

Evidence of Tuberculosis as a Surgical Disease: A Prospective Observational Study

Rajesh Kumar Dora¹, Abhilash Panda², Dharendra Nath Soren³, Amar Kumar Behera⁴, Debashisha Roy⁵

¹Associate Professor, Government Medical College and Hospital Keonjhar

²Senior Resident, M.K.C.G Medical College, Berhampur

³Associate Professor, Fakir Mohan Medical College and Hospital, Balasore

⁴Associate Professor, Government Medical College and Hospital, Sundargarh, Odisha

⁵Assistant Professor, Dept. of Surgery, PRM Medical College & Hospital, Baripada

Received: 22-01-2023 / Revised: 20-02-2023 / Accepted: 10-03-2023

Corresponding author: Dr. Amar Kumar Behera

Conflict of interest: Nil

Abstract

Background: Tuberculosis has been an enigmatic problem for surgeons and physicians alike since time immemorial. Many reviews have been done by different authors and attempts have been made to find out the signs, symptoms and early diagnosis of the disease. Even with the modern diagnostic aids, the diagnosis of this disease remains a dilemma.

Aims and Objectives: The purpose of this study is to analyse various patterns of surgical manifestation of Tuberculosis, outline a scheme of management including the various surgical procedures available and correlate the histopathology findings.

Material & Methods: All the cases of suspected Tuberculosis that are admitted in the Department of General Surgery, M.K.C.G Medical College and Hospital, Berhampur from August 2018 to July 2020. Cases were included according to the inclusion and exclusion criterias, and approval from the ethical committee was obtained. Patients were included after proper informed consent. Patients were subjected to biochemical, microbiological and radiological investigations, and their sensitivity and specificity were calculated. Patients were managed either conservatively or surgically, and the requirement of surgery in tuberculosis cases has been studied extensively.

Observations and Results: Out of 83 patients in our study groups, most of the patients were in their 3rd or 4th decade of life, males were more affected when compared to their female counterparts, maintaining ratio of 1:18. In the present study 78.5% of abdominal tuberculosis presented in acute manner and 21.2% with chronic features. Acute symptoms present in 63.6% of tubercular empyema. 14.28% of tubercular psoas abscess presented acutely and 85.72 % with chronic features. Loss of weight (90.36%) was the most common symptom of abdominal tuberculosis in my study followed by malnourishment and pallor (87.97 %). In tubercular empyema thorax 90.9% presented with chest pain followed by fever in 72.7% of the people. All the patients of tubercular lymphadenitis or cold abscess presented with fever followed by pain in 78.2% of the people. In present study 71.2% cases of abdominal tuberculosis had haemoglobin <11gm%, 80.8% of cases had ESR >30mm, in 76.14% CBNAAT was positive and in 30.38% cases Montoux Test.

Conclusion: The most common age group of presentation was 21-30 years in the present study. Among the total 83 cases studied, 63 (75.9%) required surgical management according to the site of the lesion and pathology observed. Hence surgical intervention is an important aspect in the management of patients with TB with acute and chronic manifestations. The most common

presenting symptom was weight loss followed by evening rise of temperature. Among the laboratory investigations done, CBNAAT was found to be more sensitive and specific than Mantoux test. Hence CBNAAT was considered as the gold standard test in this study. Among histopathological studies epithelioid granuloma with necrosis was the most common finding.

Keywords: Tubercular Psoas Abscess, CBNAAT, Tubercular Lymphadenitis, Cold Abscess.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

TB is still a killer disease that seems to take its toll in the lower and lower middle-class population. Since the beginning of the century, TB has been one of the burning topics of medical science and in the last few decades, there have been much advancement in the diagnosis and early management of this disease. [1,2]. In spite of recent advances in the drug therapy, TB remains a major health problem in India, and Milton Rosenau correctly propounded the aphorism that “In man, the balance between immunity and susceptibility to tuberculosis is delicately adjusted: there is a small factor of safety”. [1,2]

TB is closely associated with AIDS. As AIDS is more rapidly spreading, the disease tuberculosis is also spreading in close association with it. The organism which is causing the disease is a multicomplex organism and is *Mycobacterium tuberculosis*, *Mycobacterium bovis* and other opportunistic organism (*M. kansaaii*, *M. xenopi*, *M. ovium*, and *M. intercellulare*). Tuberculosis is a necrotising inflammation with protean manifestation and wide distribution. Though lungs are most common affected organs it may be disseminated throughout the body. The 30 high TB burden countries accounted for 87% of all estimated incident cases worldwide, and eight of these countries accounted for two thirds of the global total: India (27%), China (9%), Indonesia (8%), the Philippines (6%), Pakistan (6%), Nigeria (4%), Bangladesh (4%) and South Africa (3%). [3,4]

Tuberculosis is one of the most common causes of morbidity and mortality in developing countries. Abdominal TB has been a great concern for surgeons as its prevalence has been found to be as high as 12% in cases with extra pulmonary TB. Gastrointestinal Tb is the 6th most common form of extra pulmonary TB with acute presentation (Perforation and obstruction) and a variety of chronic problems (vague ill health, anorexia, weight loss, malabsorption syndrome). In India, TB is responsible for 5 - 9% of all cases of small intestinal perforations. In India TB disproportionately involves the young. Almost 50% of multidrug- resistant TB (MDR-TB) cases worldwide are estimated to occur in china and India. The World Health Organisation (WHO) TB statistics for India for 2018 gives an estimated incidence figure of 2.69 million cases. [5-10]

Although chemotherapy is effective in 100% cases of tuberculosis, it does not control all cases of abdominal tuberculosis, where large area of avascular necrotic lesions is present. Thus, in these cases surgery is the only weapon for cure of these cases, along with chemotherapy. Surgery is also indicated in disease like intestinal obstruction, perforation, empyema etc. [11-13]

Aims and Objectives

To study tuberculosis as an aetiology requiring surgical intervention.

To study the clinical features and onset of the disease.

To study and analyse the various laboratory tests, radiological investigations and Histopathology reports of tissue specimens and to correlate with their individual clinical presentation.

To identify the cases requiring surgery, post-operative monitoring, follow up for complication, clinical response to ATT and sequel after the surgical procedures

Materials & Methods

Sampling Frame: This is a two years study of all cases presenting with Tuberculosis in Postgraduate Department of General Surgery, M.K.C.G Medical College and Hospital, Berhampur.

Sample Size: Eighty-three patients with tuberculosis, irrespective of sex.

Study Design: Prospective observational study.

Place of Study: Postgraduate Department of Surgery, M.K.C.G M.C.H, Berhampur.

Duration of study: August 2018 to July 2020.

Ethical Clearance: The present study was approved by the institutional Ethical Committee of M.K.C.G Medical College and Hospital, Berhampur on human subject research.

Criteria for Patient Inclusion:

- Young patients with enlarged and draining lymph nodes with fistulous tract.
- All patients with intestinal obstruction with suspicion of TB.
- All patients with haemoptysis and swelling over cervical region.
- Patient's dyspnoeic for a long period along with weight loss (cachexia) not responding to usual antibiotics.
- Patients on immunosuppressive therapy, HIV history, Acute onset of cough, weight loss and fever.

Criteria for Patient Exclusion:

- Extremes of age.
- Patient with cancer (advanced)

Management plan:

The investigations possible in our hospital setup on emergency basis is plain X-ray abdomen, USG abdomen, X-ray chest, CECT abdomen and thorax and complete blood examination along with serum ADA, Montoux test and CBNAAT was done.

The results of various investigations were noted after the patients admission through SOPD or emergency department. After arriving at a tentative/ definitive diagnosis the patients were prepared for operation. Exploratory laparotomy was done for cases with abdominal presentation. Intercoastal drainage was done for all cases of empyema thorax. Excision or drainage of pus done in case presenting as Lymphadenitis or cold abscess and ICD done for cases with empyema thorax.

The tissue was collected after the operative procedure in an adequate volume of fixative (ratio of 20:1) in a container of appropriate size with proper labelling. 10% buffered formalin was used. Pus was collected in sterile culture tube, labelled and sent to pathology department. The post-operative complications encountered during the patients stay in hospital or thereafter, as reported during follow up were also recorded. Post-operatively all the patients were started on anti-tubercular therapy (ATT).

As per RNTCP guidelines 2018, all new cases were treated with four drug regimen of rifampicin (R), isoniazid (H), ethambutol (E) and pyrazinamide (Z) with intensive phase of 2 months of HRZE and followed by a continuation phase of 4 months with HZE. Relapse or failure cases were put on an intensive phase of 3 months (HRZES [2 months] {S- streptomycin} and HRZE

[1month]) and continuation phase of 5 months minimum (HRE).

Analysis of Data

Data will be collected according to the given Case Proforma and will be compiled and tabulated in Microsoft® Excel and will be statistically analysed using IBM® SPSS 26.0.

Follow Up

All the patients were discharged with advice to come for follow up at the end of 2 months and then at the end of 6 months.

Observations & Results

This study included 83 patients who were diagnosed to be having tuberculosis both preoperatively and post-operatively.

Table 1: Incidence of tuberculosis

Total number of cases of tuberculosis – 83		
	No of Cases	Percentage
TB Abdomen	42	50.60
TB Empyema thorax	11	13.25
TB Cervical Lymphadenopathy	18	21.68
TB Psoas Abscess	7	8.43
TB peripheral Lymphadenitis	5	6.02
Total cases	83	100

Table 2: Age and sex incidence

Age group	Female	Male	Total
1 -10	1	0	1
11 – 20	4	7	11
21 – 30	12	15	27
31 – 40	9	11	20
41 – 50	7	8	15
51 – 60	3	3	6
60 – 80	2	1	3
Total	38	45	83

Inference: Of the 83 cases, 45 were male and 38 were females. The youngest patient was 8 yrs. old male child and the oldest patient was 79 yrs. old women. Most of the patients were in the age group 21- 30 years and the next common age group is 31-40 years.

Types of Tubercular Lymphadenitis: Out of 23 Tubercular lymphadenitis, Cervical lymphadenopathy was seen in 18 cases (7 males, 11 females) & Peripheral lymphadenitis was seen in 5 cases (2 males, 3 females)

Mode of Presentation of Tubercular Lymphadenitis: Out of the 23 cases of TB lymphadenopathy, all 23 cases (100 %) had fever followed Abscess formation was seen in 21 cases (91.30%), pain 18 cases (78.2%), Localized tenderness 16 cases (69.5%), and lymph nodes were calcified in 4 cases (17.3%).

Mode of Presentation of Tubercular Empyema Thorax: Out of 11 cases of Tubercular Empyema thorax 10 cases (90.9%) presented with chest pain, Fever in 8

cases (72.7%) and 6 cases (54.5%) presented with tachycardia and tachypnoea.

Table 3: Mode of presentation of PSOAS abscess

Type of presentation	No of cases	Percentage
Fever	5	71.42
Flexion deformity	5	71.42
Weight loss	4	57.14
Backache	3	42.85
Abdominal pain	3	42.85

Inferences: Most common presentation of psoas abscess, fever and flexion deformity 71.42% followed by weight loss 57.14% and (42.85%) had backache

Duration of Presentation of Psoas Abscess:

Out of the 7 cases that presented with psoas abscess 1 case had duration of < 3 months (acute), 2 cases in 3 – 6 months and 4 cases of >6 (chronic).

Mode of Presentation of Abdominal Tuberculosis:

78.5% (33) of abdominal tuberculosis were presented in acute manner and 21.2% (9) with chronic features.

Acute Presentation of Abdominal Tuberculosis:

The acute group comprised 24 cases (72.72%) of intestinal obstruction, 4 cases of perforation (9.2%), 4 cases (9.52%) simulating peritonitis due to peritoneal tuberculosis and 1 case (3.03%) was simulating acute appendicitis.

Type of Chronic Presentation: Out of 9 cases of chronic abdominal Tuberculosis, 6 cases (14.28%) presented with obstruction

and 3 cases (7.14%) presented without obstruction.

Presenting Symptoms: Loss of weight (90.36%) was the most common symptom of abdominal tuberculosis in my study followed by malnourishment and pallor (87.97 %). In tubercular empyema thorax 90.9% presented with chest pain followed by fever in 72.7% of the people. All the patients of tubercular lymphadenitis or cold abscess presented with fever followed by pain in 78.2% of the people.

Different Signs: In the present study, 87.89% (73) of the patients were of poor built (undernourished). Pallor was present in 87.97% of patients. Among the other signs, cervical region tenderness seen in 19.27% (16) of patient, lymphadenopathy in 42.16% (36) of patients, abdominal tenderness was seen in 36.14% of patients, abdominal distention in 51.80% (43) of patients, abdominal lump in 18.07% of patients. Ascites was seen in 18 cases (21.68%) of patients.

Table 4: Laboratory investigation

Investigation	No. of cases (out of 83)	Percentage
A. Haematological		
1. Haemoglobin		
Below 11gm%	65	78.31
Above 11gm%	8	21.69
2. Differential white blood cell count		
Normal count	13	15.66
Leucocytosis	11	13.25

Leucopenia	11	13.25
Relative Lymphocytosis	37	44.57
Eosinophilia	11	13.25
3. Erythrocyte sedimentation rate		
Below 30 mm	10	12.04
Above 30mm	73	87.95
B. CBNAAT for tuberculosis		
Positive	67	80.72
Negative	16	19.28
C. Montoux test		
Positive	24	28.91
Negative	59	71.08
D. Elisa for HIV		
Positive	2	2.40
Negative	81	97.59

Sensitivity and Specificity of CBNAAT and Montoux Test:

Montoux Test:

Sensitivity = $16 / (16 + 51) \times 100 = 23.8\%$

Specificity = $12 / (12 + 4) \times 100 = 75\%$

CBNAAT:

Sensitivity = $55 / (55 + 12) \times 100 = 82.7\%$

Specificity = $13 / (13 + 3) \times 100 = 81.25\%$

Montoux test compared with CBNAAT as gold standard had a sensitivity of 23.8% and specificity of 75%. CBNAAT when compared with clinical response had a sensitivity of 82.7% and specificity of 81.25%.

Serum Ascites Albumin Gradient Value:

In 75% of Abdominal TB cases the Serum ascites albumin gradient value was < 1.1 g/dl.

Chest X-Ray Finding: In the present study 19 cases (22.9%) had active disease, fibrosis was seen in 31 cases (37.3%) of cases, empyema in 3 no of cases (3.6%), Pleural effusion was seen in 21.7% (18 cases) of patients

Straight X-Ray Abdomen Pa View Findings: 18 (21.7%) showed Dilated coils of intestine, In the present study 4 cases

(4.8%) showed pneumoperitoneum and 45 cases (54.2%) had non-significant findings. Multiple fluid and gas level was seen in 16 cases (19.3%).

USG Findings of Abdomen and Pelvis: On USG of abdomen and pelvis 9.6% had dilated loops of intestine, 18.1%(27) cases had multiple air fluid level, 6%(8) each of dilated loops with ascites and There was no significant finding on USG in 34 cases (41.0%).

CECT Findings Of Abdomen And Pelvis:

CECT of Abdomen and pelvis in abdominal tuberculosis 17.9% (15) cases had dilated bowel with thickened wall and presence of adhesion. 3.6% (3) cases had enlarged mesenteric lymph nodes

Site of Lesion: In TB abdomen 1 lesion was found at duodenum (1.2%), 18 lesions at ileocaecal region, 6 lesions (7.2%) at jejunum and 6 lesions (7.2%) in iliopsoas muscle.

In the present study, 11 lesions (13.3%) were seen in pleural cavity and 14 cases (16.9%) of mesenteric lymph node at intra-operative site. 18 lesions (21.7%) were present in cervical lymph nodes, 2 lesions (2.4%) of axillary Lymph nodes and in 4 lesions (4.8%) at inguinal lymph nodes.

Operative Procedures Adopted:

Laparotomy and adhesiolysis was done in 7 patients (8.4%), incision and drainage with suction drain done in 3 cases (3.6%) of psoas abscess, laparotomy with drainage of pus done in another 3 cases (3.6%) of psoas abscess. Intercoastal tube drainage was given in 9 cases (10.8%) of empyema thoracic of tuberculosis, Resection and Anastomosis was done in 13 cases (15.7%) of abdominal TB.

Histopathological Findings: Out of 83 cases of tuberculosis, in 12 cases HPE was not done. In 39 (47%) cases acid fast culture was positive.

In the study 2 cases had acid fast negative culture. Epitheloid granuloma with necrosis was seen in 16 cases (19.3%), epitheloid granuloma without necrosis seen in 7 cases (8.4%), non-granulomatous seen in 3 cases (3.6%) and non-specific inflammation seen in 4 cases (4.81%).

Post-Operative Complications: In the present study, 30 out of 83 (36.0%) patients had complications following or during treatment. Surgical Wound sepsis was the most common with 14 cases (16.9%) of cases. Next was fistula in 5 cases (6.0%), Enterocutaneous fistula was present in 2 cases (2.4%)

Discussion

Age and Sex	
Study	Findings
Vakil and Desai [4]	54.65% age group of 21 -40 yrs abdominal Tuberculosis
Sharma Y R [5]	45.7 % in age group of 21 -40 year
Kishore P [3]	52% in 3rd decade of age

Presentation: Most of the patients of abdominal tuberculosis presented themselves in an acute manner or acute on chronic manner (78.5%) and 21.2% presented with chronic features. Bharati and Minhas echoed the same saying over 50% of their TB abdomen cases came in emergency. Baloch *et al* found similar results of around 90% cases having acute presentation.

Symptomatology: Chest pain incidence of 90.9% in the present study was almost similar to study of Chawla *et al* (87%), Das *et al* (80%) and Sahn *et al* (94%). [15,16,17]. Chest pain was due to pus collection and pleurisy of chest cavity. Fever incidence in present study was almost similar to study by Sahn *et al* (76%) and Chawla *et al* (78%). As Das *et al* had more cases in acute presentation fever symptom was more in percentage. [15, 16, 17]

In tubercular lymphadenitis and cold abscess: Fever was the presenting symptom

in all the cases (23) of the present study (100%) being almost similar to other author's study. Evening rise of temperature was due to chronic low-level inflammation in tuberculosis and the effect of cortisol. [20] Pain was present in 78.2% of cases similar to study by Polesky *et al*, Singh *et al* and Marais *et al*. In study by Dandapat *et al* more cases presented with stage of lymphadenitis; thus, pain was presenting symptom in 87%

In Abdominal tuberculosis: Loss of weight (90.36%) was the most common symptom of abdominal tuberculosis in my study, similar to study by Shukla *et al* (83%), Bhansali *et al* (85%), and Leone *et al* (83%) and Vakil and Desai (90%). followed by malnourishment and pallor (87.97 %) similar to study by Vakil and Desai (80% each), Leone *et al* (78% and 80%), Bhansali *et al* (85% and 81.5%) and Shukla *et al* (78% and 90%). Malnutrition and pallor was common as most patients belonged to the low socioeconomic status with poor hygiene. [4,7,11,23]. In tubercular

empyema thorax 90.9% presented with chest pain followed by fever in 72.7% of the people. All the patients of tubercular lymphadenitis or cold abscess presented with fever followed by pain in 78.2% of the people.

Abdominal tuberculosis:

Haemoglobin <11gm% was found in 71.2% of case. Vakil and Desai found it in 62% of cases and Shukla *et al* found in 80% of cases similar to the present study. [4,24]

CBNAAT for Tuberculosis was positive in 76.14% of abdominal tuberculosis cases. Shukla *et al* found it positive in 65.8% of cases which was almost similar with some variations as all patients underwent CBNAAT in our study. CBNAAT has a high sensitivity (75%) and specificity (98%) in detection of tuberculosis as it is a nucleic acid amplification test. [24, 25]

Radiological Examination:

X-Ray Chest:

In abdominal tuberculosis: In the present study 26% of patients of abdominal tuberculosis had active lesions similar to study by Sharma *et al* and Mandal *et al*. [26] Healed lesions were found in 42% of cases and pleural effusion in 19 % of cases in the present study. Abdominal tuberculosis occurs as primary tuberculosis without pulmonary involvement and approximately 15-25% of cases with abdominal tuberculosis have concomitant pulmonary TB.

In Psoas Abscess: In the present study healed lesions were found on chest X-ray in 71% of cases of psoas abscess similar to study by Chern *et al* (78%). Harrigan *et al* had only 32% case of healed lesion due to less pulmonary involvement by tuberculosis.

In empyema thorax: Pleural effusion was seen in 77% of cases in the present study similar to study by Banga *et al* (80%) and Long *et al* (84%). [6]

In tubercular cervical lymphadenitis: In tubercular cervical lymphadenitis healed pulmonary tubercular lesion was seen in 50% of cases in the present study similar to study by Marais *et al* (55%), Kanlikama *et al* (54%) and Jha *et al* (45%). [18,19,21]

Active tubercular lesion was seen in 33.3% in the present study almost similar to study by Marais *et al* (33%), Kanlikama *et al* (28%) and Jha *et al* (35%).

X-Ray Abdomen Erect PA View: Dilated loops of intestine & Multiple gas fluid level was seen in 38.1% of cases in the present study similar to study by Shukla *et al* (40%) and Bansali *et al* (30%). [7,24]

CECT of Abdomen and Pelvis:

CECT of abdomen and pelvis was done in 41 cases of Abdominal Tuberculosis and Psoas abscess. In the present study 15 cases (17.9%) of cases had findings of dilated bowel loops with thickened wall and presence of adhesion, 3.6% of cases had mesenteric lymph nodes with ascites and in 6% case stricture, adenitis and ascites was seen. The above findings were similar to study by Li *et al* (22%, 6%, 10%), Yunaev *et al* (13%, 2%, 8%) and Hulnick *et al* (15%, 6%, 20%).

Ultrasonography Findings

Abdomen and Pelvis: On USG of abdomen and pelvis 9.6% had dilated loops of intestine which was similar to study by Mandal *et al* (15%), Darbari *et al* (12%) and Chalya *et al*. [1,12], 18.1% cases had multiple air fluid level, similar to study by Mandal *et al* (22%), Darbari *et al* (14.2%), 6% each of dilated loops with ascites and 12% cases had space occupying lesion.

Type of Management

In Abdominal tuberculosis: In the present study surgical treatment was done in 71.5% of cases and almost similar to study by Leone *et al* (69.5%) and Cho *et al* (65%). In the

study by Sharma *et al* only 57% of cases underwent surgery whereas 43% of cases were managed medically as most cases presented chronically and were managed with ATT and the symptoms subsided subsequently. [20,22,23]

In tubercular cervical lymphadenitis and cold abscess: In the present study 72.22% of cases underwent surgical management and only 27.78% of cases went with medical treatment by ATT.MDR-TB responds less to ATT with a longer duration of treatment. [10]

In Tubercular Psoas Abscess: Surgical management was done in 83.33% of cases of psoas abscess in the present study similar to study by Yacoub *et al* (75%) and Dave *et al* (80%).

In Tubercular Empyema Thorax: Tubercular empyema thorax was managed surgically with ICD in 90.9% of cases in the present study similar to study by Sahn *et al* (85%),

Table 5: Intraoperative finding of abdominal tuberculosis

Finding	Shukla <i>et al</i> [24]	Vakil and Desai [4]	Mandal <i>et al</i>	Present study
Stricture %	20	15	12	10
Stricture with mesenteric lymphadenitis %	23	20	27	26.6
Stricture with MA with ascites %	20	15	15	20
Intestinal Perforation %	10	10	5	13.33
Hyperplastic lesion with MA with ascites %	10	15	6	6.66
Interloop adhesions %	17	25	35	26.6

On exploratory laparotomy stricture was seen in 10% cases, stricture with mesenteric lymphadenitis in 26.5% cases, stricture with MA with ascites in 20% cases, perforation in 13.3% cases, hyperplastic lesion with MA with ascites in 6.6% of cases and interloop adhesions in 26.6% cases.

Table 6: Site of lesion in abdominal tuberculosis

Finding	Bockus <i>et al</i> [13]	Darbari <i>et al</i> [4]	Bhansali <i>et al</i> [9]	Present Study
Ileocaecal region %	50	52	54	42.85
Ileum %	35	20	19	38.09
Jejunum %	10	20	11	14.28
Duodenum %	1	-	2	2.38
Mesenteric lymph node %	-	8	4	16.9

Ileocaecal region is most commonly involved followed by ileum in 38.09% of patients due to abundance of lymphoid tissue and stasis of stool in the region.

Table 7: Operative Procedure

Findings	Vakil and Desai [4]	Bhansali <i>et al</i> [7]	Anand <i>et al</i> [8]	Pujari <i>et al</i> [14]	Present study
Resection and anastomosis %	46	50	30.2	30	43.3
Adhesiolysis %	16	25	30	40	23.3
Laparotomy and biopsy %	10	2	5	3	3.3
Stricturoplasty %	20	18	25	15	26.8
Primary closure of perforation %	6	5	9.8	12	3.3

In abdominal tuberculosis, out of the 30 cases that underwent surgical treatment:

In abdominal tuberculosis resection and anastomosis was done in 43.3 % of cases in the present study similar to study by Vakil and Desai (46%) and Bhansali *et al* (50%)., Adhesiolysis done in 23.3% of cases in the

present study similar to study by Vakil and Desai (16%) and Bhansali *et al* (25%), laparotomy and biopsy done in 3.3% of cases, stricturoplasty in 26.8% of cases and primary closure of perforation was done in 3.3% of cases.

Table 8: In Psoas abscess

Finding	Yacoub <i>et al</i>	Dave <i>et al</i>	Present Study
Percutaneous drainage of pus %	80	70	50
Laparotomy and pus drainage %	20	30	50

In tubercular empyema: Intercoastal tube drainage done in 81.1% cases of empyema thorax. Sahn *et al* (75%), Thoracotomy was not available in our setup so the present had to limit surgical procedure with tube drainage.

In cervical lymphadenitis: Incision and drainage done in 66.67% of cases of cervical tubercular lymphadenitis similar in study to Kanlikama *et al* (70%) and Jha *et al* (60%). excision of lymph node done in 22.22% of cases.

Histopathology**Table 9: H.P Study In abdominal tuberculosis**

Findings	Dasgupta <i>et al</i>	Shukla <i>et al</i> [24]	Present Study
Epitheloid granuloma with necrosis %	70	60	53.33
Epitheloid granuloma without necrosis %	10	201	23.33
Non-granulomatous %	10	8	10
Chronic non-specific inflammation %	10	12	13.33

In abdominal tuberculosis: The present study differed from study by Dasgupta *et al* at 70%.

In cervical tubercular lymphadenitis and cold abscess: In cervical tubercular lymphadenitis Acid Fast Bacillus was positive in 88.9% cases similar to study by Jha *et al* (80%).^[21] and negative in 11.1% of cases.

Complications**Table 10: Complications in Abdominal Tuberculosis**

Finding	Shukla <i>et al</i> [24]	Bhansali <i>et al</i> [7]	Vakil and Desai [4]	Present study
Bronchopulmonary infection %	25	20	30	19.04
Surgical Wound sepsis %	20	22	15	14.28
Enterocutaneous fistulae %	5	10	10	2.38
Burst abdomen %	10	5	5	7.14
Death %	1	1	5	2.38
No morbidity %	39	42	35	54.76

Inferences: Of the 30 cases of abdominal tuberculosis that were +9operated, bronchopulmonary infection seen in 19.04% of cases, surgical wound sepsis in 14.28% of case, burst abdomen in 7.14% of case, entero-cutaneous fistula in 2.38% of case and Death in 1 case (2.38%).

Complications in psoas abscess: In psoas Abscess, 15% of patients in my study had Though a vast progress has been made in the fields of prophylaxis, diagnosis and treatment of pulmonary and extra-pulmonary tuberculosis is still a major health problem. The true incidence is not fully realized because of fallacies in diagnosis and misinterpretation of signs and symptoms of this chronic disease. The most common age group of presentation was 21-30 years in the present study. surgical intervention is an important aspect in the management of patients with TB with acute and chronic manifestations. All the cases were started with ATT and first follow up was done after 2 months. From this prospective study it was finally concluded that TB presenting as surgical disease was most commonly seen in the 3rd decade of life, and the most sensitive diagnostic investigation was CBNAAT. Surgery was the mainstay of treatment among the study population. Hence from the above study it is evident that tuberculosis is a surgical disease depending upon the mode of presentation.

References

1. Chalya PL, Mchembe MD, Mshana SE, Rambau PF, Jaka H, Mabula JB. Clinicopathological profile and surgical treatment of abdominal tuberculosis: a single centre experience in northwestern Tanzania. *BMC Infect Dis.* 2013 Jun 8;13(1):270.
2. Mackie A. Mycobacterium. In: Mackerty F, Atkins HS, editors. *Practical Medical Microbiology*. 14th ed. Philadelphia: Elsevier (A Division of Reed Elsevier India Pvt. Limited); 329–35.
3. Hoon JR, Dockerty MB, Pemberton J de J. Ileocecal tuberculosis including a comparison of this disease with nonspecific regional enterocolitis and noncaseous tuberculated enterocolitis. *Int Abstr Surg.* 1950 Nov;91(5):417–40.
4. Vakil HK and Desai PF. Abdominal tuberculosis. *Ind J Surg.* 1985;47(5):206-10.
5. Yemer C, Das P C, Radhakrishnan K. Abdominal tuberculosis in Taiwan: a report from Veterans' General Hospital, Taipei. *Tuber Lung Dis.* 1995 Feb 1;76(1):35–8.
6. Long R, Barrie J, Stewart K, Peloquin CA. Treatment of a tuberculous empyema with simultaneous oral and intrapleural antituberculosis drugs. *Can Respir J.* 2008;15(5):241–3.
7. Bhansali SK. The challenge of abdominal tuberculosis in 318 cases. *Indian J Surg.* 1978; 40:65.
8. Anand, S.S, Pathak, I.C. Surgical treatment of abdominal tuberculosis with special reference to ileocaecal tuberculosis: a record of one hundred cases treated surgically. *J. Med. Ind. Asso;*1961; 37, 423- 429.
9. Bhansali SK. Abdominal tuberculosis. Experiences with 300 cases. *Am J Gastroenterol* 1977; 67: 324–337.
10. Mackie A. Mycobacterium. In: Mackerty F, Atkins HS, editors. *Practical Medical Microbiology*. 14th ed. Philadelphia:

- Elsevier (A Division of Reed Elsevier India Pvt. Limited); p. 332-333.
11. Andersen S, Banerji D. A sociological inquiry into an urban tuberculosis control programme in India. *Bull World Health Organ.* 1963;29(5):685–700.
 12. Darbari A, Jauhari A, Darbari G, Shrivastava V, Shrivastava A. Abdominal tuberculosis: a study of 50 cases. *International Journal of Research in Medical Sciences.* 2017 Jan 26;2(4):1453–61.
 13. Bockus H L, *Gastroenterology, Vol II, Tuberculosis of Intestine, 2ndEdn, 1964 Philadelphia, Saunders Co.:320-330.*
 14. Das P, Shukla HS. Clinical diagnosis of abdominal tuberculosis. *Br J Surg.* 1976; 63:941-46.
 15. Chawla K, D'Souza A, Bhat NS, Mukhopadhyay C. Primary tubercular psoas abscess: a rare presentation. *J Infect Dev Ctries.* 2012;6(1):86-8.
 16. Das DK. Age and sex distribution in malignant and tuberculous serous effusions: A study of 127 patients and review of the literature. *Geriatrics & Gerontology International.* 2015;15(9):1143–50.
 17. Sahn SA, Iseman MD. Tuberculous empyema. *Semin Respir Infect.* 1999 Mar;14(1):82–7.
 18. Marais BJ, Wright CA, Schaaf HS, Gie RP, Hesselning AC, Enarson DA, *et al.* Tuberculous Lymphadenitis as a Cause of Persistent Cervical Lymphadenopathy in Children from a Tuberculosis-Endemic Area. *The Pediatric Infectious Disease Journal.* 2006 Feb;25(2):142–146.
 19. Kanlikama M, Mumbuç S, Bayazit Y, Sirikçi A. Management strategy of mycobacterial cervical lymphadenitis. *J Laryngol Otol.* 2000 Apr;114(4):274–8.
 20. Chern CH, Hu SC, Kao WF, Tsai J, Yen D, Lee CH. Psoas abscess: making an early diagnosis in the ED. *Am J Emerg Med.* 1997 Jan;15(1):83–8.
 21. Jha BC, Dass A, Nagarkar NM, Gupta R, Singhal S. Cervical tuberculous lymphadenopathy: changing clinical pattern and concepts in management. *Postgraduate Medical Journal.* 2001 Mar 1;77(905):185–7.
 22. Cho J-K, Choi YM, Lee SS, Park HK, Cha RR, Kim WS, *et al.* Clinical features and outcomes of abdominal tuberculosis in southeastern Korea: 12 years of experience. *BMC Infect Dis.* 2018 Dec 27;18(1):699.
 23. Leone V, Misuri D, Fazio C, Cardini S. Abdominal tuberculosis: clinical features, diagnosis and role of surgery. *Minerva Chir.* 2007 Feb;62(1):25–31.
 24. Shukla S, Kumar K. Spectrum of clinical presentation of abdominal tuberculosis and its surgical management. *International Surgery Journal.* 2018 Mar 23;5(4):1482–7.
 25. Blakemore R, Story E, Helb D, Kop J, Banada P, Owens MR, *et al.* Evaluation of the Analytical Performance of the Xpert MTB/RIF Assay. *Journal of Clinical Microbiology.* 2010 Jul 1;48(7):2495–501.