REVIEW OF LITERATURE
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1. **Historical Background:**

   Tuberculosis, a disease of great antiquity, is as old as history of mankind. The antique drawings, engravings, paintings on stones, Egyption mummies, Babylonian scriptures, vedas, charak and Shrushut samhitas, all reflect its existence during respective periods.

   Egyption mummies, revealed evidence of tuberculosis and vedas described "Yakshma", a similar disease.

   Hippocrates (460-370 B.C.), the father of Modern Medicine and an eminent epidemiologist described it as "Phthisis" meaning to waste away. Aristotle and celsus also recognised and described the disease and its management. The literature of the library of leipsig, revealed that Jesus Christ, an era man, had suffered from the disastrous disease.

   Various forms and manifestations of this disease such as tubercular cold abscess bovine tuberculosis
haemoptysis, and contagious nature of the disease
where identified and detailed by Pliny (50 A.D.),
Arectacus of Rome, Galen (130-200 A.D.) and vegetious
(420 A.D.) respectively.

The Arabian physicians of middle ages
(400-1400 A.D.) namely Rhasen (850-923 A.D.) and
Aveena (930-1037 A.D.) led the spread of misbeliefs
based on totally unscientific facts. In England the
disease was called as "King's evil" during the 11\textsuperscript{th}
and 12\textsuperscript{th} century and touching of king's feet, was
practiced as a measure of its cure.

Jerome Fracaster (1483) described the
infectious nature of disease. Francicus Sylvius
(1614-1672) found 'tubercles' on autopsy of lungs
in cases of tuberculosis. Richard Morton (1637-1668)
in his famous book "Phthisiologia" (1689) wrote on
clinical features of tuberculosis and distinguished
it from other forms of Pulmonary diseases.

Sushruta described the disease and observed
that it was difficult to cure.
Lainnec (1819) recognised the chronic form of tuberculosis.

In 1882, Robert Koch discovered the tubercle bacillus, and it is one of the most important discoveries in bacteriology.

In 1895 Roentgen discovered X-rays which proved invaluable for diagnosis of tuberculosis.

With the publication of classical paper of Crohn, Ginsburg and Oppenheimer in 1932 (36) in which the authors described a chronic granulomatous condition involving the terminal ileum. In this description, a good deal of interest was focussed on the non-tuberculous lesions of terminal ileum. Although Crohn had described the involvement of terminal ileum only, he himself and many other writers came to recognise that the lesion could also affect caecum, ascending and transverse colon. This resulted in the belief that ileo-caecal tuberculosis was not a specific diseases as the histological and clinical picture of the two disease, regional ileitis and ileo-caecal tuberculosis were the same.
Hypertrophic ileo-caecal tuberculosis was recognised as a well known entity, in the part. It is being recognised as primary intestinal tuberculosis, if there are no lesion in the lungs.

Warren and sommers in 1948, examined 120 cases and concluded that so called ileo-caecal tuberculosis is a non specific granulomatous disease.

Ukil (1942); Anand (1956); Hamandi and Thamer (1956), reviewed that intestinal tuberculosis is common in India.

Peritoneal tuberculosis was reported by Faulknar in 1930.

Meselson (1965) gave idea of Peritoneoscopy and Crelona et al (1965) took interest in needle biopsy of Peritoneum to diagnose peritoneal tuberculosis.

2. Abdominal Tuberculosis:

Abdominal tuberculosis has been recognised as a clinical entity for a long time and several detailed descriptions of the disease are met in the literature
from India, and other countries. In India, tuberculosis of intestine is the commonest granulomatous lesion and Crohn's disease is quite rare.

The disease is now rare in U.K., U.S.A., and Europe and on the other hand common in India. The low incidence of intestinal tuberculosis noted in western hemisphere is related to the marked diminution in the incidence of tuberculous infection.

It is, however, difficult to comment on the exact incidence of intestinal tuberculosis in any country due to limitation of correct antemortem diagnosis. An incidence of 0.8% of hospital admissions in Delhi, while 3.4 to 11 percent of all cases of small intestinal obstruction and 5.7% of all perforations have been reported to be due to abdominal tuberculosis.

Incidence of primary tuberculosis is about 5.0% secondary abdominal tuberculosis is quite frequent and its incidence depends on the frequency of pulmonary disease in a community. It also depends up on how early the pulmonary disease is being treated in a
population. Incidence of Secondary abdominal tuberculosis is 51.1% of pulmonary tuberculosis cases.

Abdominal tuberculosis is usually a disease of adults with a relatively high incidence between 15 to 40 years of age. In India, disease has higher incidence in females, though such a finding has not been observed in the west. People of low and middle socio-economic status are more susceptible but there is no significant difference in its prevalence in rural an urban population.

3. **Etiology and Pathogenesis of Abdominal Tuberculosis**

Abdominal tuberculosis is classified differently according to the etiopathogenesis.

3.1) Gastro intestinal tuberculosis is classified in two types.

(a) Primary tuberculosis.

(b) Secondary tuberculosis.

Primary tuberculosis is due to ingestion of bovine type of tubercle bacillus. This type has been
declining rapidly in western world as pasteurization has become more widely practiced. It was not seen in any case of Bradford series. In our country, practice of consumption of boiled milk may not allow bovine bacillus to infect human beings.

In 1968 klebs produced enteric ulcers in Guinea pigs by feeding them bovine and human tuberculous matter. Lichtheim in 1893 demonstrated the presence of tubercle bacilli in the stools of patients with tuberculous enteritis.

Infected milk may be the source of bacilli giving rise to primary enteric lesions. Reichle (1936) was able to isolate only the bovine bacillus in primary illeo-caecal lesions.

In 1932, Blalock held the bovine strain responsible in 59% of children, under five years of age, who were suffering from intestinal tuberculosis. The decreased incidence of hypertrophic tuberculous enteritis in America has been thought to be due to the nearly complete elimination of tuberculosis from cattles.
Secondary tuberculosis is by human type of tubercle bacillus and is secondary to tuberculosis else where, most commonly pulmonary tuberculosis. It is regarded as being spread via the blood stream as in miliary tuberculosis or by direct imasion, as a result of swallowing of infected sputum. In India Ukil and Anand recovered the human strain of tubercle bacilli in nearly all of their patients.

It is generally assumed that the mode of infection is by ingestion of heavily contaminated sputum, secondary to an active pulmonary focus. The incidence of intestinal tuberculosis is proportional to the extent of pulmonary disease.

Human strain Mycobacterium tuberculosis may infect and involve any portion of small and large bowel as well as Peritoneum liver, gall bladder, Stomach, pancreas, kidney, genital tract.

(3.2) Holme sellers and livingstone in 1953 classified abdominal tuberculosis in 3 years.

1. Intestinal
2. Glandular
3. Peritoneal

A patient may exhibit one type or more than one type in different combinations of the above mentioned lesions.

1. **Intestinal Tuberculosis:**

   Following the ingestion of organism, the bacillus passes through the stomach, where it is protected against digestion by its fatty capsule the organism initiates a focus of infection in the ileum, colon, jejunum, appendix, sigmoid colon, rectum, duodenum and stomach, in decreasing order of frequency. Approximately 85% of lesions are located in ileo-caecal region. Incidence of tuberculosis in ileum is quoted 89% and in ileo-caecal junction 87%.

   A number of factors have been considered to play a part in determining the localisation of disease.

   (i) Areas of increased physiological status.
   (ii) Regions of most abundant lymphoid tissue.
   (iii) Areas of increased rate of absorption.
   (iv) Areas where the small bowel contents are more completely digested; Thus permitting freer contact of the bacilli with mucus lining.
After transport to the site of stasis, the bacillus becomes localised in the depths of glands of mucosa and initiates the inflammatory reaction. The bacillus is carried through the epithelial layer, by phagocytes, to the submucosa. In the sub mucosa the initial session is formed in the lymph follicles or payer's patches. The overlying mucosa, deprived of its blood supply through endarteritis, may slough forming ulcers. The most active inflammation takes place in the submucosa. It becomes thickened as a result of oedema, cell infiltrates, lymphatic hyperplasia, formation of tubercles and fibrosis. Penetration of inflammation, through the wall leads to the formation of tubercles which may be visualised on gross examination. This spread is considered to occur either by lymph channels or by direct contiguity.

The typical microscopic picture of tuberculous enteritis comprises.

(a) Epitheloid cells.
(b) Lymphocyte infiltration in to the lymph follicles.
(c) Lymph nodes with giant cells formation and central caseation necrosis.
Resultant lymphangitis and arteritis causes a circular 'girdle' mucosal ulceration. Longitudinal ulcers, rarely develop unless peyer's patches alone are involved. Consequently cobble stoning of crohn's disease, which requires both transverse and longitudinal ulcers is seldom seen in intestinal tuberculosis.

Tuberculous ulcers, classically encircle the bowel and heal by fibrosis to create a residual stenotic lesion and thus they lead to slowly progressive bowel obstruction.

2. **Glandular tuberculosis**

Because of the apparent affinity of the organism for Lymphoid tissue, mesenteric lymph nodes are involved early in the pathogenetic sequence, often with more extensive caseation necrosis than the accompanying bowel lesion. The mesenteric nodes are invaded through transportation of tuberculous material along lymph channels. There, lymph nodes show complete range of changes from hyperplasia to caseation and calcification.

It is important to examine mesenteric lymph
nodes. Anand pointed out this fact and only 10% patients of his series showed caseation necrosis in the bowel wall; whereas, caseation was present in the lymph nodes in 100% of patients. In the end stage, lymphatic obstruction results and eventually the mesentery as well as the involved bowel becomes a thick, fixed tuberculous mass.

3. **Peritoneal Tuberculosis**

   It follows haematogenous spread from distinct areas of tubercular lesions. It may also be caused by discharge of caseous material from lymph nodes, diseased bowel or fallopian tubes. Co-existing tubercular enteritis and peritonitis are not common.

   Ascitic form Peritonium is studied with tubercules and the peritoneal cavity becomes filled with pale, straw colored fluid.

   **Plastic form** - It is characterised by production of widespread adhesion. These adhesions cause coils of Intestine to be come matted together and distended.
Following, is a very valuable clinicopathological classification, embracing Pathology and prognosis and offering a guide to treatment.

A. Ulcerative
B. Hypertrophic
C. Ulcero-hypertrophic

The ulcerative process, virulent and carrying poor prognosis, seems to be the result of an overwhelming continuous inoculum of bacilli from the lungs. It is not likely to be amenable to surgical treatment. Antibiotics may offer the only hope of control.

By contrast, hypertrophic process, the common cause of tuberculous ileo-caecal tumor, is frequently the only tuberculous lesion for obstructing symptoms and it is amenable to surgical treatment. In such cases, antibiotics are only a desirable adjunct. This lesion is common in ileo-caecal region.

Ulcero-hypertrophic variety is a combination of the two preceding types and is most frequently classified under the hypertrophic variety.
(3.3) **Pathology of Crohn’s Disease:**

The bowel is engorged and oedematous so that the lumen is markedly narrowed and may produce obstruction. The mucosa is oedematous showing a "cobble stone" pattern with linear ulceration and fissuring. Characteristically these changes are patchy, even when a relatively short segment of bowel is affected, it can be seen that inflammatory process is interrupted by islands of normal mucosa. The change from normal mucosa to the affected part is abrupt. This type of lesion is called 'skip' lesion. The affected lymph nodes are enlarged and mesentery is thickened.

Microscopically, inflammatory change involves all coats of the bowel wall. All grades of inflammation may be seen and characteristically there is oedema and hyperplasia of the lymphoid follicles. There is presence of deep fissures on to the mucosal surface and sometimes these fissures pass through the entire thickness of the bowel wall. These deep fissures are responsible for fistula formation.
(4) **Clinical features of Abdominal tuberculosis:**

Clinical diagnosis of abdominal tuberculosis, in its early stage is one of the most difficult one. The accuracy of clinical diagnosis was 50% in series of 182 cases studied by Das (39). The fact that symptomatology is so vague and presentation so poor that a high index of suspicion is required before one proceeds to confirm its diagnosis by investigations.

Clinical presentation of a patient with abdominal tuberculosis will very depending upon:-

(i) Severity of the disease.
(ii) Immune response of the patient.
(iii) Duration of disease.
(iv) Part of gastro intestinal tract affected.
(v) Associated complications.

(4.1) **Age incidence:**

The most frequent age of onset is between 20-40 years. In Western countries the most common age group which is affected by abdominal tuberculosis is 40 years (60, 91); However, some authors reported the mean age of 63 years. In India, the commonest age group affected is 20-30 years (39, 73).
(4.2) **Sex Ratio**:

Abdominal tuberculosis is more common in females than in males. In Britain the male and female sex ratio, affected, is 1 : 25 and in America it is 1 : 1.3 (60). In India, sex ratio varies from 1 : 2.6 to 1 : 2.6 to 1 : 3.4 (39, 73).

(4.3) **General Symptoms**:

Low grade fever with evening rise is a common symptom associated with loss of appetite, loss of weight and general weakness. Percentage of these symptoms, in western countries varies from 25 to 75%. In India, these symptoms are analysed, as fever in 42.2%, loss of appetite in 44.4%, loss of weight in 35.0% and general weakness in 45.6% cases.

(4.4) **Abdominal Symptoms**:

These symptoms are vague and nonspecific. A number of reports state that there is considerable variations among those patients with pulmonary tuberculosis who have gastro-intestinal symptoms. At autopsy many instances of tubercular enteritis are found where no suggestive symptoms were recorded prior to death.
(1) **Abdominal Pain:**

In most series, pain of cramping nature in abdomen is the most common symptoms. Pain may be of any type depending up on Pathology and the viscera involved i.e. tubercular peritonitis, mesenteric lymphadenitis or ulcerative or hypertrophic tuberculosis of intestine.

In series studied, by Das (39), Pain in abdomen was in 94% of Patients and following table depicts the distribution of pain in abdomen.

<table>
<thead>
<tr>
<th>Site of Pain</th>
<th>No. of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Umbilicus</td>
<td>60</td>
<td>35.4</td>
</tr>
<tr>
<td>Generalised</td>
<td>55</td>
<td>32.3</td>
</tr>
<tr>
<td>Pt. iliac fossa</td>
<td>35</td>
<td>20.6</td>
</tr>
<tr>
<td>Epigastrium</td>
<td>11</td>
<td>6.5</td>
</tr>
<tr>
<td>Lt. Hypochondrium</td>
<td>4</td>
<td>2.4</td>
</tr>
<tr>
<td>Rt. Hypochondrium</td>
<td>3</td>
<td>1.8</td>
</tr>
<tr>
<td>Lt. iliac fossa</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Rt. Lumber region</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>170</strong></td>
<td><strong>94.0</strong></td>
</tr>
</tbody>
</table>
Analysis of character of pain revealed the following:

(a) Out of 93 cases of obstruction group, in 89% cases pain was colicky; in sex cases it was vague and in two cases it was gripping.

(b) In non-obstructive group of cases colicky pain was present in 37 cases out of 89, while pain was vague in 29 and gripping in character in 21 cases.

Khan (73) reported vague abdominal pain in 81.8% colicky pain in 50% cases and acute continuous pain in 18.2% cases.

In western countries, some authors reported abdominal pain in 77% of cases in series of 24 patients. The pain occurred most frequently in umbilical region, epigastric and in, right iliac fossa region. In this series, pain was of cramping in nature.

(ii) Nausea & Vomiting:

These symptoms occur also in other various conditions, so these symptoms are not specific to abdominal tuberculosis. These symptoms are more prominent and more frequent in obstructive lesions.
In different series incidence of vomiting is reported to be 69.6% and Nausea in 40.9% cases. Patients with ascites had the lowest incidence of vomiting (25%). In western countries incidence of vomiting varies from 48.3% to 81% and that of Nausea is 51.7%

(iii) Change in bowel habit:

This may occur in any inflammatory and obstructive lesion of abdomen, but this is usual occurrence in abdominal tuberculosis. Usually this symptoms signifies intestinal tuberculosis, but in peritoneal and mesenteric lymph node involvement patient complains of change in bowel habit in form of diarrhoea, constipation and alternate diarrhoea and constipation.

In western countries diarrhoea is found in 32.2% to 36.2% cases, constipation in 22.5% to 24.1% cases and alternate diarrhoea and constipation in 3.4% cases.

In our country the incidence of these symptom is 4.5% to 11.0%, 46.7% and 8.8% respectively. In obstructive group, Constipation is more common (67.7%) than in non-obstructive group (24.8%).
(iv) **Moving lump in Abdomen:**

This feature signifies hypertrophic tuberculosis of intestine and also ulcerative process in intestine causing narrowing of the bowel segment. This symptom is due to movement of peristalsis proximal to the obstruction. Some authors described this feature as feeling of persistent lump or ball of wind or 'Gola' moving in abdomen.

In western countries 26% incidence, of moving lump in abdomen is reported, and in India 28.8% to 36% incidence is reported.

(v) **Borborygmus:**

These are the sound of flatus in the intestine and signifies increased mobility of gut. This gas is due to biological process taking place in intestine, some gas producing bacteria and airophagia. In western countries incidence of borborygmus is 17.2% and in our country it is 25.5%.

(vi) **Post Prandial Distress:**

Feeling of abdominal distress after meals, is common feature of abdominal tuberculosis. In
western countries its incidence is 41.4% and in our country, 81.8% incidence is noted.

(vii) **Distension of Abdomen:**

It is a common feature of obstructive variety and ascitic type of tubercular peritonitis. Various authors reported its incidence in western countries and India, which is 22.4% and 45.0% respectively.

(viii) Scanty flow during menstrual period in female patients, is due to tubercular involvement of genital tract or due to general weakness. Das reported 35.6% incidence of oligomenorrhea.

(4.5) **Duration of Symptoms:**

The duration of symptoms before attending hospital varies considerably. This reflects the insidious nature of the disease process as well as the difficulty in making diagnosis.

In U.K., reported duration of symptoms is one month to six months and in U.S.A. 3 years.
In our country, the duration of symptoms is one year.

(4.6) **Physical Signs:**

(i) **Poorly nourished Patient:**

Loss of appetite, change in bowel habits and impairment of digestion and proteinlose in form of mucus, ascitic fluid, contribute to loss of weight and malnutrition. Incidence of this sign varies from 13% to 72.7%.

(ii) **Tenderness in abdomen:**

Involvement of parietal peritoneum, intestinal obstruction and mesenteric lymph adenitis, contribute to tenderness in abdomen. In our country it is the most frequent sign.

(iii) **Distension of abdomen:**

Distension of abdomen varies from mild to severe, depending upon type of pathology. Hypoproteinaemia is also a contributing factor in distension of abdomen. Incidence of this sign varies from 59.2% to 81.8%.
(iv) Doughy feel to abdomen is after quoted as typical of a tubercular abdomen. This sign is present in 6% cases in India.

(v) Visible peristalsis is due to increased mobility of intestine and is most frequent finding in obstructive group. This sign is absent in ascitic tubercular peritonitis.

(vi) ascitis is due to tubercular peritonitis and fluid is on exudate. In western countries its incidence is 21% and in our country its incidence is 18.6% to 27.2%.

(vii) 

Lump in abdomen

Is due to hypertrophic tuberculosis or involvement of omentum by tubercular process, site of this lump varies considerably.

Reports from western countries indicate that the incidence of lump in abdomen is 26% to 65%. 16% cases have lump in right iliac fossa, 6.4% in umblical region and 3.2% in left iliac fossa region.
In India, various reports showed that incidence of lump in abdomen varies from 28.6% to 59.0%.

(4.7) **Features of different types of abdominal tuberculosis:**

1) **Ulcerative type:**

There is chronic continuous or periodic diarrhoea with gripping pain. These cases may often have acute exacerbations. Lack of appetite and vomiting is a frequent symptom. General toxæmic manifestations in the form of high grade fever, cold sweet general weakness etc. are quite marked. In these cases, signs and symptoms of pulmonary tuberculosis are frequently encountered as associated findings.

2) **Hypertrophic type:**

There is persistent feeling of diffuse distension of abdomen which is aggravated after meals and is relieved after passing flatus. It is associated with feeling of increased borborygmi, in the majority of patients. Feeling of a persistent lump in right iliac fossa or a ball of wind or 'Gola'
moving in the abdomen are other important abdominal complaints. This later symptom is highly suggestive of partial obstruction in a patient of intestinal tuberculosis.

Abdomen, reveals tenderness and a man in right iliac fossa, hyperactive bowel sounds and visible small bowel peristalsis. The lump in right iliac fossa is formed by an ileo-caecal mass. Caecum is felt thickened, tender and distended and quite often it can be emptied by pressure, producing a gurgling sound in the process.

3. Mesenteric Lymph Adenitis:

Apart from other features of abdominal tuberculosis, nodular swelling can be felt due to enlarged mesenteric lymph nodes. Tenderness all over the abdomen and central fullness may be present. Usually we can find marks of counter irritation all over the abdomen.

4. Tuberculous Peritonitis:

It proved difficult to separate the cases of tuberculous peritonitis into plastic and exudative
type. Generally the patients with adhesive type. Generally the patients with adhesive type of tuberculous peritonitis present with chronic history and abdominal pain than swelling. The abdomen is tender, occasionally rigid and contains abdominal masses. The doughy abdomen is found in some cases. There may be guarding of abdominal wall.

The patient with exudative type have a more acute history. There is rapid onset of abdominal pain and swelling associated with chills and rigors with fever. Ascitis is frequent finding.

(5) **Diagnosis of abdominal tuberculosis:**

(5.1) **History and Clinical Examination:**

History and clinical examination is so vague that a high index of suspicion is required before one proceeds to confirm the diagnosis by investigations.

(5.2) **Blood Studies:**

Haematological determinations are so non-specific that they have no definite diagnostic
value. These diagnostic techniques are proved disappointing.

Reports from western countries suggest that patients with active tuberculosis may have normal erythrocyte sedimentation rate. Incidence of raised E.S.R. varies from 25% to 92%. In our country incidence of raised E.S.R. is 92.9%.

Leucocytosis was present in 19.8% to 46% of cases in series of patients, studied in advanced countries, whereas in our country its incidence is 14% to 43.8%.

Marked lymphocytosis is reported by Kaufman and Donovan in cases of abdominal tuberculosis. In contrast to this, Das reported low lymphocyte count in 14.7% of patients of his series.

In majority of cases (70%), haemoglobin level was below 12.78% in series of Kaufman and Donovan. Roman et al also reported anemia in 55% of cases. In our country, anemia is constant finding in this lesion.
(5.3) Mantoux Test:

This is also known as tuberculin skin test. Tuberculin is a protein fraction of tubercle bacilli, when introduced into the skin of a person with tuberculous infection, whether clinically apparent or dormant, it triggers release of several lymphokines. These, lymphokines cause a localised thickening of the skin over the next 24 to 72 hours.

In clinical practice, it is performed, by injecting 0.1 ml of a solution containing 5 tuberculin units (T.U.) of purified protein derivative stabilized with tween 80 (5 TU of PPD - T) into the skin of the volar aspect of the forearm with a small hypodermic needle of 26 gauge. The test is read 48 to 72 hours later and is considered positive if the diameter of skin thickening measures 10 mm or more, doubtful if it is 5 to 10 mm and negative if less than 5 mm.

Detailed literature on the helpfulness of the tuberculin skin test in promoting the diagnosis of abdominal tuberculosis is sparse. Most reviews have either not reported data on tuberculin skin test or have only noted that the Mantoux Test was positive.
were positive in 13 patients out of 17 patients studied by George. He suggested that negative reactions are of no help in excluding disease, but strongly positive reactions are helpful guide to the presence of abdominal tuberculosis. This test was positive in 31% cases of Bradford series and 60% cases studied by Mandal and Scofield. In our country, studies had been performed indicating that test is positive in 100% cases of abdominal tuberculosis.

(5.4) **Radiology in Abdominal Tuberculosis:**

The greatest aid to the diagnosis of abdominal tuberculosis is radiology. If a patient had got radiologically proved pulmonary tuberculosis and complains of abdominal symptoms for a long time then we can proceed to investigate for abdominal tuberculosis.

Although these are no pathognomia signs, certain features are suggestive of disease.

(1) **Chest Roentgenograms:**

Following lesions are characteristic of tuberculosis.
(a) Early tubercular infiltration which may be exudative or productive. This is manifested as an increased density or a well defined homogenous area of consolidation.

(b) Pneumonic or Broncho pneumonic lesion.

(c) Cavitaling lesions.

(d) Disseminated lesions- Fine or course nodular densities scattered throughout both the lungs.

(e) Miliary tuberculosis- Millet seed size shadows distributed evenly in both the lungs from apices to bases.

(f) Pleurisy with effusion.

(g) Calcification of hilar lymph nodes and paratrachial lymph nodes.

In our country different authors reported different incidences pulmonary tuberculosis associated with abdominal tuberculosis. This figure varies from 6% to 50%. 
(ii) **Plain roentgenogram of Abdomen**:

Plain X-Ray abdomen may reveal the following features.

(a) Calcified mesenteric lymph nodes.

(b) Fluid levels, in the patient with the acute or subacute intestinal obstruction.

(c) Fluid in Peritoneal Cavity.

(d) Right iliac fossa mass.

The triad of ascites, absence of gas shadow or gaslessness in Right iliac fossa (i.e. presence of mass in Right iliac fossa) and segmental dilatation of terminal ileum on plain film reentgenogram, appears to be suspicious of intestinal tuberculosis.

Das reported that plain X-ray abdomen was done in 54 cases and in 14 cases, out of 29 cases of constructive group, multiple fluid levels and gas shadows were present. In only one case, out of 25 cases belonging to the non-obstructive group. Multiple fluid levels and gas shadows were present. Calcified mesenteric lymph nodes were observed in two cases of ascitic group; gas under diaphragm was found in our care each, belonging to the non-obstructive group and obstructive group.
(iii) **Barium Meal Examination:**

Following features on barium meal examination are suggestive of intestinal tuberculosis.

(a) Sterline, in 1911, first noted that ileo-caecal tuberculosis is characterized by lack of retention of barium in the diseased segment of ileum and caecum. So a column of barium remains proximal and distal to this filling defect. The area occupied by the lesion fails to visualise because of its hyper irritable state; barium passes rapidly through it to a region of normal tonus & size.

(b) Single filling defect in the caecum is frequently encountered in hyperplastic tuberculosis but it can not be differentiated from other granulomatous processes or malignancy.

(c) Higherup caecum and obtuse angle of ileo-caecal junction with caecum is differentiating feature from malignancy caecum.

(d) Dilatation, delay in emptying and prominent valvulac conniventes of the small bowel are common in hyperplastic ileo-caecal tuberculosis.
(e) Ileo-caecal valve may show a tendency to gape due to ulceration or granulation, progressing to fibrosis and retraction of the valve lips. This is represented, roentgenographically by a broad based triangular appearance of the terminal ileum (base toward caecum) and this appearance is known as Fleischner's sign.

In the series reported by Das barium meal was done in 38 patients. In 15 cases there was no significant finding. In 34.2% cases, areas of small bowel obstruction and dilatation were seen. An unusual finding was the presence of pyloric obstruction in one case and dilatation of first, second and third, part of duodenum in three cases.

(iv) **Barium Enema Examination**

Barium enema studies are to examine the colon especially the caecum. On examination contracted and lifted up caecum, may be found. There may be obstruction at ileo-caecal junction. Terminal ileum may show dilatation, an irregular and persistent filling defect in caecum and ascending colon may also be found.
(v) **Intravenous Pyelography:**

It can show kinking of ureter due to tubercular retroperitoneal fibrosis. Singh et al were not able to show any urinary abnormality by intravenous pyelography in 47 patients of tubercular peritonitis.

(vi) **Salpingography:**

This procedure can reveal tubercular involvement of fallopian tube. Beaded appearance of tube is characteristic of tubercular salpingitis.

(vii) **Lymphangiography:**

Visualisation of lymphatic system of involved region is also an important diagnostic procedure for abdominal tuberculosis.

(5.5) **Ascitic fluid Examination:**

This is one of the most important procedures for diagnosis of tubercular peritonitis of ascitic type. Following are the characteristic features of ascitic fluid.

(a) **Yellow or Straw Colored fluid.**
(b) Specific gravity more than 1015.

(c) Protein content more than 2.5mg per dl.

(d) 1000 leucocytes/mm³ with 70% lymphocytes.

(e) Positive test for staining and culture of acid fast bacilli.

(5.6) **Peritoneal Biopsy:**

It is safe and useful method to diagnose abdominal tuberculosis. This procedure is much more readily performed in patients with ascitis, than in those with adhesive type of tubercular peritonitis.

Das(1976) examined 71 cases of abdominal tuberculosis by peritoneal biopsy, of these, 59 biopsies were done with an Abrahms needle and 12, by making a small incision in Right iliac fossa (open peritoneal biopsy). In ascitic and chronic miliary peritonitis group, the biopsy material showed tubercular histopathology, in 46 cases out of 52. In the remaining cases a non specific picture was present although these cases had other evidences tuberculosis out of 12 cases, with open peritoneal biopsy, histopathological examination revealed tubercular peritonitis in 11 cases.
(5.7) Biopsy of other tissues is a confirmatory evidence of abdominal tuberculosis.

(a) Mesenteric lymph nodes.
(b) Excised tissue removed after laparotomy.
(c) Liver.
(d) Endometrium.

(5.8) Bacteriological Examination:

Demonstration of acid fast bacilli by following methods is confirmatory evidence of abdominal tuberculosis.

(a) Staining
(b) Culture
(c) Animal inoculation.

These bacilli may be demonstrated in sputum, gastric aspirate, stools, excised tissue, ascitic fluid etc.

(5.9) Colonoscopy with targeted biopsy is a valuable help to differentiate tuberculous lesions from other diseases of large bowel. Hodular regions with areas of polypoid changes are the major gross appearances, this may simulate neoplastic changes.
(5.10) **Radio Isotopic Scanning** is also a helpful method to diagnose tubercular peritonitis. This is performed with the help of gallium 67. Not only tubercles in the abdomen are seen on this scan but also extraperitoneal infection such as the pleural effusion of tubercular origin can also be detected. It is not, yet, known, how specific gallium 67 scanning is for tuberculous infection.

(6.0) **Complications of Abdominal Tuberculosis:**

(6.1) **Intestinal Obstruction:**

It is the most common complication of abdominal tuberculosis. This occurs in three ways.

(i) Encreachment of the thickened bowel wall up on the lumen because of hypertrophy and circular contraction of scar tissue.

(ii) Extensive intraperitoneal adhesions, which is formed as a result of exudation during the earlier acute phases, eventually contract, resulting in kinking or constriction of intestine.

(iii) As a result of retraction of the mesentary and shortening of the right colon in the healing phase, the medial wall of the caecum is drawn and medially, causing a change in the angle of
entrance of the terminal ileum into the caecum from 90 to 180 degrees. A kink at the ileo-caecal junction results and causes obstruction.

(iv) In addition to these, mesenteric lymphadenopathy causes localised compression and leads to intestinal obstruction.

Khan reported 59% cases of sub acute intestinal obstruction and analysed them as follows:

(a) Stricture of small bowel (13.8%).
(b) Hypertrophic ileo-caecal tuberculosis (92%).
(c) Adhesive Peritonitis (27.4%).
(d) Tabes mesentrica (9.2%).

(6.2) Perforation of Intestine: is rare as the healing of ulcer in intestinal tuberculosis is by fibrosis. Therefore, it produces stricture rather than perforation.

Incidence of perforation in tuberculosis of bowel varies from 0-10.5%.
(6.3) **Haemorrhage from ulcer is rare:**

There was no case in series of patients studied by Khan. However, Pimparkas reported incidence of 1 to 4% and Homan et al reported haemorrhage in 39% cases.

(6.4) **Intussusception can also occur in abdominal tuberculosis** and may lead to acute intestinal obstruction.

(6.5) **Fistula** may develop between bowel and female adnexal organs and between bowel and external surface usually they occur as a result of secondary bacterial invanon in the areas of necrosis causing penetration abscesses.

Khan reported two cases of fistula out of 22 cases (9.2%). One case had perianal fistula and other entero-umblical fistula. Two other patients developed intestinal fistulae, after surgery when an attempt was made to separate the loops of bowel in cases of fibrous type of peritonitis and in tabes mesenterica, when gut was adherent to lymph glands.
Faustian and Bochus reported the incidence of fistula in 25% cases.

(6.6) Malabsorption Syndrome and steatorrhoea are common occurrence in tubercular abdomen.

(6.7) Amenorrhoea & Sterility in females is reported by Banerjee 1950. He reported it in 91.5% of female patients.

(6.8) Amyloidosis is a very rare complication. Jones and Peck reported amyloidosis of liver in 5% of 3/0 autopsus performed and in 53% there was fatty infiltration of liver.

(7.0) Treatment of Abdominal Tuberculosis:

Drug therapy of gastro-intestinal tuberculosis is the same as for the disease elsewhere. Prior to introduction of streptomycin, treatment consisted of general supportive care, dietotherapy, heliotherapy, calcium gluconate and pneumo peritoneum, senatonium care.
With the introduction of antibiotics and chemotherapeutic agents and their miraculous effect on intestinal tuberculosis, medicinal therapy became the treatment of choice.

The use of corticosteroids, to prevent intestinal obstruction from tuberculous enteritis, is largely empirical although, are study indicates that corticosteroids given for peritonitis reduce the likely hood of intestinal obstruction.

Anti tubercular drugs have changed the face of treatment of gastro-intestinal as well as other forms of tuberculosis used in conjunction with excisional surgery or with by pass surgery, they appear to have controsted the intestinal and pulmonary disease.

Surgical interventions is required for the complications of abdominal tuberculosis.

**INDICATIONS OF SURGICAL INTERVENTIONS**:

1. Intestinal obstruction due to strictures of bowel or Shortening of mesentery.
2. Hypertrophic ileo-caecal tuberculosis resulting in marked decrease in humen.

3. Free perforation of tuberculous ulcer.

4. Perforation with localised abscess formation.

5. Gastro-intestinal haemorrhage.

6. Internal or external tuberculous fistulae.

7. Tuberculous lesions of anal and perianal region.

George mentioned that merely opening the abdomen had a beneficial effect on the outlook.

The advocated surgical treatment for tuberculosis of ileo-caecal region is by exclusion of diseased segment by ileo-transverse anastomosis or complete removal by right hemicolecotomy.

The strictures in the bowel have been dealt with either by resection or entero-anastomosis. Sharma & Mehta suggested localised resection for tuberculous lesion; and similarly the simple procedure of stricturoplasty for cicatrising lesions of the bowel is advocated.