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Research Article

Abdominal tuberculosis: a study of 50 cases

Ashutosh Darbari[1], Abhinav Jauhari[2,*], Geetika Darbari[3], Vartika Shrivastava[4], Ambuj Shrivastava[5]

[1]Asst. Professor, Dept. of Surgery, Chirayu Medical College, Bhopal, Madhya Pradesh, India
[2]Post Graduate Student, Dept. of Surgery, J.N. Medical College, Sawangi(M), Wardha, Maharashtra, india
[3]Senior Resident, Dept. of Obstetrics and Gynecology, Chirayu Medical College, Bhopal, Madhya Pradesh, India
[4]Post Graduate Student, Department of Obstetrics and Gynecology, S.D.U. Medical College, Tamaka, Kolar, Karnataka, India
[5]Post Graduate Student, Department of Radiodiagnosis, S.D.U. Medical College, Tamaka, Kolar, Karnataka, India

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***Correspondence:**
Dr. Abhinav Jauhari,
E-mail: abhinavjauhari05@gmail.com

ABSTRACT

Background: The main type of tuberculosis of interest to any hospital- based surgeon is intestinal, the clinical presentation of which varies from one of an acute abdomen to one of a protracted cause of ill health and morbidity with a notorious reputation for poor response to therapy, both conservative as well as surgical. Low socio- economic status and malnutrition in our country are very important causes of the high prevalence of pulmonary tuberculosis, and with superadded problems of overcrowding and poor access to good sanitation and neglect for medical attention, extra pulmonary forms of tuberculosis also form a sizeable proportion of the case load of tuberculosis. The major source of infection is the open untreated case of pulmonary tuberculosis.
Methods: Presented here is a brief account of hospital- based study of the presentation of 50 cases of abdominal tuberculosis and its management in both the acute as well as chronic setting, carried out at the B. Y. L. Nair Municipal Hospital Mumbai.
Results: In our study 40% patients presented with signs of intestinal obstruction, 6% with perforative peritonitis, 34% with diffuse or well defined lump and 54% with ascites. All these patients underwent biochemical, radiological and endoscopic investigations. All the cases in this study were put on antitubercular four drug regime. Isoniazid (5mg / kg), Rifampicin (5-10mg/kg), Ethambutol (15mg/kg) and Pyrazinamide (20-25mg/kg) for two months followed by Isoniazid and Rifampicin for seven months. None of the patients developed drug toxicity during treatment. In our study out of 50 patients, 24 patients were treated conservatively. These includes 12 with tuberculous peritonitis (2 of the 12 had associated paraortic lymphadenopathy), 6 with subacute intestinal obstruction, 4 with RIF lump and 2 with colonic pathology) were treated conservatively. 26 patients underwent surgical treatment. Out of these 26 patients, 14 were operated in emergency and 12 were operated electively. Emergency surgeries were performed after correction of fluid electrolyte imbalance. Of the 14 emergency cases, 3 patients underwent resection anastomosis of small bowel, 6 patients underwent right hemicolectomy for iieocaecal tuberculosis. One patient had a stricturoplasty for ileal stricture in addition to right hemicolectomy. One patient underwent a stricturoplasty for ileal stricture and one unstable patient underwent drain insertion under local anaesthesia to drain out contaminated peritoneal fluid. Remaining two patients underwent adhesiolysis.
Conclusions: In this study 60% patients had an acute and subacute presentation and 40% patients had a chronic presentation.

Keywords: Tuberculosis, Abdominal tuberculosis

INTRODUCTION

Tuberculosis is one of the earliest known disease of mankind Hippocrates as early as 460 B.C., remarked about abdominal tuberculosis, "that the diarrhoea attacking a person with chronic cough is a mortal symptom". The association of pulmonary tuberculosis with inflammatory intestinal lesions was however, recognized only as late as 1643 by Virdodt.

The problem of tuberculosis is worldwide and is a major health problem in developing countries.[1-2] The diagnosis of gastrointestinal tuberculosis is often delayed, increasing the morbidity associated with this treatable condition.[3] The disease may develop secondary to primary focus elsewhere in the body, usually the lungs, or it may originate within intestinal tract from swallowed sputum or rarely ingestion of cow's milk.[4] Many cases go unrecognized until a surgically removed specimen is examined histopathologically, particularly when active pulmonary disease is absent. Gastrointestinal (GI) tract is reported to be the sixth most common extrapulmonary site, and 15 to 50 % of patients with GI involvement may have active pulmonary disease. Abdominal tuberculosis can involve the luminal gastrointestinal tract, liver, spleen, lymph nodes, peritoneum and female genital tract, the most common site being the lleocecal region. Tuberculous peritonitis occurs in less than 1% of cases of tuberculosis. The organisms may enter the peritoneal cavity through the bowel wall, by direct extension from the gynaecological tract, or by haematogenous spread from a primary pulmonary focus. The diagnosis of tubercular peritonitis is often difficult to make and requires a high index of clinical suspicion. The onset usually is insidious, with symptoms present for many months before diagnosis. Peritoneal tuberculosis may also present in some clinical conditions like cirrhosis of liver with portal hypertensive Ascites. In such patients, the diagnosis of concomitant tuberculous peritonitis may be suspected and is often overlooked.

Routine laboratory and radiographic analyses are of limited diagnostic value. Total leukocyte count is usually normal and negative mantoux test does not exclude the disease. Active pulmonary disease may be evident only in 14% of cases and AFB smears on ascitic fluid are rarely positive.

Cultures require weeks to mature and are positive in a few as 20% of diagnosed cases. Polymerase chain reaction (PCR) analysis for rapid detection of bacillus, tubercles and ascitic adenosinase levels are currently being evaluated as diagnostic tools. Laparoscopy is the gold standard for the diagnosis of peritoneal tuberculosis. It allows a presumptive visual diagnosis in more than 85% of cases and with guided biopsy allows a definitive diagnosis in over 97% of cases. Therefore, due to less specific clinical presentations and less sensitive and non specific available investigations, abdominal tuberculosis may have diagnostic dilemma. Clinicians should maintain a high index of suspicion for tuberculosis so that anti-tubercular drug therapy which is very effective in absence of drug resistance, may be initiated early and treatment delay is associated with significant mortality.[5-6]

METHODS

This was a prospective observational study carried out in Department of General Surgery at the B. Y. L. Nair Municipal Hospital Mumbai. 50 consecutive patients with either sex with abdominal tuberculosis were enrolled in the study. All patients were clinically evaluated with meticulous history and physical examination and were investigated by available tests like blood counts including TC DC, ESR, HB, Mantoux test, chest X-ray, abdominal X-ray, abdominal ultrasonography, barium X-rays, ascitic fluid study, fine needle aspiration cytology, abdominal laparoscopic study and Histopathology and CT Scan of abdomen in selected patients.

All patients received 9 months of standard anti tubercular treatment with Rifampicin; Isoniazid and Pyrazinamide.

RESULTS

Abdominal tuberculosis is more common in females than males.[7,8] Abdominal tuberculosis is more common in young adults. In this study of 50 cases, 58% of patients were in age group of third and fourth decade of life. Among the common presenting symptoms, Abdominal pain in 45 (90%), Vomiting in 28 (56%), Fever in 22(44%), Distension in 38(76%), Lump in 11(22%), Bowel disturbances in 29(58%), Evening of temp. in 19(38%), Wt loss in 41(82%) and Anorexia in 41(82%) in cases (Table 1). The abdominal pain was of varying quality, and frequently cramping or dull aching in nature mostly located in right side of abdomen and was correlated with the site of disease.

Table 1: Common Presenting Symptoms.

Symptoms	No. of Patients	% of Patients
Pain	45	90%
Vomiting	28	56%
Fever	22	44%
Distension	38	76%
Lump	11	22%
Bowel disturbances	29	58%
Evening of temp.	19	38%
Wt. loss	41	82%
Anorexia	41	82%

Among the presenting signs, signs of Intestinal obstruction in 20(40%), Perforation peritonitis in 3(6%), Lump abdomen in 17(34%) and Ascites in 27(54%) cases.

The ultrasonography findings of abdomen were suggestive of Free fluid in 24(48%), Paraortic lymphadenopathy in 2(4%), Pseudo kidney sign in 10(20%), Dilated bowel loops in 12(24%), RIF probe tenderness in 3(6%) and Normal in 8(16%) cases.

Table 2: Presenting Signs.

Signs of Patients	No. of Patients	% of Patient
Intestinal obstruction	' 20	40%
Perforation peritonitis	3	6%
Lump in abdomen	17	34%
Ascites	27	54%

Table 3: Ultrasonography Findings of Abdomen.

Findings	No. of Patients	% of Cases
Free fluid	24	48%
Paraortic lymphadenopathy	2	4%
Pseudo kidney sign	10	20%
Dilated bowel loops	12	24%
RIF tenderness	3	6%
Normal	8	16%

USG abdomen showing para aortic lymphadenopathy.

USG abdomen showing free fluid in pelvis.

Table 4: Laboratory Investigations.

Laboratory Investigation	No. Of Patients	% Of Cases
Hb<10gm%	15	30%
Lymphocytosis	8	16%
Raised ESR	37	74%
Normal LFT	50	100%
HIV +	3	6%
Raised ADA level	11	90%
Hypoalbuminemia	48	96%

Table 5: Radiological Findings.

Plain X Rays	No. of Patients	% of Cases Having Findings
a) Chest X Ray with Kochs findings.	17	34%
b) Abdomen X Ray -		
Free gas under the diaphragm	3	6%
Multiple air fluid levels	11	22%
Barium studies		
lleocaecal kochs	5	10%
Ileal stricture	6	12%
Jejunal stricture	2	4%
Contracted Caecum	2	4%
Normal	4	8%

X-ray chest showing Rt. apical lobe lung fibrosis.

X-ray abdomen showing calcification of para aortic lymphnodes.

X-ray chest showing free gas under the diaphragm.

Ba meal follow through showing ileocecal tuberculosis.

X-ray chest showing multiple air fluid levels.

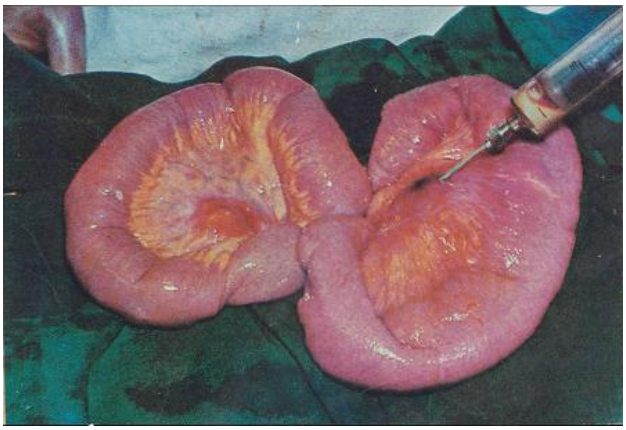
Ba enema showing transverse colon tubercular stricture.

Table 6: Percentage of Patients Undergoing Conservative Line of Treatment.

Type of Pathology	% of Cases
Tuberculous peritonitis	24%
Paraaortic lymphadenopathy	4%
Subacute intestinal obstruction	12%
RIF lump	8%
Colonic ulcer / thickened mucosa on colonoscopy	4%

Table 7: Surgical Management.

Type of Surgery	Emergency	Elective
Resection Anastomosis	3	2
Rt hemicolectomy / partial colectomy	6	10
Rt hemicolectomy with Stricturoplasty	1	0
Stricturoplasty	1	0
Adhesiolysis	2	0
Drain insertion	1	0
Total	14	12



Mesenteric lymphadenopathy with caseous material aspirate from the lymphnode.

Table 8: Distribution of Emergency Cases.

Presentation	No. of Cases
Intestinal obstruction	11 (22%)
Perforative peritonitis	3 (6%)

Acute perforation proximal to tubercular stricture.

Table 9: Type of Anastomosis Following Right Sided Colectomy.

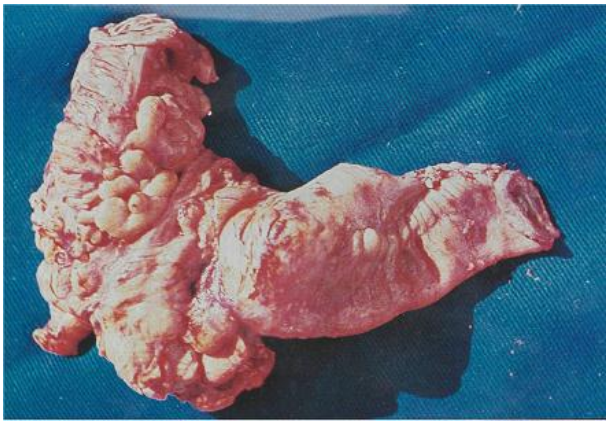
Type Anastomosis	Em	El	Total No. of Cases
lleotransverse	4	6	10
lleoascending	3	4	7
	7	10	

Table 10: Type of Anastomosis and their Distribution.

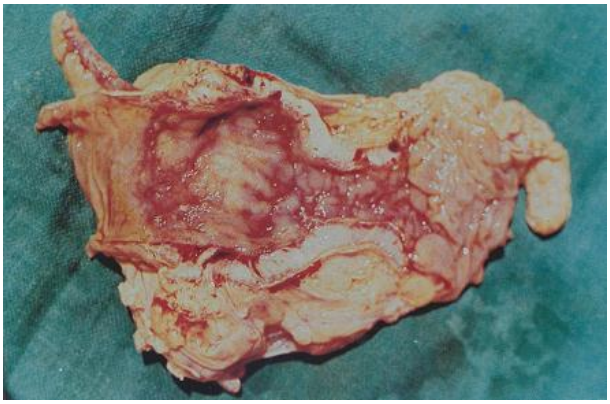
Anastomosis	No. of Patients
lleotransverse	10
lleoascending	7
lleoileal	4
lleojejunal	1
Stricturoplasty	2

Table 11: Anatomic Distribution of Tuberculosis of the Intestine in this Study.

Site	% of Cases
Duodenum	0
Jejunum	2
lleum	38%
IC junction	24%
Colon	8%
Rectum / Analcanal	0



Ileocaecal Tuberculosis.



Cut section of tuberculous Ileocaecal region.

Table 12: Postoperative Complications.

Complications	No. of Patients
Wound infection	5
Burst abdomen	1
Anastomotic leak	1
Respiratory complication	2
Post operative adhesion	1
Gastric ulcer perforation	1
Septicaemia	3

Table 13: Mortality.

Line of Management	Number of Mortality
Medical	2
Surgical - Emergency Elective	4 0
Total No. of cases	6

DISCUSSION

Tuberculosis has been known from time immemorial. The burden of tuberculosis extends beyond mortality. The annual incidence of new cases of all forms of tuberculosis is over 7.1 million in the developing world. Tuberculosis of the gastrointestinal tract is one of the commonest forms of extra pulmonary tuberculosis and accounts for 10% of gastrointestinal disorders.

In clinical practice, very few cases of pulmonary tuberculosis show abdominal tuberculosis. Around 0-20% of abdominal tuberculosis cases are associated with active pulmonary tuberculosis and 5% to 35% are associated with inactive pulmonary tuberculosis as reported by Abraham et al, 1992.[7] In our study of 50 cases, 10% patients had active pulmonary tuberculosis and 34% patients had inactive pulmonary tuberculosis.

In developed countries, there is low incidence of tuberculosis, but now as there is a rise in HIV infection, the incidence of tuberculosis has risen.

In developing countries like India incidence of tuberculosis is very high because of low socio economic status, overcrowding, poor living conditions, poor hygiene and illiteracy.

Abdominal tuberculosis is more common in females than males. The female preponderance varies from 1.5 times[8] to 3 times[9] the incidence in males. But in our study of 50 cases male to female ratio comes to 1.3:1 similar to ratio reported by Vijetal 1992.[10]

Abdominal tuberculosis is more common in young adults. In a study of 135 cases of abdominal tuberculosis by Bhansali and Desai, 1968,[8] two third of patients were in third and fourth decade of life. In this study of 50 cases, 58% of patients were in age group of third and fourth decade of life.

This condition is more common in lower socio economic groups of the population because of poor nutrition, over-crowding and insanitary living conditions.

In our study 60% patients had an acute and subacute presentation and 40% patients had a chronic presentation. These findings are compare favourably with those in a study carried out by Bhansali et al 1968.[8] They reported 56% patients presented with acute and subacute manifestations and 43% presented with chronic ailment only.

In our study of 50 cases, patients presented with abdominal pain (90%), distension (76%), vomiting (56%), fever (44%), Lump (22%), Bowel disturbances (58%) & constitutional symptoms (fever 38%, wt loss 82% and anorexia 82%) comparable to a study of 52 cases of abdominal tuberculosis carried out by Dandapat

and Rao 1985.[11] They reported all patients presented with abdominal pain, 57.7% with vomiting, 61.5% with bowel disturbances, 67.3% with distension, 23% with lump, 56% with fever, 79% with weight loss and 50% with anorexia.

In our study 40%patients presented with signs of intestinal obstruction, 6% with perforative peritonitis, 34% with diffuse or well defined lump and 54% with ascites. All these patients underwent biochemical, radiological and endoscopic investigations.

On investigations one third patients had anaemia in our study, 74% patients had raised ESR & 82% had hypoalbuminaemia, Chuttani and Sarin 1985[9] reported in their study more than three fourth of the patients had raised erythrocyte sedimentation rate, anemia and hypoalbuminemia.

In our study, 22% patients presented with acute intestinal obstruction had multiple air fluid level findings on plain X Ray abdomen and 6% patients presented with perforative peritonitis had free gas under the diaphragm findings on plain X ray abdomen. These patients underwent emergency surgical procedures. The incidence of intestinal obstruction and perforative peritonitis in patients with intestinal tuberculosis has been reported as 12% to 60% and (1-10%) respectively by Chuttani et al 1985.[9]

In our study 19 patients underwent Barium studies and 15 were reported pathological as given in Table No. 6. Of these 15 patients, elective surgery was performed on 12 patients. One patient with multiple jejunal and ileal strictures following barium studies went into obstruction and were subjected to emergency stricturopiasty. Two patients with contracted caecum and thickened jejunum on barium studies were treated conservatively.

Three patients underwent endoscopic investigations. One patient on upper Gl scopy had duodenal compression due to tuberculous abdominal lymphadenopathy which was confirmed by CTScan abdomen. This patient expired due to multidrug resistant abdominal and pulmonary tuberculosis. Anand et al 1961,[12] and Bhansali et al 1968,[8] had reported one case and two cases each of duodenum compression due to enlarged lymphnodes in their study. Two patients who underwent colonoscopy with biopsy were found to have colonic ulcer and thickened tuberculous colonic mucosal folds. These patients were treated conservatively.

All the cases in this study were put on antitubercular four drug regime. Isoniazid (5mg / kg), Rifampicin (5-10mg/kg), Ethambutol (15mg/kg) and Pyrazinamide (20-25mg/kg) for two months followed by Isoniazid and Rifampicin for seven months. None of the patients developed drug toxicity.

In our study out of 50 patients, 24 patients were treated conservatively. These includes 12 with tuberculous peritonitis (2 of the 12 had associated paraortic lymphadenopathy), 6 with subacute intestinal obstruction, 4 with RIF lump and 2 with colonic pathology were treated conservatively.

26 patients underwent surgical treatment. Out of these 26 patients, 14 were operated in emergency and 12 were operated electively. Emergency surgeries were performed after correction of fluid electrolyte imbalance. Of the 14 emergency cases,3 patients underwent resection anastomosis of small bowel, 6 patients underwent Rt hemicolectomy for iieocaecal tuberculosis. One patient had a stricturoplasty for ileal stricture inaddition to Rt hemicolectomy.One patient underwent a stricturoplasty for ileaJ -stricture and one unstable patient underwent drain insertion under local anaesthesia to drain out contaminated peritoneal fluid. Remaining 2 cases underwent Adhesiolysis. In patients operated on elective basis anaemia, and hypoproteinaemia were corrected with high protein diet, hematinics and multivitamins. In our institution TB Diet consisting of two eggs and 500 C.C milk daily were given. Two patients underwent resection anastomosis of the small bowel and 10 right hemicolectomy for ileocaecal tuberculosis were performed electively.

In our study resection anastomosis was more commonly performed compared to stricturoplasty for small bowel strictures. But if the stricture is passable and decrease is quiescent, it is advantageous to cut across the stricture and perform stricturoplasty as reported by Munagekar P.D. 1977.[13] A longitudinal incision is taken across the stricture and repair similar to Miculicz or Finney's pyloroplasty - Joshi M.J. 1978.[14]

Right hemicolectomy was the commonest surgical procedure performed in our study, 7 were emergency Rt hemicolectomy and 10 were performed electively. Out of these 17 Rt. hemicolectomy 10 ileotransverse and 7 ileoascending anastomosis were performed. Local ileocaecal resection, .going 2 inches beyond the palpable limit of the disease on either side, and end to end anastomosis between the ileum and ascending colon, is advocated currently. It is adequate and admirably suited. In this procedure extensive mobilization of colon is not necessary so that risk of injury to the duodenum, kidney and ureter is minimised and considerable length of functioning colon is preserved. Also being a less extensive procedure, partial colectomy with ileoascending anastomosis can be done quickly and with minimum trauma especially in patients with poor general condition - (Chuttani et al 1985.[9]

In our study ileum (38%) and ileocaecal region (24%) were most commonly involved followed by Colon (8%). Chuttani et al 1985,[9] in their study reported, the commonest site for tuberculous involvement of the

intestine is the ileocaecal region, being affected in 30-89% of cases.

The commonest postoperative complication was wound infection in this study similarly reported by Dandapat and Rao 1985,[11] in 18 cases out of 52 cases and Bhansali et al 1968,[8] in 13 cases out of 135 cases. One patient who underwent emergency Rt hemicolectomy had anastomotic leak and burst abdomen, died postoperatively due to septicaemia. Two patients had postoperative respiratory complications. One patient developed respiratory distress due to tuberculous bronchopneumonia and expired. Another with ileal perforation underwent emergency ileo ileal resection anatomosis developed post operative gastric ulcer perforation. This patient underwent reexploration, developed septicaemia and respiratory distress due to left pleural effusion with lung collapse and expired. One unstable patient with tuberculous perforative peritonitis who underwent drain insertion under local anaesthesia expired postoperatively due to septicaemia.

One patient with postoperative adhesion was operated for ileocaecal tuberculosis, where an emergency Rt hemicolectomy was done. After three months the patient presented with acute intestinal obstruction and emergency exploration was done. An adhesive band strangulating jejunal loop was found and treated by resection anastomosis.

In our study of 5 0cases, 6 patients expired i.e. mortality was 12%. Of these two patients were treated conservatively died of septicaemia following tuberculous peritonitis and multidrug resistant abdominal and pulmonary tuberculosis. Cause of death in the four patients who underwent emergency surgeries died postoperatively were tuberculous toxaemia, tuberculous bronchopneumonia, septicaemia with tuberculous perforative peritonitis and respiratory complication along with gastric ulcer perforation and abdominal tuberculosis. Thus mortality was more in those patients who underwent emergency surgical procedures.

In study of 135 cases of abdominal tuberculosis by Bhansali et al 1968,[8] 10 patients expired postoperatively, of which 9 resulted after emergency surgeries. In study of 52 cases of abdominal tuberculosis by Dandapat et al 1985,[11] 6 patients expired postoperatively, of which 5 resulted after emergency surgeries.

CONCLUSION

1. Inspite of specific antituberculous drugs and vast measures against the disease, including chemoprophylaxis and pasteurisation abdominal tuberculosis remains a fairly common disease even today.
2. Young adults between 20-40 years are the most commonly affected.
3. The patient often comes with vague clinical features, and unless this condition is kept in mind, it may be difficult to diagnose the condition.
4. Diagnosis of abdominal tuberculosis can only be made after correlating clinical presentation with biochemical and radiological investigations.
5. Plain X ray chest and abdomen coupled with ultrasonography of the abdomen are the investigations of choice in acute cases.
6. The ileum and ileocaecal junction is the most commonly involved part of the Gl tract and Rt hemicolectomy is the surgery of choice.
7. Either resection anastomosis or stricturoplasty are the treatment of choice in patients with passable stricture as no follow up data is available to prove efficacy of one over the other.
8. If the disease is restricted to ileocaecal region, Local ileocaecal resection should be performed, rather than an extensive hemicolectomy.
9. Inspite of antituberculous drugs and investigative modalities the disease has significant morbidity and mortality.
10. There is considerable higher morbidity and mortality in emergency surgery probably due to inadequate bowel preparation, contamination and fluid electrolyte imbalance.
11. Tuberculosis is common in patients with HIV infection, necessitating screening for HIV for all patients.
12. Early diagnosis and treatment along with education of patients about hygiene and sanitation is the key to success.
13. Regular follow up, AKT and proper nutritional support is required to prevent relapses and multi drug resistant tuberculosis.
14. Along with vaccination and chemoprophylaxis, special tuberculosis programmes, education, sanitation, improving living standards, nutrition and socio economic status are very important to decrease the incidence of tuberculosis.

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REFERENCES

1. Harries A, Maher D and Uplekar M. TB a clinical manual for SEA 1997. 19-23
2. Rahim MA, Alam MN, Alam MR etal. A controlled clinical study of Ciprofloxacin in the Retreatment cases of Tuberculosis. Bangladesh Journal of Medicine 2001; 12:69-75.
3. Bernhard JS, Bhatia G, Knauer CM. Gastrointestinal Tuberculosis Jclin Gastrenterol 2001; 1 : 397-402
4. Raviglione MC, Brien RJ. Tuberculosis. In: Fauci AS, Braunwald E, Wilson JD, Editors, Harrison's

Principles of Internal Medicine (14th ed.). Mc graw-Hill 1998; 1:1004-14.
5. Bernhard JS, Bhatia G, Knauer CM. Gastrointestinal tuberculosis an eighteen patient experience and review. J. Clin Gastroenterol 2000; 30:397.
6. Karawi MA etal. Protean manifestations of Gastrointestinal tuberculosis 1995; 20:225.
7. Philip Abraham and Fersosh P. Mistry: Tuberculosis of the Gastrointestinal tract, Ind. J. Tub. 1992, 39, 251.
8. Bhansali S.K., Desai A.N.: Abdominal tuberculosis clinical analysis of 135 cases. Ind. J. Surg.; 1968, 218.
9. Chuttani H.K., Sarin S.K.: intestinal tuberculosis; Ind. J. Tube; 1985, 32, 117. #4.
10. Vij J.C., Malhotra V.: A clinicopathologic study of abdominal tuberculosis, ind. J. Tub. 1992, 39, 213. #5.
11. Dandapat M.C., V. Mohan Rao. : Management of abdominal tuberculosis, Ind. J. Tub, 1985, 32, 126.
12. Anand S.S., Pathak I.C.: Surgical treatment of abdominal tuberculosis with special reference to ileocaecal tuberculosis: a record of the100 cases treated surgically; J. Ind. Med. Ass. 1961, 37, 423.
13. Mungekar P.D.: Initial experience with a new operation for T.B. stricture; Ind. J. Surg. 1977, 39, 494.
14. Joshi MJ. The surgical management of intestinal tuberculosis A conservative approach. Ind J Surg. 1978;40:78.

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