

ABDOMINAL TUBERCULOSIS

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ABSTRACT

Tuberculosis is a common disease and its incidence is in rising tendency in developed world because of AIDS and transglobal migration. Abdominal tuberculosis is more common in immunocompromised population and manifests as infection of peritoneum, hollow or solid abdominal organs and abdominal lymphatics with mycobacterium tuberculosis organism. The peritoneum and ileo-cecal region are the most likely sites of infection and are involved in the majority of cases by hematogenous spread or through swallowing of infected sputum from primary pulmonary tuberculosis. Pulmonary tuberculosis is evident in less than half of patients either in active or latent form. Abdominal tuberculosis has a protean manifestation although the most common clinical feature is the triad of abdominal pain, fever and weight loss. The diagnosis is often delayed because of non-specific presentation and is usually made through a combination of radiologic, microbiologic, histopathologic, endoscopic and molecular techniques. None of them provide a gold standard by themselves. However, an algorithm of these diagnostic methods leads to considerably higher precision in the diagnosis of abdominal tuberculosis which primarily necessitates a clinical awareness of this serious health problem. Abdominal tuberculosis is a serious condition and if untreated outcome is fatal. Early diagnosis and immediate initiation of treatment along with dietary support is crucial for better outcome. Antimicrobial treatment is the same as for pulmonary tuberculosis and management often requires combination of antitubercular drugs and surgery – for diagnosis as well as therapy.

Key Words: *Tuberculosis; Abdominal Tuberculosis; Extrapulmonary Tuberculosis.*

Introduction

Tuberculosis (TB) was recognized in as early as 4th century and known as phthisis, lupus, and scrofula. Koch's described the bacillus in 1882.

Despite the expectation of World Health Organization "Tuberculosis should be virtually eradicated from most developing countries within 50 years"¹ it is the common communicable disease worldwide. It has come back in developed as well as in developing countries due to transglobal immigration, ageing of population, alcoholism, socioeconomic

deprivation and acquired immune deficiency syndrome (AIDS).² World Health Organization has declared a global emergency of tuberculosis.³ The World Health Organization (WHO) estimates that in 1999, there were 8.4 million new cases, up from 8.0 million in 1997.⁴ The WHO also estimates that there are nearly 2 million deaths from tuberculosis annually; thus, the disease ranks second only to human immunodeficiency virus (HIV) infection as an infectious cause of death.⁵ Approximately 1.7 billion people, nearly one third of the world's population, are thought to be infected with Mycobacterium tuberculosis.⁶

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In context to Nepal, 45% of total population is infected and there is 80-90 thousands cases of active tuberculosis. Each year, 44,000 of new tuberculosis cases including 20,000 of sputum positive pulmonary tuberculosis and 8,000–11,000 deaths are reported.⁷ In Nepal 75% of tuberculosis cases are treated in DOTS (Directly Observed Treatment Short course) centers. Out of total cases 48 % cases are sputum positive pulmonary tuberculosis, 28% sputum negative pulmonary tuberculosis, 9% defaulter and relapse cases and 15% extrapulmonary tuberculosis.⁸

Among extrapulmonary tuberculosis the prevalence of abdominal tuberculosis shows rising tendency. The proportion of abdominal tuberculosis is proportionally related to the prevalence of active pulmonary tuberculosis. Because of AIDS, it is increasing and becomes a challenge to health personal.^{2,9} Other type of extrapulmonary tuberculosis has comparatively good prognosis, although similar is true in the case abdominal tuberculosis but in early phase only. Late phase of abdominal tuberculosis needs multidisciplinary approach, which is costly. This communication highlights this issue of abdominal tuberculosis and emphasizes on early diagnosis and early treatment.

ABDOMINAL TUBERCULOSIS

Abdominal tuberculosis is defined as infection of the peritoneum, hollow or solid abdominal organs, and abdominal lymphatics with *Mycobacterium tuberculosis* organisms. Abdominal tuberculosis is relatively rare in western countries and is the less common extrapulmonary location. Populations at risk include immigrants, the homeless, prisoners, and residents of long-term care facilities, subjects suffering from chronic disease like diabetes mellitus, chronic renal failure, malnutrition and the immunocompromised.

Gastrointestinal involvement had been reported to be 55-90% in patients with active pulmonary tuberculosis before the advent of specific antitubercular treatment. But it was regressed to 25% after the development of specific drugs.⁶ Abdominal tuberculosis is again on the rise all over the world with the resurgence of multidrug resistant tuberculosis and with AIDS pandemic. It is also an increasing health problem because of the immigrants from underdeveloped countries where it is more common. Reported incidence of abdominal tuberculosis varies from country to country. Worldwide its prevalence is 11 % of all extra pulmonary tuberculosis.¹⁰ In Saudi Arabia, it comprises 16% of all extra pulmonary tuberculosis,¹¹ while in UK in 1995 it comprised 5% of all cases of tuberculosis.¹² In Nepal, it is estimated that 15% of total cases are extra pulmonary tuberculosis and out of them approximately 30% are abdominal cases.⁸

CLASSIFICATION AND PATHOPHYSIOLOGY

Depending on anatomical site of pathological process abdominal tuberculosis is classified as following, although isolated involvement of one site is less common than combination of two or more sites.

1. Peritoneal TB
2. Mesenteric and retroperitoneal TB lymphadenitis
3. Gastrointestinal TB
4. Solid organs TB

Peritoneal TB

Mostly, the involvement of peritoneum in tuberculosis is a manifestation of disseminated TB or millary TB. It has a predilection to young women of childbearing age and old male in association with alcoholism. Retrograde spread of bacilli from fallopian tube could be the possible explanation to the former situation. It may be wet or dry type. Wet type peritoneal TB may present as generalized or localized ascites. Similarly dry type of peritoneal TB may present with adhesions, bands and millary tubercles.

Mesenteric TB

Isolated mesenteric lymph node involvement is an incidental finding during ultrasonographic investigation of abdomen. It can present as mesenteric lymphadenitis mostly associated with pulmonary TB, mesenteric cyst, and abscesses or rolled up omentum. Occasionally it can manifest as obstructive jaundice due to the compression on common bile duct and abdominal lump.

Gastrointestinal TB

Terminal ileum^{13,14} and ileocecal junction^{15,16} are the most commonly involved parts of the intestine. Plenty of lymphoid tissue, prolonged stasis of food, increased absorptive activity and reduced digestive activity in this area makes terminal ileum and ileocecal junction more prone to tubercular bacilli. Other parts involved are jejunum, ascending colon, transverse colon, rectum, anal canal, duodenum, stomach, and esophagus in this order. Gastrointestinal TB is associated with chronic pulmonary tuberculosis. It is more common in developing countries. Previously, the reason for this fact was supposed to be ingestion of milk contaminated with tubercular bacilli *Mycobacterium bovis*. But the fact that there is usual practice of boiling milk before drinking in developing countries and pasteurization of milk in west makes ingestion of bacilli unlikely. This view is further supported by the isolation of *mycobacterium tuberculosis* in abdominal TB even in developing countries.^{17,18,19} It is thought that most of the gastrointestinal TB is due to the chronic ingestion TB bacilli associated with pulmonary TB. Few of them may be due to primary dissemination of TB.

Intestinal tuberculosis may be ulcerative, stricturous, or hypertrophic. Pure form of intestinal TB is rare and combination of ulcero-constrictive or ulcero-hypertrophic is common. Small intestine tuberculosis present as ulcerative or stricturous and large intestine TB presents as ulcero-hypertrophic lesions. Tubercular strictures are multiple. In a study among 117 patients with strictures, 71 had multiple strictures,¹⁶ up to 19 strictures in single patients had been reported.²⁰ Colonic involvement is mostly associated with ileocecal or ileal involvement. Fistula is usually associated with chronic pulmonary TB, spinal TB or TB of sacroiliac joints. Low virulence of bacilli, high resistance by host and fibroblastic reaction causes thickening of bowel leading to the formation of a mass with omentum, lymph nodes and mesentery giving rise to the cocooning effect leading to intestinal obstruction. Formation of ulcer is the main pathological changes in ulcerative intestinal TB. These ulcers are transversely placed, multiple in number and healing of these ulcers leads to stricture formation.

Solid organ TB

Tuberculosis can affect the solid organs of abdominal cavity. Mainly it is the manifestation of disseminated TB. Tubercular hepatitis and pancreatitis had been reported as a part of disseminated TB.²¹ Liver abscesses with multiple cystic lesions, TB spleen, and tubercular calculus cholecystitis also had been reported. Isolated gallbladder TB, gall bladder TB as a part of millary TB and acute cholecystitis associated with lymph node involvement are the uncommon manifestation of visceral organ TB.

PATHOGENESIS

Mycobacterium tuberculosis and *Mycobacterium bovis* are the two most common organisms involved. Tubercular Bacillus is a gram positive, aerobic, nonmotile, and non-spore forming, stained by Ziehl-Neelsen basic fuchsin dyes and cultured in 4 to 8 weeks in egg or agar based Lowenstein-Jensen or Middlebrook 7H10 medium.

Underlying pathological conditions play important contributing role in the development of abdominal TB. The interaction of human host with *Mycobacterium tuberculosis* begins when droplet nuclei containing microorganism from infectious patients are inhaled. Majority of inhaled bacilli are trapped in the upper airways and expelled by ciliated mucosal cells and a fraction usually fewer than 10% reaches the alveoli. When the organism is first infected, most commonly by droplet route; primary focus is formed in the lung. Gastro-intestinal focus, which is infrequent, may develop due to hematogenous dissemination from primary focus, swallowing sputum with direct seeding of TB bacilli and ingestion of milk from cows affected by bovine tuberculosis. If the immune response is adequate this primary focus resolves it self without any clinical manifestation and the focus remains dormant. It can reactivate when there is immunosuppressed condition due to various causes like malnutrition, weight loss, alcoholism, diabetes mellitus, chronic renal failure and immunosuppression due to drugs or HIV infection. Spreading of the dormant primary focus in immunosuppressed condition may be because of hematogenous dissemination, ingestion of bacilli or direct extension of infection.

Table I : Demographic characteristics and symptoms at presentation in Indian patients with abdominal tuberculosis

Variable	Das P, Shukla HS ²⁷ 1976 (n = 182)	Bhansali SK ¹³ 1977 (n = 310)	Singh V et al ²⁸ 1995 (n = 145)
Place of Study	Allahabad	Mumbai	Banaras
Duration of study (years)	7	13	5
Male : Female	1:2.6	1:0.9	1:2
Symptoms (%)			
Fever	42.2	49.2	66.2
Abdominal pain	94.0	100.0	88.3
Vomiting	69.6	29.9	55.2
Constipation	46.7	40.5	24.1
Diarrhoea	11.1	15.4	20.7
Diarrhoea alternating with constipation	8.8	11.4	20.0
Weight loss	35.0	25.6	21.4
Anorexia	44.4	ND	71.7
Cough	8.8	ND	11.0
Moving lump in abdomen	28.8	ND	26.2
Borborygmi	25.5	ND	ND
Postprandial distress	27.2	ND	ND
Abdominal distension	45.0	ND	41.4
Menstrual abnormalities	35.6	14.6	35.0
	(n = 132)	(n = 160)	(n = 97)
Dysphagia	ND	ND	0.7
Bleeding per rectum	ND	ND	4.8

Table II : Physical signs at presentation in Indian patients with abdominal tuberculosis

Variable	Das P, Shukla HS ²⁷ 1976 (n = 182)	Bhansali ¹³ 1978 (n = 310)	Singh V et al ²⁸ 1995 (n = 145)
Anemia	56.5	29.0	ND
Malnutrition	45.6	21.7	ND
Peripheral	1.6	9.0	ND
Lymphadenopathy	51.0	30	50
Features of intestinal obstruction	65.9	62.6	ND
Abdominal tenderness	58.2	81.3	41.4
Distension of abdomen	6.0	ND	11.7
Visible peristalsis	25.1	66.2	31.7
Ascites	18.6	1.9	20.0
Rigidity/guarding	8.7	31.7	ND
Lump abdomen	28.6	59.1	1.0

Table III : Clinical features in abdominal TB (percent)

Symptoms and signs	Muneef et al 1997 ²⁹	Uygur-Bayramicli et al 2003 ³⁰ (n = 32)
Abdominal pain	ND	51.2
Weight loss	68	51.2
Ascites	61	38.4
Diarrhea	ND	32.0
Cough and sputum	ND	19.2
Vomiting and nausea	ND	16.0
Fever	70	12.8
Perforation	ND	9.6
Bone pain	ND	6.4
Night sweats	30	6.4
Urinary symptoms	ND	3.2
Mass in the lower quadrant	13	3.2
Cervical pain	ND	3.2
Evisceration following laparotomy	ND	3.2
Incidental	ND	3.2
Operation because of brid	ND	3.2
Doughy abdomen	9	ND
Anorexia	30	ND
Change in bowel habit	39	ND
Abdominal swelling	67	ND

CLINICAL FEATURES

Most of the patients with abdominal TB are young adults of 21–40 years of age.^{13–15} Seventy percent of subjects are 30–40 years of age.^{16,17,22,23} Most of the studies show similar incidence among female^{6,11,16} although few had shown higher incidence in female.^{16,17,24} Recent studies showed peak age of 34 year and male to female ratio 1:2 in Pakistan and 46 year and 1:1.1 in Saudi Arabia. Intestinal involvement is more common in adults whereas ninety percent of abdominal TB in children is peritoneal or lymph node TB.²⁵

Abdominal TB can manifest as acute, acute on chronic and chronic form. Peritoneal or lymph node TB could be the incidental finding of abdominal TB on routine examination.¹⁹ Clinical features can be classified as systemic features like fever, anorexia, weight loss, night sweating, chills and specific

features depending on the affected site. Comparative chart of clinical features shown in different studies is given below (Table I and II)

Recent prospective trials conducted by Muneef et al²⁹ in Saudi Arabia from 1984 to 1997 and Uygur-Bayramicli et al³⁰ in Turkey from 1998 to 2001 had shown similar clinical features (Table III).

The most common clinical feature is the triad of abdominal pain, fever and weight loss. Some clinical features may vary depending on epidemiological features of subjects. The United States-born patients with abdominal tuberculosis, as compared to the foreign-born patients, were older (mean age 74 years vs. 35 years), more likely to have chronic medical illnesses (80% vs. 7%), and had concomitant pulmonary tuberculosis (60% vs. 0%).³¹

Table IV : Clinical features depending on site of tubercular lesion

Site of the lesion	Nature of lesion	Clinical features
Small intestine	Ulcerative	Diarrhea, Malabsorption
	Strictureous	Obstruction
Large intestine	Ulcerative	Rectal bleeding
	Hypertrophic	Lump, Obstruction
Peritoneal	Ascitic	Pain, Distension
	Adhesive	Obstruction
Lymph nodes		Lump, Obstruction
Ano-rectal TB		Stricture, Fissure in ano, Fistula in ano

In our hospital we had observed that abdominal pain, weight loss, diarrhea and intermittent constipation associated with worsening of the pain were the common presentation. Among physical signs marked emaciation, ascites, malabsorption, features of subacute intestinal obstruction, non-healing ano-rectal fissures, fistulas, perianal lesions were common. Abdominal lump was more common in rural area and rare in urban population. Dysenteric syndrome, peptic ulcer like syndrome, gastric outlet obstruction, hepatitis,³² obstructive jaundice due to enlarged mesenteric lymph node³³ or pancreatic mass and dysphagia are the other rare clinical features of abdominal tuberculosis.

Abdominal tuberculosis is regarded as a disease with insidious onset and chronic presentation, most patients having symptoms for a few weeks to months, sometimes years. However, between 15 and 40% of patients may present with an acute abdomen.^{23,24} In a retrospective study carried out by Khan et al in Pakistan showed that 71% patients presented with chronic abdominal symptoms, while 29% presented as an acute surgical emergency mandating exploratory laparotomy.³⁴ Acute manifestations of abdominal tuberculosis are:

- ? Intestinal obstruction: acute or acute on chronic
- ? Peritonitis: with or without perforation
- ? Acute mesenteric lymphadenitis
- ? Acute tubercular appendicitis
- ? Acute acalculus cholecystitis

Along with the systemic clinical features of tuberculosis, some specific signs and symptoms pertinent to pathological process localized in specific site of gastrointestinal tract or abdominal cavity may prevail on presentation. Specific features pertinent to the affected site are as follows. (Table IV)

DIFFERENTIAL DIAGNOSIS

Abdominal TB has a protean manifestation and mimics different clinical condition. Early diagnosis and early initiation of treatment is the clue to the success and better outcome. Table V illustrates different clinical condition mimicking abdominal TB.

Table V : Differential diagnosis of Abdominal TB

A. Intestinal lesions

1. Ulcerative
 - ? Coeliac disease
 - ? Tropical sprue
 - ? Immunoproliferative small intestinal disease
 - ? Giardial infestation
 - ? Ulcerative colitis
2. Strictures:
 - ? Crohn's disease
 - ? Malignancy (Adenocarcinoma, lymphoma)
3. Hypertrophic:
 - ? Carcinoma cecum
 - ? Appendicular lump
 - ? Ameboma
 - ? Actinomycosis
4. Perforations:
 - ? Typhoid

B. Peritoneal

1. Ascites:
 - ? Cardiac failure
 - ? Malnutrition
 - ? Nephrotic syndrome
 - ? Cirrhosis
2. Tubercles:
 - ? Carcinomatosis

C. Systemic features

- ? Pyrexia of unknown origin
- ? Unexplained weight loss
- ? Hepatosplenomegaly

Among these conditions differentiation of Crohn's disease from tuberculosis is very important in view of their similarity and quite different approach to the management of these diseases - glucocorticosteroid is the mainstay of treatment in Crohn's disease whereas it is contraindicated in abdominal tuberculosis. The points which help on differentiating tuberculosis from other disease include:

- ? High risk for tuberculosis
- ? Previous history of tuberculosis
- ? Evidence of previous tuberculosis in chest X – ray
- ? Positive Mantoux test
- ? Endoscopy may reveal characteristic morphological findings
- ? Histologic demonstration of AFB
- ? Colonoscopic examination with brushing

INVESTIGATIONS

Hematological investigations may show anemia, leucocytosis with relative lymphocytosis. ESR is raised in 50–80% cases.^{14,24}

In a study, erythrocyte sedimentation rate >50 mm/h was detected in 60% of patients with tubercular peritonitis and 4.4% had an Erythrocyte sedimentation rate >100 mm/h.³⁵ Thrombocytopenia and pancytopenia are usually the manifestation of disseminated tuberculosis. Biochemistry of blood may reveal hypoalbuminaemia reflecting the features of malnutrition and its prevalence is higher in subjects with intestinal obstruction.¹² Majority of cases have positive Mantoux test¹² and negative test does not necessarily rule out tuberculosis. In studies from Iran and Saudi Arabia only 24 % and 27% subjects with confirmed peritoneal TB had positive Mantoux test respectively.³⁵ So interpretation of Mantoux test should be done cautiously.

Chest X – ray evaluation of all subjects is mandatory. It may reveal concomitant pulmonary TB, tubercular pleuritis, tubercular pericarditis, tubercular pleural effusion or lymphadenopathy. Similarly it may reveal any evidence of past TB like calcified foci or fibrotic changes. In a study done by Prakash *et al* in India the prevalence of concomitant or past evidence of TB in other organs except in abdomen was 39%.²⁴ From Spain³⁶ and Saudi Arabia²⁹ reported prevalence of such changes was 82 % and 30 % respectively. After an experience of 44 years in 1977, Homan *et al* had concluded that a normal chest X- ray virtually rules out abdominal TB.³⁶ Tandon *et al*¹⁴ in 1986 and Dandapar *et al*³⁸ in 1985 had found that 25% of subjects with abdominal TB had positive chest X – Ray.

X – Ray of abdomen may show calcified lymphnodes, multiple fluid levels reflecting intestinal obstruction, enteroliths and ascites. Barium meal follow through, though rarely used nowadays, may show compression of esophagus, increased motility of the intestine, thickened distended gut, straightening of ileocecal junction or thin linear barium streak. Small bowel enema shows mucosal irregularity, rapid emptying especially in ulcerative form, and displaced loops due to enlarged lymph nodes, dilated loops and stricture. In adhesive type there may be adherent fixed loops. Double contrast barium enema may reveal shortened ascending colon, deformed caecum, deformed and incompetent ileocecal valve, dilated ileum, distorted ileocecal junction and increased ileocecal angle.

The development of ultrasound has displaced radiocontrast evaluation in abdominal tuberculosis. It is very useful in the evaluation any abdominal condition. In subjects with abdominal tuberculosis, it may show ascites, enlarged lymph nodes, hypertrophic lesions, thickening of omentum and bowel loops and organomegaly and clarify the nature of abdominal lump. The combination of mesenteric thickening of 15 mm with associated mesenteric lymphadenopathy has been stated as a prominent sonographic finding in abdominal TB,^{39,40} which was not confirmed in a more recent study, which showed rather nonspecific findings in abdominal ultrasonography such as ascites and hepatomegaly.³⁰

USG guided fine needle aspiration and cytology of lesions or lumps is diagnostic in majority of cases. Microbiological diagnosis in abdominal tuberculosis is a difficult task. The yield of mycobacterium from abdominal lesion is low because extrapulmonary disease is paucibacillary. Acid Fast Bacilli (AFB) smear is positive only in 6 –8 % cases but the histological examination is diagnostic in most of the cases.^{23,24} Therefore the diagnosis of abdominal tuberculosis is mainly histological - epithelioid cell granulomas with Langhan's cells, peripheral rim of lymphocytes and plasma cells and central caseation necrosis. Non-caseating granulomas resembling to Crohn's disease, may be present in TB due to low virulence of organism and increased host resistance. Therefore

Table VI : Abdominal ultrasonographic findings (may be more than one in each patient) and their frequency in the patients (n=26)³⁰

Abdominal USG findings	Number of patients	Percentage (%)
Normal	4	17.2
Ascites	14	53.2
Hepatomegaly	4	17.2
Thickening of omentum	3	11.4
Atrophic changes	2	7.6
Hepatosteatorrhea	2	7.6
Splenomegaly	1	3.8
Pericardial effusion	1	3.8
Lymphadenopathy	1	3.8
Calcifications	1	3.8

mycobacterial culture should be done in all suspected cases because it may be positive even in the absence of typical histological features. In today's laboratories, the use of liquid media with radiometric growth detection (for example BACTEC-460) and the identification of isolates by nucleic acid probes or high liquid chromatography of mycolic acid have replaced the traditional methods of isolation on solid media and identification by biochemical tests. These new methods have decreased the time required for isolation and speciation to 2 to 3 weeks. The isolation of Mycobacterium tuberculosis with BacTec or Polymerase Chain Reaction are promising methods for the future but even these methods appear to be far from ideal since it is not enough for the treatment of the disease because of the lack of sufficient specificity and sensitivity and there is need to refine isolation procedures for the bacterium.

Computer tomography scanning of abdomen shows adherent bowel loops, thickened omentum, peritoneal involvement with ascites, solid organ involvement, irregular soft tissue densities and caseating lymph nodes.⁴¹ In CT scanning active lymph nodes appear as non-homogenous opacity with central low attenuation and peripheral rim enhancement and non-active lymph nodes appear as homogenous opacity without attenuation but with calcification. CT features of abdominal TB have been reported to be of value in the diagnosis⁴² and the ability to differentiate TB peritonitis from malignant diseases of the peritoneum could be increased by combining some CT findings.⁴³ The same is true for the more recent study where a positive finding in 88% of the patients in abdominal CT have been reported.³⁰ The results obtained on CT scans were comparable to USG findings in the literature.⁴⁴ Thus abdominal CT findings appear to provide more objective data about the disease than other radiological methods.

Endoscopic evaluation may reveal hyperemic friable mucosa, irregular ulcers with sharply defined margins with undermined edges, pseudopolyp or cobblestoning appearance.⁴⁵ Endoscopy can be used to take the biopsy or FNAC sample. The sensitivity of endoscopic biopsy ranges between 30 and 80 % and Bhargawa *et al*⁴⁶ suggested obtaining 8 to 10 biopsies for histology and 3 to 4 specimens for culture. Colonoscopic examination with biopsy or brushing and cytological and histopathological examination of samples supplemented with culture and sensitivity examination of these samples increases the detection rate.

Ascitic fluid examination for biochemistry, microscopy for AFB staining could be helpful. In abdominal TB the characteristic changes of ascitic fluid is raised protein level usually > 3 g/dl, serum albumin ascitic fluid gradient <1.1, ascitic blood glucose ratio <0.96, PH of ascitic fluid <7.2. Total cell count is usually

more than 1000/microliter, predominantly lymphocytes.⁴⁷ Ascitic fluid smears for AFB could be positive only in few cases. Diagnostic yield will be increased if supplemented with culture or by tapping large amount of ascitic fluid for examination. Recent development in the use of liquid media with radiometric growth detection probes or high-pressure liquid chromatography of mycolic acids have replaced the traditional methods. Similarly, more sensitive markers of tuberculosis like adenosine deaminase (ADA) and gamma interferon have been suggested. ADA level is usually more than 33 U/l and more than 45 U/l is diagnostic.⁴⁷ The use of polymerase chain reaction technology is highly specific and sensitive but It is expensive and requires highly sophisticated lab technology.⁴⁸ Stool culture could be informative in intestinal TB but it is not so popular.

Laparoscopy with biopsy of the lesion is diagnostic in most of the cases. It shows enlarged lymph nodes, ascites with tubercles and can reveal lump or mass, which can be biopsied. A retrospective analysis of records of abdominal tuberculosis subjects revealed that the laparoscopy provide positive diagnosis of tuberculosis in 87% subjects.⁴⁵ Due to the availability of laparoscopy, laparotomy or small incision open peritoneal biopsy is rarely performed but could be a diagnostic option where laparoscopy is not available.

In some cases despite all investigations and thoughtful approach, diagnosis could not be reached. In a cross-sectional study of abdominal TB cases done by Khan *et al*³⁴ in 2001, 70.3% cases were diagnosed in histopathological examination, 22.2% cases were diagnosed radiologically, and no diagnosis was reached in 7.4% cases, but they were responsive to antitubercular drugs. Another prospective study from Turkey showed that the diagnosis of abdominal TB was confirmed histopathologically in 60.8% and microbiologically in 16% subjects and no objective evidence of TB was found in 23.2% subjects except clinical features.³⁰

TREATMENT

Abdominal TB is a serious condition and if untreated outcome is fatal. Early diagnosis and immediate initiation of treatment is crucial for better outcome. Once there is severe malnutrition success of treatment is doubtful without proper nutritional support. Malnutrition, features of intestinal obstruction, poor intake, anemia, acute complications, hypoalbuminaemia, hypotension and multiple organ involvement are the poor prognostic factors. Antitubercular drug is the mainstay of treatment. Treatment should be started with three or four drugs including Rifampicin, Isoniazid, Pyrazinamide and Ethambutol and should be continued for two months and then later two drugs can be stopped and former two drugs should

be continued for four months more. Treatment can be done according to WHO or National Tuberculosis Programme guideline.³

The role of steroids in abdominal TB is controversial. Steroids are supposed to diminish late fibrotic obstructive sequel, reduce the subsequent complications of adhesions, and overall reduction in mortality.

Role of surgery in abdominal TB can be grouped as diagnostic such as elective diagnostic laparotomy, small incision laparotomy with biopsy and laparoscopy with biopsy and therapeutic. Therapeutic surgery in abdominal TB may require in intestinal obstruction due to single or multiple strictures, adhesions, mass, or due to cocoon formation and intra-abdominal abscess due to confined perforation or mesenteric abscess. Similarly surgery may be required in internal or external enteric fistula, free perforation of tuberculous ulcer, hemorrhage. Surgery might require when malignancy could not be ruled out or may coexist and when diagnosis cannot be confirmed with reasonable accuracy.

In conclusion TB has staged a global comeback in combination with acquired immune deficiency syndrome. Abdominal TB is much more common among HIV patients and more common in developing countries. Protean manifestation with non-specific signs and symptoms makes the recognition of disease more difficult. Neither clinical signs, laboratory, radiological and endoscopic methods, nor bacteriological and histopathological findings provide a gold standard by themselves in the diagnosis of abdominal TB. However, an algorithm of these diagnostic methods leads to considerably higher precision in the diagnosis of this insidious disease which primarily necessitates a clinical awareness of this serious health problem. Management requires combination of antitubercular drugs and surgery – for diagnosis as well as therapy. Treatment outcome is favorable if started earlier and supported with balanced diet.

ACKNOWLEDGEMENT

I am highly grateful and pleased to Mrs Usha Ghimire for her secretarial support and encouragement.

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