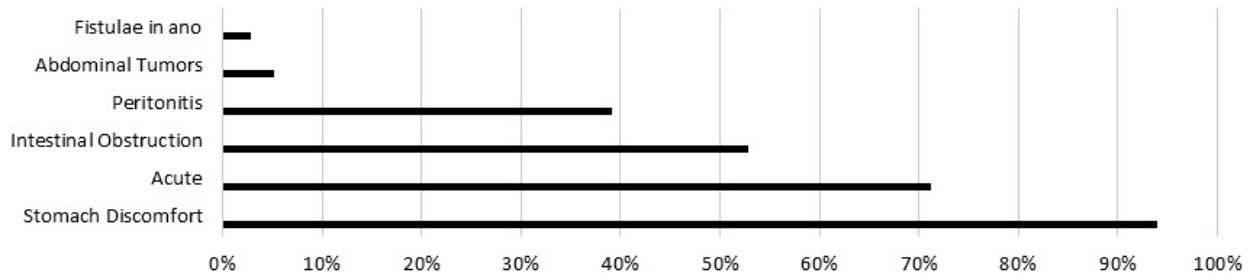


Figure 2. Percentages of patients facing symptoms at the time of clinical presentation

while 14 (31.1%) were known cases receiving antiretroviral therapy (ARV). 34 (75.5%) of the 45 HIV-positive individuals had risk factors for the virus, such as having had several relationships ($p = 0.001$) and abusing alcohol ($p = 0.011$).

19 patients (7.6%) had previously had treatment for tuberculosis, while 11 patients (4.4%) had a family history of the disease. Among the patients, 189 (75.6%) had primary abdominal TB, and 61 (24.4%) had secondary abdominal tuberculosis due to concomitant pulmonary tuberculosis

Both the median hemoglobin level and the median ESR were 55 mm/hour (IQR = 34 to 78 mm/hour) and 7.8 (IQR = 03 to 09 g/dl), respectively. In 208 (83.2%) patients, the level of hemoglobin was less than 10 g/dl. All patients had their serum creatinine and electrolytes tested, and 98 (39.2%) and 65 (26%) of them had poor values. Forty-five (18%) patients had positive results from a serological test for HIV infection. Only 33 patients had a CD4+ count available. The CD4+ count of a total of 21 HIV patients (63.6%) was below 200 cells/l, while the CD4+ count of the remaining 12 patients (41.4%) was also below 200 cells/l. The ascetic fluid was not cultured for acid-fast bacilli. In 123 (49.2%) of the patients, abdominal plain radiography showed several dilated small intestine loops with considerable air-fluid levels. In 74 individuals, or

29.6% of the total, free air was observed under the right diaphragm.

On chest x-rays, 59 individuals (23.6%) displayed characteristics indicative of pulmonary tuberculosis, and 11 (4.4%) had indicators by radiology, of pulmonary tuberculosis (active). In 139 (55.6%) and 25 (10%) of the patients who had abdominal ultrasonography and computed tomography (CT) scans, respectively, aberrant findings suggestive of abdominal Tuberculosis, including enlarged lymph nodes, ascites, omental thickening, thickness of intestinal wall, and abdominal masses, were found. 33 individuals had ascites, and 26 (78.7%) of them had fibrinous strands in the ascitic fluid, according to abdominal ultrasonography. 69 (27.6%) of the patients who had barium examinations shared characteristics that were indicative of abdominal TB, including luminal constriction and proximal bowel loop enlargement. Histological analysis was conducted on biopsy samples from a total of 219 patients, accounting for 87.6% of the study population. The findings of this examination indicated the appearance of non-caseating granuloma in 141 patients, representing 56.4% of the sample. Additionally, central caseation was observed in 61 patients, accounting for 24.4% of the sample. Furthermore, chronic inflammatory cell infiltration without definitive granuloma formation was observed in 17

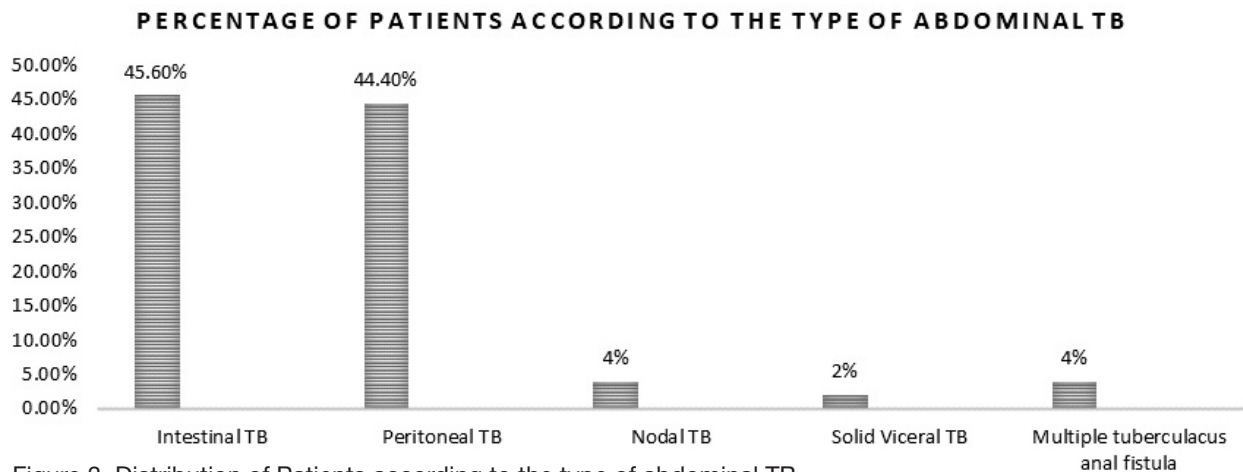


Figure 3. Distribution of Patients according to the type of abdominal TB

patients, representing 6.8% of the sample. The foundation for the diagnosis in thirty-four (13.6%) individuals with suggestive negative diagnostic workup and clinical history was the response to treatment anti-TB medication trials. In this study, there were no patients who underwent a colonoscopy to check for intestinal TB. None of our patients had their *M. tuberculosis* tested using the Polymerase Chain Reaction (PCR) for abdominal tuberculosis.

In this study, 219 patients—or 87.6% of the total—were admitted to the hospital's general surgical wards. Thirty-one (12.4%) of the remaining patients received outpatient care.

31 patients (12.4%) had conservative anti-tuberculous therapy, leaving a total of 219 (87.6%) patients who underwent surgical treatment for abdominal tuberculosis. 40 patients (18.2%) of those who underwent surgery did so electively as a result of their poor response to antitubercular medication therapy, while 179 (81.7%) of those who underwent surgery on an emergency basis. Surgery was performed on patients who did not react to therapeutic anti-tuberculous medication trials, and all 40 patients had tissue evidence of tuberculosis. illustrates the surgical findings of abdominal TB. Among the patients with abdominal TB, 119 (45.6%) had intestinal involvement, 111 (44.4%) had peritoneal, 10 (4%) had nodal, and 5 (2%) had solid viscera. Multiple perianal fistulae were present in 10 (4%) of the remaining individuals. (Figure 3) With 114 (55.8%) patients, the ileo-caecal area was the most often affected bowel, followed by the ileum and the jejunum with 73 (35.7%) and 10 (4.9%) patients, respectively. Seven patients (3.4%) had colon involvement. In 57.5% of patients, the most common surgical operation was the release of bands and adhesions. Following surgery, all patients had to take antituberculous medications for a year. Anti-tuberculous therapy patients underwent four follow-up visits each week.

In 81 (32.4%) patients, a total of 124 postoperative problems were noted. HIV positive was statistically substantially related with surgical site infection. The median length of stay (LOS) was 29 days (IQR = 15 to 52 days), with a range of 1 to 125 days. The length of hospital stay for patients with post complications was statistically significant ($P = 0.02$). Total of 47 patients (18.8%) passed away. Advanced age (> 65 years old), co-morbid illnesses, late presentation, HIV positive, and low CD 4 count were statistically significantly linked with death, accordance with multivariate logistic regression analysis. 195 (96.1%) patients who were among the 200 survivors upon discharge were in good health. Eight patients (3.9%) were discharged against doctors' orders. In the current investigation, no patient reported having a persistent disability. Only 81 (39.9%) of the 206 survivors were accessible for review at twelve months following discharge, and 122 (60.1%) were lost to follow-up. During this time of review, no patient displayed any signs of a

disease relapse.

Discussion

In underdeveloped nations, abdominal TB causes significant morbidity and mortality and is a significant public health issue.^{1,2,12} According to this study's findings, men were marginally more affected than women, which is consistent with other researchers' findings.^{14,20,21} There are more women than men, according to other authors.²²⁻²⁵

According to some experts, the disease affects men more frequently in developed countries than it does in less developed ones.²⁶ We were unable to locate the causes of these gender differences in the literature. Although it can affect persons of any age, abdominal tuberculosis is more prevalent in younger age people.²⁷ The patients that are involved in this study were in their young ages, which is similar with findings from studies previously reported.^{14,28} Given that these individuals are in their prime years of productivity and that this illness places a heavy strain on their families and society as a whole, the occurrence of abdominal TB in this age range has significant economic ramifications.

In line with prior research,^{12,29-31} the bulk of the study's patients were from low-income rural households living a long way from the study area, and more than 90% of them lacked any kind of recognizable health insurance. This finding has implications for the disease's awareness and accessibility to medical institutions. The majority of our study participants experienced symptoms that had been persistent for longer than six months at the time of presentation, which is consistent with previous authors.³⁰⁻³² The difficulties diagnosing abdominal Tuberculosis in its early stages due to its generalized and symptoms that are not-specific, may be the cause for late presentation as in this study. Due to this, patients go undiagnosed and it results with complications like bowel perforation with peritonitis and intestinal obstruction.

The lack of knowledge of the illness and the accessibility to the healthcare facilities, may have contributed to the late presentation in this study. It is possible that some of the professionals who were first treating the patients didn't think of the diagnosis as a possibility. Patient transfers, challenges with abdominal TB diagnosis, and insufficient medical care are common causes of delayed presentation to a hospital in resource-constrained nations.

In our analysis, the majority of patients presented acutely and were treated for intestinal obstruction and peritonitis through the emergency room, necessitating an urgent exploratory laparotomy. Similar observations have also been observed by other writers.^{25,33} In our series, there were many patients with peritonitis and intestinal obstruction. This could be because abdominal TB was diagnosed later than it should have been, which allowed for the complications development including peritonitis

and intestinal obstruction as a result of bowel perforations. According to reports, tuberculous anal fistulae is less common and has a unique clinical appearance. The majority of tubercular fistulae are numerous and recurring.³³⁻³⁶ According to Shukla et al.,³⁷ up to 14% of instances of fistula in ano were caused by tuberculosis. Only 2.3% of the cases in our analysis involved fistula in ano, and they were all numerous. In this study, primary abdominal TB predominated, with concomitant pulmonary tuberculosis (secondary abdominal tuberculosis) occurring in only 22.7% of patients. The present series' high prevalence of primary intestinal TB is consistent with the majority of prior studies done in underdeveloped nations.^{14,25,38} Secondary TB is more prevalent, according to studies from wealthy nations.³⁹ We were unable to determine the causes of this geographic variation. It has been noted previously that patients with tuberculous intestinal blockage may respond differently if they also have another medical condition.⁴⁰ Our study, which found that patients with co-existing medical conditions had a much higher fatality rate, reflects this.

HIV seroprevalence was determined to be 18% in this study. High prevalence of risk factors that causes HIV infection, observed in the population of our study, may be responsible for the high HIV seroprevalence seen there. The prevalence of HIV infection among these individuals may have been underestimated, nonetheless, due to the failure to identify HIV infection throughout the study's window period and the exclusion of some patients. The risk of infection at surgical site and mortality has been linked to HIV infection. In our investigation, it was discovered that patients who were HIV positive had much greater rates of surgical site infections and mortality than patients who were not HIV positive. The mainstay of the presumptive diagnosis of abdominal TB is radiological investigation, which includes chest x-rays, abdominal ultrasonography or CT scans, and barium investigations.^{41,42} The most expensive radiological investigation, a CT scan of the abdomen, provides the clearest image of the intestine and extra intestinal structures. However, only 9.0% of patients in this evaluation underwent an abdominal CT scan, which is consistent with findings from earlier studies.^{43,44} The sporadic availability of CT scans has been ascribed to factors such as equipment breakdowns and patients' financial constraints. The utilization of radiography for diagnostic purposes is characterized by its expediency, simplicity, and costeffectiveness. However, it should be noted that such diagnoses are presumptive in nature and do not provide absolute exclusion of alternative conditions, such as Crohn's disease and cancers affecting the solid abdominal viscera.⁴⁵

The tuberculous granuloma identification is a crucial diagnostic procedure in establishing a fully differentiated diagnosis of abdominal tuberculosis. The primary

diagnostic method, histopathology, in 87.6% of the patients included in our study. However, it is worth noting that a characteristic granuloma with caseation was observed in only 24.4% of the patients within our cohort. Khan et al.⁴⁶ identified a histological pattern that is similar. When the specimen is obtained with surgical intervention or laparoscopy, as opposed to colonoscopy, the identification of tuberculosis granuloma becomes efficient. The interpretation of non-caseating granuloma on colonoscopic biopsies presents challenges in distinguishing it from Crohn's disease, as evidenced by previous research.⁴³

Several authors have proposed the use of therapeutic trials along the anti-tubercular therapy. However, it is not advisable to habitually urge this approach, since it has the potential to delay the diagnosis of malignancy, lymphoma, and Crohn's disease.^{43,47} The current study found that in 13.6% of patients who had a clinical history suggesting tuberculosis but had negative results from diagnostic tests, the response to a treatment trial of anti-TB medications was used as the foundation for diagnosis. The quoted value by Khan et al.⁴⁴ is more than 2.0%. According to existing research, a therapeutic trial of anti-tuberculosis (TB) medications was administered to up to 40% of patients.⁴⁴ Consistent with previous studies,^{14,32,46,47} the present series observed that intestinal tuberculosis (TB) was the prevailing manifestation of abdominal TB, representing 52.8% of the patient population. The predominant proportion of individuals examined in this study had involvement in the ileocaecal area. This finding aligns with previous studies on abdominal TB, which reported that 50% to 78% is the prevalence of the intestinal type of abdominal tuberculosis.^{46,48} The presence of ileocaecal involvement is hypothesized to be attributed to factors such as physiological stasis, the extensive surface area of the gut in this particular region, the thorough digestion of food, and the abundance of lymph nodes in the vicinity.¹¹ Previous studies have demonstrated that M cells, which are linked to Peyer's patches, are capable of phagocytosing BCG bacilli.⁴⁹

The investigation revealed that the most often observed surgical results were bands and adhesions. Ali et al.⁵⁰ also found similar surgical findings, however their results diverged significantly from other studies that identified the most prevalent intra-operative findings that was bowel strictures.^{31,32} The most commonly performed surgical technique in our series was the removal of bands and adhesions, followed by segmental bowel resection. Other authors have also documented a similar surgical therapy pattern. This finding is in opposition to the results as by Akbar et al.,³² who identified stricturoplasty as the prevailing surgical intervention. According to previous studies,^{31,32,46,50} postoperative administration of anti-tuberculous medication was advised for all patients diagnosed with tuberculosis. Consistent with previous research,^{25,50} the current study found that surgical site

infection was the most prevalent postoperative complication. This can be attributed to the presence of HIV infection and a low CD4 level.

The present investigation revealed a median hospital stay duration of 29 days, surpassing the findings reported by previous researchers.³⁰⁻³² The rationale for this observation can be attributed to the substantial proportion of patients in our study who experienced postoperative problems. The death rate of 18.8% observed in our study exhibited a statistically significant disparity when compared to the rates reported by other authors.^{30,46} A significant increase in mortality was observed among individuals who exhibited advanced age, co-morbid disease, HIV positivity (with low CD4 count), and delayed hospital presentation. It is imperative to acknowledge and address the various causes that contribute to the elevated death rates observed in our patient population in order to effectively mitigate the mortality burden associated with this particular ailment.

The phenomenon of patients leaving the hospital against medical advice is acknowledged as a significant issue within our specific healthcare context. Likewise, inadequate post-discharge follow-up visits from healthcare facilities continue to be a subject of apprehension. The study observed a notable deficiency in patient follow-up, with a majority of over sixty percent being lost to further monitoring.

These challenges frequently arise as consequences of socioeconomic disadvantage, geographical remoteness from healthcare facilities, and lack of knowledge or awareness. The study was limited by several factors, including delayed presentation, theatre space inadequate availability, delayed confirmation of abdominal tuberculosis (histology), and a significant proportion of participants lost to follow-up. Notwithstanding these constraints, the study has furnished localized data that might be employed by healthcare practitioners to strategize preventive measures and build management protocols for these individuals. It is imperative to address the issues that arise in the patients' management with abdominal tuberculosis in our specific setting, in order to provide the highest quality of care for these individuals.

Conclusion

Abdominal TB is a significant public health concern in our setting and poses a diagnostic difficulty that necessitates a heightened level of clinical suspicion. The disease in this region is characterized by early onset, delayed presentation, socioeconomic disadvantage, and significant morbidity and mortality. In order to ensure the provision of appropriate care for these patients, it is imperative to address these problems. Timely identification, prompt administration of antituberculous medication, and surgical intervention to address any related problems are imperative for ensuring the patient's life.

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