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# Varied Clinical Presentations of Abdominal Tuberculosis Causing Bowl Obstruction

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## ABSTRACT

**Background:** This study investigates the clinical presentations and surgical outcomes of abdominal Koch's disease, a common cause of intestinal obstruction, and the outcomes of surgical interventions.
**Objective:** To evaluate the clinical presentations, surgical outcomes, and postoperative progress in patients with abdominal tuberculosis causing intestinal obstruction.

**Materials and Methods:** A study of 50 patients diagnosed with abdominal TB at DHQ Teaching Hospital from 16 September 2021 to 16 September 2022 found that 80% were emergency cases, with a male-to-female ratio of 1:1.2, and a mean age of 24 years. The majority were Afghan nationals, with a majority coming from lower-middle socioeconomic backgrounds. Common symptoms included abdominal pain, distension, constipation, vomiting, weight loss, pallor, abdominal tenderness, and a mass in the abdomen. Laboratory findings included anemia, leukocytosis and raised ESR. Imaging findings showed distended small bowel loops and multiple air-fluid levels in 80% of cases, while 20% had evidence of coexisting pulmonary Koch's on chest X-rays.
**Results:** Abdominal Koch's is diagnosed 50% of the time, with 35% of confirmed cases having positive clinical findings. Common lesions included strictures, ileocecal masses, and intestinal perforations. Surgical procedures varied, and patients received full antitubercular therapy postoperatively. Complications occurred in 30% of cases, and hospital mortality was 4%.
**Conclusions:** Abdominal tuberculosis, a major cause of intestinal obstruction, but it is mostly asymptomatic and commonly affecting lower-middle socioeconomic groups. Surgical intervention and antitubercular therapy often led to improvement, but postoperative complications and mortality persist.
**Keywords:** Abdominal tuberculosis, Intestinal obstruction, Mycobacterium tuberculosis.

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## INTRODUCTION

Tuberculosis (TB) is a communicable disease that is a major cause of ill health and one of the leading causes of death worldwide. Until the coronavirus (COVID-19) pandemic, TB was the leading cause of death from a single infectious agent, ranking above HIV/AIDS. The global number of deaths officially classified as caused by TB in 2021 (1.4 million) was more than double the number caused by HIV/AIDS (0.65 million)[1]. TB is caused by the bacillus Mycobacterium tuberculosis, which is spread when people who are sick with TB expel bacteria into the air (e.g. by coughing). About a quarter of the global population is estimated to have been infected with TB, but most people will not go on to develop TB disease and some will clear the infection. Of the total number of people who develop TB each year, about 90% are adults, with more cases among men than women. The disease typically affects the lungs (pulmonary TB) but can affect other sites as well.

Pakistan is fifth among high-burden countries for tuberculosis.[2] A steady increase is seen in extrapulmonary tuberculosis (EPTB), which now accounts for 20% of all notified TB cases.

The Abdomen is involved in 11% of patients with extra-pulmonary tuberculosis;[3] The most common site of involvement is the ileo-caecal region, other locations of involvement, in order of descending frequency, are the ascending colon, jejunum, appendix, duodenum, stomach, esophagus, sigmoid colon, and rectum.

The ileocecal region is the most common site of involvement in GI TB seen in 8090% of cases.[4] An abundance of lymphoid tissue and an increased rate of absorption may predispose this site for TB involvement[5]. The involvement of the rest of the small bowel is infrequent and usually occurs together with peritonitis.

It can occur as a consequence of reactivation of latent tuberculosis, ingestion of Mycobacterium tuberculosis (via infected lung secretions, unpasteurized dairy products, or undercooked meats), hematogenous spread from an adjacent focus, or through infected lymphatic channels and nodes.[6]

Throughout the world, tuberculosis is associated with poverty, deprivation, and human immunodeficiency virus infection. Abdominal tuberculosis is usually of insidious onset with diverse symptoms and signs.[7] A few present with acute complications of perforation, obstruction, or bleeding.

The clinical presentation of abdominal TB may be acute or chronic. Patients often have fever (4070%),weight loss (4090%), abdominal pain (8095%), abdominal distension, diarrhea (1120%), and constipation. Fatigue, malaise, and anorexia are also seen. Dysphagia and odynophagia are seen in esophageal TB. Gastric TB may mimic peptic ulcer disease or

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gastric carcinoma. Duodenal TB may present with dyspepsia or duodenal obstruction. Abdominal pain, nausea and vomiting, and symptoms of malabsorption may be seen in ileocecal TB. Colonic tuberculosis may be focal or multifocal with pain as the predominant symptom. Other symptoms such as fever, anorexia, weight loss, and change in bowel habits are often reported. Rectal and anal involvement by TB presents with hematochezia as the predominant symptom with constipation in approximately one-third of patients.[8] Multiple fistulae may be the presenting feature in anal TB.

The diagnosis of abdominal tuberculosis is considered difficult because symptoms are diverse and vague with a lack of specific diagnostic testing. Abdominal symptoms mimic other gastrointestinal diseases such as inflammatory bowel diseases, intestinal lymphomas, or malignancy.[9] This dilemma results in delays in diagnosis and treatment, leading to significant morbidity and mortality. Hence, most of the cases of abdominal tuberculosis present in surgical emergency with obstruction and peritonitis. In such situations, surgery plays a pivotal role in the diagnosis and treatment.

Due to a lack of consensus guidelines, surgical management of ATB remains a challenge for surgeons.[10-13] Bypass surgery, segmental resection (one-stage or two-stage), and stricturoplasty are among the most frequently documented surgical procedures.

Despite abdominal tuberculosis being a significant health concern in high-burden regions like Pakistan, there is limited data on the specific clinical presentations and surgical outcomes of patients suffering from intestinal obstruction caused by abdominal TB. Many previous studies focus on pulmonary tuberculosis, leaving a gap in comprehensive understanding of abdominal TB and its varied manifestations. Furthermore, there is a need for more detailed studies examining surgical intervention outcomes, particularly in low-resource settings. This study aims to fill this gap by providing updated insights into the clinical features, diagnostic challenges, and postoperative outcomes of abdominal TB in a large cohort of patients over a one-year period.

This study is significant as it contributes to the limited body of research on abdominal tuberculosis in Pakistan, a country with a high TB burden. By analyzing the clinical presentations, surgical interventions, and postoperative outcomes in a cohort of patients, the study provides valuable insights into the effective management of intestinal obstruction caused by abdominal TB. It highlights the diagnostic difficulties due to the diverse and insidious nature of the disease and underscores the importance of timely surgical intervention combined with antitubercular therapy. The findings could guide clinicians in making more accurate preoperative diagnoses and selecting appropriate surgical strategies, ultimately improving patient outcomes in similar settings. Additionally, the study's results may inform public health strategies for the better management of abdominal tuberculosis in resource-limited settings.

## MATERIALS AND METHODS

It is a descriptive cross sectional study, comprising a total of fifty patients of tuberculous intestinal obstruction, carried out in the surgical unit of Divisional HQ Hospital, Kohat, KP Pakistan, from 16 September 2021 to 16 September 2022.

A detailed history regarding patient biodata, presenting complaints such as anorexia, nausea, vomiting, diarrhea, constipation, fever, malaise, weight loss), and past history of abdominal or pulmonary tuberculosis, history of tuberculosis in close contacts, malignancy, and metabolic disorder such as ureamia and liver disorders were taken. In Clinical examination patient's weight, vitals, anemia, jaundice, abdominal examination, complete chest examination and cervical lymphadenopathy were checked in all patients and various investigations like baseline such as complete blood count, erythrocytes sedimentation rate, renal function tests, liver function, Random blood sugar and chest x ray and special investigations like serum electrolytes, abdominal X-rays (erect and supine), and abdominal ultrasound were carried out. All the patients were resuscitated (By keeping NBM, N/G Aspiration, giving them I/V fluids, Antibiotics and Analgesics), and laparotomy performed through midline incision.

Surgical procedures like stricturoplasty,( It is defined as a surgical procedure designed to widen a narrowed segment of the bowel without resection),[25] resection with end to end anastomosis and limited right hemicolectomy (It is a surgical procedure in which the right side of the colon (including the cecum, ascending colon, and a portion of the transverse colon is removed)[25] were performed and tissue was obtained for biopsy depending upon the site involved, like intestine, peritoneum, omentum, and mesenteric lymph nodes. In those cases with perforation and widespread peritoneal contamination exteriorization of gut in the form of ileostomy was performed instead of primary closure.

Patients who had typical tuberculous lesions on gross examination and proven on histology were given a year course of Anti-tuberculous Therapy (initial phase of two to three months, including ethambutol, pyrazinamide, isoniazid plus rifampicin and continuation phase of nine to ten months including isoniazid plus rifampicin).

Finally prospective clinical diagnosis was compared with final diagnosis based upon histopathology and occurrence of positive clinical findings in confirmed cases was calculated.

The data was collected through predesigned performa and analysis was done through Statistical Package for

Social Sciences 16.0 for Windows (SPSS Inc., Chicago, Illinois, United States of America). Mean, mode, range and standard deviation were calculated for numerical variation such as age and rate and percentages and frequency were calculated for descriptive variables.

The patients were selected irrespective of age and sex, with the age range of 12-70 years. The other inclusion and exclusion criteria were as under.

**A. Inclusion criteria**

i. Patients with a long history of vague abdominal symptoms like pain abdomen, GIT upset (anorexia, nausea, vomiting, diarrhea, and constipation), and mass abdomen.
ii. Patients having constitutional symptoms like fever, malaise, weight loss, anorexia with evidence of pulmonary Koch's and abdominal symptoms.
iii. Patients with intestinal obstruction and symptoms and signs suggestive of abdominal tuberculosis.
iv. Typical features of tubercolus lesion seen per-operatively.
v. Proof of abdominal tuberculosis on histopathology.

**B. Exclusion criteria**

i. Patients with known malignancy.
ii. Other causes of dynamic intestinal obstruction proved on laparotomy.
iii. Patients with abdominal presentations of metabolic disorders like uremia, chronic liver failure, and diabetes.

## RESULTS

The study involved patients aged 12 to 70 years, with a mean age of 26.36 and a standard deviation of 3.27. The most commonly affected age group was between 21 to 30 years. Among the 50 patients, 28 were female and 22 were male, resulting in a male-to-female ratio of 1:1.2. The table 01 below shows the age group of different participants of this research.

**Table 1. Particpants Age Group**

| Age | Male n(%) | Female n(%) | Total n(%) |
|---|---|---|---|
| 12-20 Years | 8 (16) | 10 (20) | 18 (36) |
| 21-40 Years | 9 (18) | 14 (28) | 23 (46) |
| 41-60 Years | 3 (06) | 3 (06) | 6 (12) |
| >60 Years | 2 (04) | 1 (02) | 3 (06) |
| Total | 22 (44) | 28 (56) | 50 (100) |

Regarding nationality, 60% of the patients were Pakistani nationals, while 40% were Afghan refugees. In terms of admission, 80% of the cases were admitted as acute emergencies through the casualty department, while 20% were admitted as elective cases through the outpatient clinic.

Regarding associated tuberculosis, 80% of the patients were considered to have primary abdominal TB, while 20% showed characteristic TB findings on chest X-ray, indicating either active or healed tuberculosis, and were categorized as cases of secondary abdominal TB.

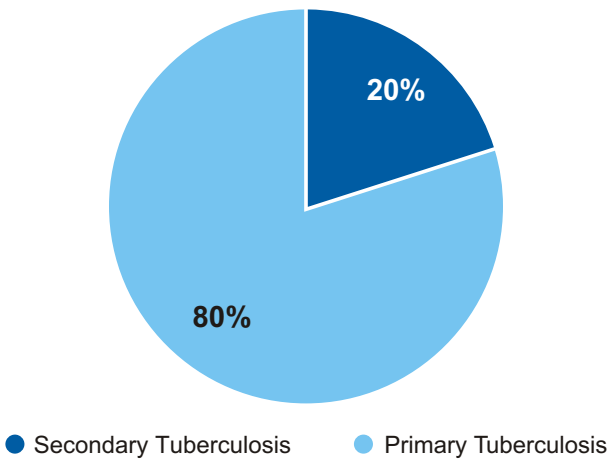



**Figure 01. Pie Chart of TB Patients**

In terms of presentation, half of the patients (50%) exhibited symptoms and signs of subacute intestinal obstruction, 40% presented with clinical features of acute intestinal obstruction, and 10% presented with acute peritonitis. The duration of symptoms before admission varied from 3 months to one and a half years.

**Table 02. Presentng Symptoms**

| Symptoms and Signs | No. of Patients | Percentage (%) |
|---|---|---|
| Pain Abdomen | 50 | 100 |
| Abdominal Distension | 40 | 80 |
| Constipation | 40 | 80 |
| Nausea and vomiting | 30 | 60 |
| Fever | 25 | 50 |
| Night sweats | 10 | 20 |
| Menstrual problems | 10 | 20 |
| Diarrhea / constipation | 5 | 10 |
| Pallor | 30 | 60 |
| Weight Loss | 15 | 30 |
| Visible peristalsis | 5 | 10 |
| Tenderness | 30 | 70 |
| Rigidity | 10 | 20 |
| Mass abdomen | 6 | 12 |
| Ascites | 2 | 4 |
| Exaggerated bowel sounds | 45 | 90 |

The incidence of pulmonary Kochs (active or healed) along with abdominal TB (secondary TB) is 20% (10 out of 50).

Significant anemia (hemoglobin less than 10 grams /deciliters) was seen in 70% (35 out of 50) of the patients, similar incidences have been reported by other studies.

A 4% mortality rate was observed in this study keeping in view the fact that most of the patients received were in critical condition and needed vigorous resuscitation before surgery.

Depending upon site, type and extent of lesion various surgical procedures were done. Resection of the diseased bowel and primary ileoileal anastomosis was considered in cases of single or multiple strictures with or without perforation. Limited right hemicolectomy and primary ileocolic anastomosis was done in lesion or lesions within ileocaecal region with or without perforation.

The Presence of tuberculous lesions (active or healed) on chest X-ray was found in 20% of the cases.
Plain abdominal X-ray (supine and erect) revealed distended bowel loops and multiple air-fluid levels in 80% of the cases.

Barium follow-through was performed in 10 patients with subacute obstruction. Positive radiological findings were seen in 8 patients (80%). Other imaging techniques like abdominal ultrasound which is frequently done but is usually of not much help in the diagnosis of abdominal TB.

In this study, 70% of the lesions were found in terminal ileum while ileocaecal region was involved in 26% of the cases and remaining 4% was found in jejunum.

**Table 03. Location of disease involvement**

| Location of Lesion | Number of Patients | Percentage of Cases (%) |
|---|---|---|
| Terminal Ileum | 35 | 70 |
| Ileocaecal Region | 13 | 26 |
| Jejunum | 2 | 4 |
| Total | 50 | 100 |

**Table 04. List of Procedures**

| Surgical Procedure | Description | Frequency n(%) |
|---|---|---|
| Right Hemicolectomy | Resection of the right side of the colon, was performed for ileocaecal TB with mass formation. | 23 (46.66) |
| Ileocecal Resection | Surgical removal of the terminal ileum and caecum due to obstruction or mass formation. | 11 (23.33) |
| Stricturoplasty | Procedure to widen narrowed segments of the bowel without resection, used for isolated strictures in jejunum | 13 (26) |
| Perforation Repair | Surgery to repair a perforated bowel segment, a life-threatening complication of intestinal TB. | 2 (4) |

In present study two-staged surgical procedures like loop ileostomy were done in 10% of the patients in cases of perforation.

## DISCUSSION

Abdominal TB has been reported in all age groups but this disease commonly occurs in the third decade of life and certainly, this was the finding in our study, as the most common age group, affected was 21-30 years which is similar to many other studies in literature reviewed.[14]

Females slightly predominated over males in our study and this may be due to the fact that in many third-world countries,[15] the woman assumes a nursing role among the infected family members. Similar female predominance is noted in other studies.

In this study, 40% of the patients were Afghan nationals. This high figure is due to the poor and malnourished Afghan refugees residing in camps located in the vicinity of Kohat.

Most of the patients presented as an acute emergency.[16] Studies from South-Asian countries indicated the proportion of patients presenting acutely is fairly high.

In the present study majority of the patients (80%) presented with intestinal obstruction (acute or sub-acute)[17] which is consistent with other studies from the subcontinent.

The incidence of pulmonary Kochs (active or healed) along with abdominal TB (secondary TB) is variable. It is 20% in the present study which is comparable with other studies.[18] The commonest presenting complaints of the patients in the present study were pain abdomen (100%), abdominal distension (80%), constipation (80%), and vomiting (60%), which are in agreement with other published series. Other less common presenting symptoms were night sweats (20 %), menstrual problems (20 %), and diarrhea alternating with constipation (10%),[19] which are consistent with other studies.

Weight loss and pallor were two common general physical findings found in 60% and 30% respectively.[20] The reported incidence of pallor and weight loss in other studies are 55%, 69 %, and 26%, 29% respectively.

Abdominal tenderness (70 %), abdominal distension (80%), and abdominal rigidity (20%) were common local physical findings observed in the present series, similar observations have been made by others.[21] Other less common local physical findings were mass abdomen (12%) visible peristalsis (10%) and ascites (4%), which are in agreement with other studies.

Unfortunately, there is no pathognomonic test for abdominal TB. Thus, routine laboratory investigations provide only guidelines in making the diagnosis. Significant anemia (hemoglobin less than 10 grams /deciliters) was seen in 70% (35 out of 50) of the patients, similar incidences[22] have been reported by other studies.

Mantoux test (Tuberculin skin test, TST) was done in all the patients (in 10 patients preoperatively and in the rest of the patients postoperatively) and was found positive in 70% of the cases. Negative Mantoux test has been reported in 30-35% of the cases of abdominal Koch's by others.[24]

The Presence of tuberculous lesions (active or healed) on chest X-ray was found in 20% of the cases. This is in agreement with the results of other studies, which state that in underdeveloped countries primary abdominal Koch's is much more common while in developed countries abdominal Koch's is always secondary.

A correct diagnosis based on clinical and laboratory findings was made in 25 patients (50%). Others have reported an accuracy of clinical diagnosis in 34 % and 50% of the cases. The occurrence of positive clinical findings in all finally proved cases of abdominal tuberculosis was 35 %.

Laparotomy is likely the most reliable diagnostic method, allowing a thorough examination of the peritoneal cavity and easy biopsy of the lesion. In current study all 50 patients underwent laparotomy and diagnosis was confirmed by finding characteristic tuberculous granuloma histopathologically.

In the present study all the cases, were managed surgically as all the patients presented late with obstruction needing urgent laparotomy in order to relieve the obstruction and to confirm the diagnosis.

In our study, 70% of the lesions were found in terminal ileum while ileocaecal region was involved in 26% of the cases. The most common lesion was stricture which is in accordance with other series.[32]

Stricturoplasties were considered for multiple distantly placed small gut strictures. All the single staged procedures showed good results which are in consistence with other papers. In present study two-staged surgical procedures like loop ileostomy were done in 10% of the patients in cases of perforation.

The justification for these procedures over primary anastomosis was to avoid post-anastomotic leakage and fecal fistula formation. The results of two staged procedures were found fairly good which is in agreement with the results of others.

Postoperatively all the patients were given A.T.T for one year as has been recommended by most of the series.

All the patients were followed up for one year and majority of the patients completed one year course of A.T.T with mild degree of side effects, managed accordingly. All of them showed satisfactory progressive improvement.

The commonest postoperative complication was chest infection observed in 17%, while wound infection was seen in 10% of the cases. One patient developed anastomotic leakage and one patient went into septicemia. The postoperative complications seen in present study are in accordance with postoperative complications seen by others.

## CONCLUSION

This study on intestinal tuberculosis involved patients aged 12 to 70, with a female predominance and most cases occurring between ages 21-30. The majority were emergency admissions, with 80% presenting with primary abdominal TB. Subacute intestinal obstruction was the most common presentation (50%), followed by acute obstruction (40%).

Surgical procedures were frequently required, with right hemicolectomy (46.66%) and stricturoplasty (26%) being the most common. The mortality rate was 4%, highlighting the severity of the disease at presentation. Early diagnosis and intervention are critical to improving patient outcomes.

### Ethical Consideration

This study was approved by the ethical board of Divisional Headquarter Teaching Hospital KDA, Kohat, Pakistan.

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There is no role of any funding agency in this study.

### Conflict of Interest

Authors declared no conflict of interest.

## REFERENCES

1. World Health Organization. WHO Global Task Force on TB Impact Measurement: report of a subgroup meeting on methods used by WHO to estimate TB disease burden, 11-12 May 2022, Geneva, Switzerland. World Health Organization; 2022 Oct 10. DOI: http://doi.org/10.1002/9781119600687
2. Tahseen S, Khanzada FM, Baloch AQ, Abbas Q, Bhutto MM, Alizai AW, et al. Extrapulmonary tuberculosis in Pakistan-A nation-wide multicenter retrospective study. PLOS ONE. 2020;15(4): DOI: https://doi.org/10.1371/journal.pone.0232134
3. Yule A, Sills D, Smith S, Spiller R, Smyth AR. Thinking outside the box: a review of gastrointestinal symptoms and complications in cystic fibrosis. Expert Review of Respiratory Medicine. 2023 Jul 3;17(7):547-61. DOI: https://doi.org/10.1080/17476348.2023.2237790
4. Gupta P, Kumar S, Sharma V, Mandavdhare H, Dhaka N, Sinha SK, et al. Common and uncommon imaging features of abdominal tuberculosis. Journal of Medical Imaging and Radiation Oncology. 2019;63(3):329-39. DOI: https://doi.org/10.1111/1754-9485.12874
5. Narinyan W, Poladian N, Orujyan D, Gargaloyan A, Venketaraman V. Immunologic role of innate lymphoid cells against mycobacterial tuberculosis infection. Biomedicines. 2022 Nov 6;10(11):2828. DOI: https://doi.org/10.3390/biomedicines10112828
6. Behr MA, Edelstein PH, Ramakrishnan L. Rethinking the burden of latent tuberculosis to reprioritize research. *Nat Microbiol*. 2024;9(5):1157-1158. DOI: https://doi.org/10.1038/s41564-024-01683-0.
7. Tahiri M, Goh KL, Abbas Z, Epstein D, Min-Hu C, Mulder CJ, et al. Digestive tract tuberculosis guideline. Journal of clinical gastroenterology. 2023 Aug 1;57(7):643-50. DOI: https://doi.org/10.1097/MCG.0000000000000225
8. Qureshi W. Diagnosis and Management Guide for Anorectal Disease: A Clinical Reference. CRC Press; 2024 Jun 1. DOI: https://doi.org/10.1201/9781003523826**:contentReference[oaicite:0]{index=0}.
9. Thomas AS, Schwartz M, Quigley E. Gastrointestinal lymphoma: the new mimic. BMJ Open Gastroenterology. 2019 Sep 1;6(1):e000320. DOI: https://doi.org/10.1136/bmjgast-2019-000320
10. Ahmad QA, Sarwar MZ, Fatimah N, Ahmed AS, Changaizi SH, Ayyaz M. Acute presentation and management of abdominal tuberculosis. J Coll Physicians Surg Pak. 2020 Feb 1;30(2):129-33. DOI: https://doi.org/10.29271/jcpsp.2020.02.129
11. Khan I, Ullah F, Khan M. Surgical Management of Abdominal Tuberculosis. J Postgrad Med Inst [Internet]. 2011;17(1). DOI: https://jpmi.org.pk/index.php/jpmi/article/view/796

12. Bali RS, Jain R, Zahoor Y, Mittal A. Abdominal tuberculosis: a surgical emergency. Int J Res Med Sci. 2017;5(9):3847-50. DOI: https://doi.org/10.18203/2320-6012.ijrms20173641
13. Ahmad QA, Sarwar MZ, Fatimah N, Ahmed AS, Changaizi SH, Ayyaz M. Acute presentation and management of abdominal tuberculosis. J Coll Physicians Surg Pak. 2020;30(2):129-33. DOI: https://doi.org/10.29271/jcpsp.2020.02.129
14. Goldstein E, Lipsitch M, Cevik M. On the effect of age on the transmission of SARS-CoV-2 in households, schools, and the community. The Journal of infectious diseases. 2021 Feb 1;223(3):362-9. DOI: https://doi.org/10.1093/infdis/jiaa691
15. Kedia S, Ahuja V. Intestinal tuberculosis: an overview. Tuberculosis of the Gastrointestinal system. 2022 Feb 22:73-103. https://doi.org/10.1007/978-981-16-9053-2_6
16. Khim G, Em S, Mo S, Townell N. Liver abscess: diagnostic and management issues found in the low resource setting. British Medical Bulletin. 2019 Dec 11;132(1):45-52. DOI: http://doi.org/10.1093/bmb/ldz031
17. Kudu E, Danış F. Recognizing and addressing the challenges of gastrointestinal tuberculosis. World J Clin Cases. 2024 Jul 6;12(19):3648-3653. DOI: https://doi.org/10.12998/wjcc.v12.i19.3648. PMID: 38994296; PMCID: PMC11235435.
18. Abu-Zidan FM, Sheek-Hussein M. Diagnosis of abdominal tuberculosis: lessons learned over 30 years: pectoral assay. World Journal of Emergency Surgery. 2019 Jul 12;14(1):33. DOI: https://doi.org/10.1186/s13017-019-0252-3
19. Hussain SA, Ahmad SR, Mala TA. A thirty year study of clinico pathological profile of gastric cancer in Kashmir-A single institute based study. 2019 March 2(3);88-94 DOI: https://doi.org/10.36349/easms.2019.v02i03.001
20. Vanderpool DM, O'Leary JP. Primary tuberculous enteritis. Surg Gynecol Obstet. 1988 Aug;167(2):167-73. PMID: 3041634. DOI: https://doi.org/10.1007/BF02554572?
21. Aston NO, De Costa AM. Abdominal tuberculosis. International Journal of Clinical Practice. 1990;44(2):58-63. DOI: https://doi.org/10.1111/j.1742-1241.1990.tb10736.x
22. Hardy MA, Yang C. How to Diagnose and Manage Acute Abdomen and Intra-Abdominal Infections in Low-and Middle-Income Countries. InGlobal Surgery: How to Work and Teach in Low-and Middle-Income Countries 2023 Jul 21 (pp. 317-337). DOI: https://doi.org/10.1007/978-3-031-28127-3_27
23. Patterns AB. Abnormal Bowel Gas Patterns and Extraluminal Gas in Abdomen. Textbook of Gastrointestinal Radiology. 2021 Jun 3:13.
24. Roy-Chowdhuri S, Dacic S, Ghofrani M, Illei PB, Layfield LJ, Lee C, et al. Collection and handling of thoracic small biopsy and cytology specimens for ancillary studies: guideline from the college of American pathologists in collaboration with the American college of chest physicians, association for molecular pathology, American society of cytopathology, American thoracic society, pulmonary pathology society, papanicolaou society of cytopathology, society of interventional radiology, and society of thoracic radiology. Archives of pathology & laboratory medicine. 2020 Aug 1;144(8):933-58. DOI: https://doi.org/10.5858/arpa.2020-0119-CP
25. Buchanan, G. N., & Rotimi, O. (2010). Surgical techniques for colorectal cancer: A comprehensive guide. *Annals of the Royal College of Surgeons of England*, 92(2), 165170. DOI: 10.1308/003588410X12628812459129.

**DATA SHARING STATEMENT:** The data that support the findings of this study are available on request from the corresponding author. The data is not publicly available due to privacy or ethical restrictions.

**AUTHORS' CONTRIBUTION**

The following authors fullfill authorship criteria as per ICMJE guidelines;

**Akbar F, Hussain S:** Substantial contribution to conception and design, drafting the manuscript, final approval, agreed to be accountable for all the work.

**Amir I:** Substantial contribution to conception and design, data acquisition, drafting the manuscript, final approval, agreed to be accountable for all the work.

**Khan S:** Analysis and interpretation of data, drafting the manuscript, final approval, agreed to be accountable for all the work.

**Khattak MI:** Analysis and interpretation of data, critical revision,final approval, agreed to be accountable for all the work.

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