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Research Article

Role of laparoscopy in the diagnosis and management of abdominal tuberculosis

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ABSTRACT

Background: Each year tuberculosis (TB) results in the death of 1.5 million people globally .The complexity of TB is clearly evident by noting that this disease primarily involved the lung now involves all organs and systems. Abdominal TB is one such complex presentation. The use of laparoscopy in the diagnostic work-up of suspected abdominal tuberculosis is underutilized in developing countries.
Methods: The study of Role of laparoscopy in the diagnosis and management of abdominal tuberculosis was conducted in patients with clinically suspected abdominal tuberculosis but histologically or microbiologically unconfirmed tuberculosis at any other site. Patients satisfying inclusion criteria are subjected to diagnostic laparoscopy, biopsy of specimen from peritoneum , omentum, tissues, mesenteric lymph nodes for histopathological examination, AFB staining and cartridge based nucleic acid amplification test (CBNAAT) of peritoneal aspirates for confirmation of abdominal tuberculosis.
Results: Total 38 cases were included in this study with a clinical and radiological diagnosis of suspected abdominal tuberculosis. All patients underwent diagnostic laparoscopy.
Conclusions: Diagnostic laparoscopy avoids the morbidity and mortality of laparotomy in chronically ill patients, reduces the rate of misdiagnosis of other abdominal conditions and unnecessary long-term therapy. Diagnostic laparoscopy and tissue sampling is a viable and reliable strategy in patients with suspected abdominal tuberculosis.

Keywords: Abdominal tuberculosis, Diagnostic laparoscopy, Tuberculous caesiation, CBNAAT

INTRODUCTION

Phthisis pulmonalis as called in past is nothing but the poverty stigmatous disease of underdeveloped nation commonly designated as Tuberculosis or TB. Recently it was labelled by WHO as a re-emerging global disease tormenting the underdeveloped as well as developed nations with increasing complexity and severity.[3,4] The complexity of TB is clearly evident by noting that this disease primarily involved the lung now involves all organs and systems. Abdominal TB is one such complex presentation.[7,8]

Abdominal tuberculosis poses a complex diagnostic challenge for clinicians as presentation is often subtle. Symptoms may even be absent in some patients. Therefore it can be easily overlooked with an often delay in early diagnosis.[4,7,29] Recently laparoscopy have been increasingly recognized as a procedure that offers precise visual assessment of intra-abdominal condition, collection of specimen for biochemical, microbiological, histopathological analysis and prompt intervention. Against this background, this study was conducted to

evaluate the role of laparoscopy in patients with suspected abdominal tuberculosis.[12,29,30]

METHODS

This prospective study is being conducted on patients attending surgery casualty/OPD/IPD, department of surgery of our tertiary care institute from a period of Nov-2013 to Nov-2015 with a clinical and radiological diagnosis of suspected abdominal tuberculosis after informed and written consent is obtained. The sample size under study would be the patients getting admitted during above mentioned time frame.

Patients satisfying inclusion criteria are subjected to diagnostic laparoscopy , biopsy of specimen from peritoneum , omentum , tissues, mesenteric lymph nodes for histo-pathological examination, AFB staining and cartridge based nucleic acid amplification test (CBNAAT) of peritoneal aspirates for confirmation of abdominal tuberculosis. As there is no tissue culture facility in our institute, specimen obtained are not subjected for culture. Pre-operative body weight and haemoglobin (Hb)% were recorded in all patients especially to compare with post-operative response to treatment.

All the patients underwent laparoscopy and were started on standard anti-tuberculosis treatment. Positive diagnosis of abdominal tuberculosis was considered if there was: typical tuberculous granulomata containing Langhan's giant cells with caseation or non caseating necrosis with the demonstration of AFB in the biopsied tissues or positive CBNAAT for *Mycobacterium tuberculosis* gene from the pelvic aspirate or biopsied tissues. These criteria can reliably equate to establish diagnosisS. The data were evaluated to see the diagnostic yield of laparoscopy in the form of macroscopic appearance and histological or microbiological results and the response to medications in the form of sensitivity and specificity.

All participants were evaluated for tuberculosis treatment response by assessment at week 4 and week 8 following laparoscopy. Therapeutic response was considered if there were at least two or more of the following criteria present: 1) weight gain ≥5%, 2) haemoglobin increase ≥1 gm% and 3) at least half of the symptoms were much better or resolved, including assessment of adherence to tuberculosis treatment using the TB clinic treatment card were evaluated. All the patients had repeat abdominal ultrasonography at follow up to compare the findings with the preoperative reports.

Inclusion criteria

All patients with suspected koch's having gastrointestinal complaints (abdominal distention, non-localised vague abdominal pain , nausea ,vomiting, abdominal lump etc) and other constitutional symptoms such as low grade fever, weight loss, anorexia, malaise with no conclusive diagnosis despite many investigations.

Exclusion criteria

- Diagnosed case of abdominal tuberculosis
- Case of suspected abdominal tuberculosis with acute intestinal obstruction
- Pregnant women
- Medically unfit for laparoscopic surgery

Study design

- Prospective and interventional study

Intervention

- Laparoscopy SOS open

Study population

- Patients with suspected abdominal tuberculosis getting admitted to surgery ward satisfying the inclusion criteria.

Laparoscopic technique

Laparoscopy was done under general anaesthesia in all patients. The first 10 mm trocar was introduced in the umblical region under direct vision using visiport in most of the patients to avoid bowel injuries due to adhesions. A second 5 mm trocar was introduced under direct vision in the suprapubic region. A third 5 mm or 10 mm trocar was introduced under direct vision according to the abnormalities found as shown in Figure 4. Due to a persistent logistic problem with the processing and delivery of tissue specimens for tuberculosis culture, and also inavailability of culture facilities in our institute, no analysis of this technique was carried out.

Assessing diagnostic accuracy

In assessing the diagnostic accuracy of a test or a group of tests using sensitivity and specificity as in this study, the gold standard definition of abdominal tuberculosis is key to defining the true positives .However the possibility of dual diagnosis of tuberculosis and another pathology led us not to focus purely on the diagnosis of tuberculosis but on the establishment of the diagnosis of abdominal tuberculosis. This was because we also wanted to establish if there was an alternate or metachronous diagnosis which would require specific therapy. Therefore our study focused on abdominal tissue and fluid sampling. We therefore chose the three-criteria stated in the statistical section as the gold standard.

Statistical analysis

Statistical evaluation of data entailed sensitivity (Se), specificity (Sp), positive predictive value (PPV) and

negative predictive value (NPV) analysis. The "gold standard" for the diagnosis of abdominal tuberculosis was (1) Presence of AFB in histological specimens, (2) presence of caseating granulomas in histological specimens and (3) positive CBNAAT.

In the case of quantitative data, means and 95% confidence interval (95% CI) were reported around sample estimates. Epi info version 7.1 and open Epi version were used to analyze the data.

RESULTS

This study on role of laparoscopy in the diagnosis and management of abdominal tuberculosis was conducted at the department of surgery at our tertiary care hospital from Nov 2013 to Nov 2015. A total of 38 patients of suspected abdominal tuberculosis underwent diagnostic laparoscopy after written informed consent. Out of 38 patients, 20 were males and 18 were females. The youngest case included was of 10 years and oldest case was of 70 years old .The incidence of disease was more common in age group 20-29 years (47.36%) and lowest in 50-59 years. Mean age of incidence in males was 27.45±10.19 years and 34.11±16.54 years in females with overall mean of 30.78 ±13.80 years. It was found that the disease is slightly more common in males than female with male to female ratio of 1:0.9.

In present study, the most common presenting symptom was abdominal pain present in 35 patients (92.10%) with least presenting symptom of diarrhea in 7 patients (18.42%) while pallor and abdominal tenderness were the most common signs present in 25 (65.78%) and 24 (63.15%) patients respectively with least patients having ascitis.

In present study, only 7 patients out of 38 patients (18.42%) gave past history of pulmonary TB or treatment for pulmonary TB and 23.68% patients gave positive history of presence of or treatment for pulmonary TB in other family member. No patient or family member had history of abdominal TB.

In this present study, X-ray chest were done in all patients but it was suggestive of tuberculosis in only ten patients (26.31%) though sputum AFB staining were negative in all of 10 patients. Most of the patients had healed pulmonary calcifications. Sputum examinations were performed only in patients with CXR suggestive of tuberculosis and all examinations were negative for tuberculosis.

28.94% patients with X ray abdomen standing showed signs of sub acute intestinal obstruction which responded to conservative management.

Ultrasonography abdomen were done in 38 patients and all patients had evidence suggestive of abdominal tuberculosis, but histology/CBNAAT results were positive for tuberculosis in 23 patients (60.52%). Sonographic features were peritoneal collection, intra abdominal lymphadenopathy, dilated small bowel, thickened mesentry and omental thickening.[5,6,14,18,20] The sensitivity of ultrasonography abdomen was 92% while specificity was 61.54%.The PPV of ultrasonography abdomen was 82.14% while NPV was 80%.

CT scan abdomen as shown in Figure 1 was done in all patients; 31 of them were suggestive of abdominal tuberculosis and seven were inconclusive. Features suggestive of TB were peritoneal free fluid, intra abdominal lymph adenopathy, thickened small bowel loops and omental thickening.[6,13,23,26] Only 24 of them had positive (63.15%) histology for tuberculosis and 14 were negative (36.84%). The sensitivity and specificity of CT scan are 96% (CI 80.46-99.29%) and 46.15% (CI 23.21-70.86%) respectively. The positive predictive value and negative predictive value of CT scan was 77.42% (CI 60.19-88.61%) and 85.71%% (CI 48.69-97.43) respectively.

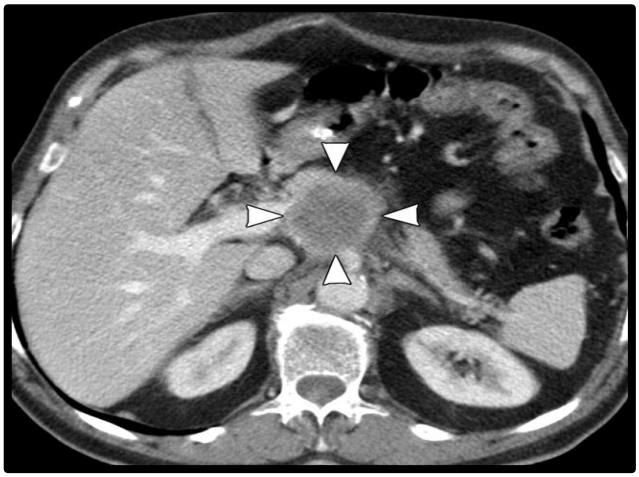

Figure 1: CT scan shows a tuberculous lymph node with the characteristic low-attenuation center and peripheral rim enhancement (arrowheads).

Mesenteric lymph nodes were biopsied from 25 patients (65.78%), 1 lymph node specimen (2.63%) from caeliac group of lymph node and 1(2.63%) from peri-pancreatic group as given in Figure 2. So total 27 lymphnode specimens were taken from 25 patients. Out of 27, 20 mesentric lymph nodes had positive (74.07%) histology for tuberculosis. 7 lymph nodes (25.92%) were negative for tuberculosis and 13 patients (34.21%) did not have any lymph node.

Amongst the 20 histology positive patients 14 (70%) had caseating granuloma and 6 had non-caseating granuloma (30%). Amongst the 7 histology negative patients, all 7 had nonspecific chronic inflammation with reactive lymph nodes. The sensitivity and specificity of lymph nodes are 80% and 100% respectively. The positive predictive value and negative predictive value of lymph

nodes are 100% (CL 83.89-100%) and 72.22% (CI 49.13-87.5%) respectively.

Small amounts of peritoneal fluid was aspirated and sent for CBNAAT from 30 patients (78.94%) and peritoneal fluid was absent in other 8 patients (21.05%) as shown in Figure 3. The amount of fluid present during laparoscopy varied widely from minimal amount to 200 ml, except in two patients where it was about 500 ml and up to 20 ml of specimen was sent for tuberculosis culture from each patient.

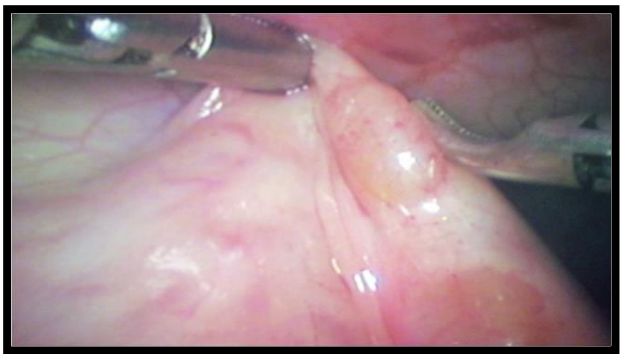

Figure 2: Mesenteric lymphadenopathy.

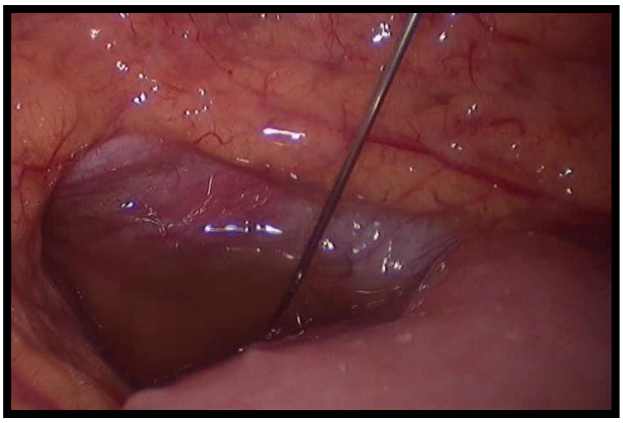

Figure 3: Peritoneal fluid aspiration.

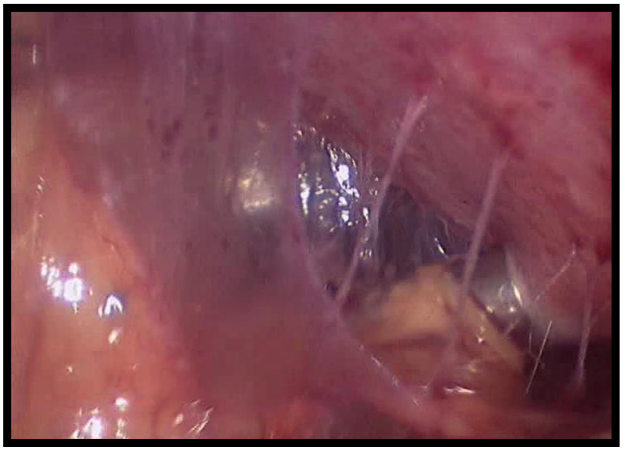

Figure 4: Extensive intra peritoneal adhesions.

Among 30 patients, 10 were positive (33.33%) for tuberculosis gene and 20 (66.33%) were negative. The correlation has been established between the peritoneal fluid CBNAAT and histology results. It has been found that all 10 patients had histology positive. The sensitivity and specificity of peritoneal aspirate CBNAAT are 40% (CI 23.4-59.26%) and 100% (CI 77.19-100%) respectively. The positive predictive value and negative predictive value of peritoneal fluid CBNAAT are 100% (CI 72.25-100%) and 46.43% (CI 29.53-64.19%) respectively.

38 specimens (100%) were taken from omentum and sent for histological examination; 21 of them were positive (55.26%) for tuberculosis and 17 were negative (44.73%). Amongst the 21 positive patients 16 had caseating granuloma (76.19%) and 5 had non-caseating granuloma.[23]

Amongst the 17 histology negative patients, all had nonspecific chronic inflammation, one had no pathology found. The sensitivity and specificity of omentum histology are 84% (CI 65.35-93.6%) and 100% (CI 77.19-100%) respectively. The positive predictive value and negative predictive value of omentum are 100% (CI 84.15 - 100%) and 76.47% (CI 52.74-90.45%).

Peritoneal tubercles

These are present and sent for histological examination in 17 patients (44.73%) and there was no deposit in the other 21 patients (55.26%); 14 of them were positive (82.35%) for tuberculosis and 3 (17.64%) were negative.

Amongst the 14 positive patients 10 had caseating granuloma (71.42%) and 4 had non-caseating granuloma (28.57%). Amongst the 3 negative patients, all had nonspecific chronic inflammation. The sensitivity and specificity of tubercles are 56% (CI 37.07-73.33%) and 100% (CI 77.19-100%) respectively. The positive predictive value and negative predictive value of tubercles are 100% (95% CI 56- 93%) and 54.17% (95% CI 28- 53%) respectively.

Total 24 patients had histology positive for tuberculosis. 1 patient had histology negative but peritoneal fluid CBNAAT positive. Total (24+1) 25 patients had positive tuberculosis findings. 13 patients were negative for tuberculosis. The histology, AFB staining and ascitic fluid CBNAAT were all negative for tuberculosis in 13 patients, but it showed non-specific chronic inflammation in 12 and no pathology was found in one patient. The histology, AFB staining and ascitic fluid CBNAAT were all positive in 2 patients. Sensitivity and specificity of these couldn't be established because the numbers of patients are not the same in all the group of tests.

A total 3 patients (7.89%) had conversion to laparotomies for various reasons; there was no death related to conversion to laparotomy. All 38 patients undergoing

laparoscopy were started on standard anti-tuberculosis treatment without delay, whilst awaiting histology report. 31 patients were started on category 1 while 7 pateints were started on category 2 treatment. Follow up of our patients was good. We followed the patient up to two months post laparoscopy. No patients died during that two months period. Out of 38 patients, only 24 patients (63.15%) came for review, all of them had positive diagnosis of tuberculosis and all of them improved symptomatically with anti TB medications. Repeat abdominal U/S, Hb%, were done and body weight were taken in all 24 patients and a trend of improvement was noted in all patients. There was no procedure related mortality during or after the laparoscopy.

DISCUSSION

It has been established that the incidence of all tuberculosis, including abdominal tuberculosis is rising and the diagnosis is still difficult.

The mortality of tuberculous peritonitis is 47- 49% if untreated, although it can be less than 5% with treatment, several studies report a mortality of up to 60% mainly because of delayed or missed diagnosis.[7,9] To avoid any delay or missed diagnosis we wished to look at the utility of diagnostic laparoscopy in abdominal tuberculosis. Although the concept of diagnostic laparoscopy in tuberculosis is not new.[8,9] Historically peritoneal biopsy or peritoneoscopy.[13] used to be done under local anaesthetics with a limited view of the abdominal cavity and higher complication rates, whereas at present laparoscopy is performed under general anaesthesia with better intra-operative views and less complication rates.[11,12]

The male female ratio is highly variable from equal in the series reported by Ramesh et al to marked male predominance reported in Abdelaal A et al and to a marked female predominance in the study of Safarpor Faizollah et al.[1,5,15] In present study , disease incidence was found to be more in males 20(52.63%) cases, females were 18(47.36%) with male to female ratio of 1:09 which is comparable with study by Rai et al, Ramesh J et al.[3,5]

The most common symptom in present study was abdominal pain in 35 patients (92.10%) followed by loss of appetite and abdominal distention (71.05% each), fever (68.42%) and weight loss (65.78%) which is comparable with studies by Rai et al, Khan R et al, Islam J et al[3,4,30] Pallor and abdominal tenderness was common findings present in 65.78% and 63.15% patients respectively. Finding of abdominal tenderness in present study is comparable with study by Safarpor Faizollah et al.[1] In the present study, association of old pulmonary TB with abdominal TB was found in 16.12% patients which comparable with study by Rai et al and more than in study by Ramesh J et al while family history of pulmonary TB or treatment for pulmonary TB in family member was found in 22.58% patients with abdominal TB which is comparable with study by Rai et al.[3,5]

In the present study, 68.41% patients had normocytic normochromic anemia which is comparable to study by Wells AD et al and Ramesh J et al while 28% patients showed raised TLC count which is comparable with Islam J et all .[5,29,30]

The chest radiographs of only 8 patients (21.05%) were suggestive of tuberculosis with pulmonary infiltrates, though sputum cultures were negative in all 10 patients; a percentage one fourth of that reported in studies by Nafeh et al and Ramesh J et al.[13,5] Ultrasonography of abdomen was suggestive of tuberculosis in all patients, but histology/CBNAAT results were positive in 25 patients. Though the sensitivity of CT scan was high (96%), the specificity was very low (46.15%) in our series. In the series presented by Bolukbas et al, the evidence of abdominal tuberculosis e.g. ascites, gut wall thickness, lymphadenopathy, abscess, and organomegally were detected in 82% of patients.[29] Caseating lymph nodes with hypodense centres and peripheral rim enhancement along with calcification are highly suggestive of tuberculosis.[2] Histology for tuberculosis was positive in 71.42% of patients with high ESR which is comparable with study by Islam J et all.[30] 10 patients (33.33%) had positive CBNAAT from peritoneal aspirate which is comparable with study by Jin et al.[28]

Mesenteric lymphadenopathy was the common finding in our series and 27 (71.05%) of our patients had lymph nodes biopsied which is comparable with study by Islam J et all.[30] Tubercles were present only in 44.73% of our patients, whereas Nafeh et al had 58% and Al-Mulhim et al had 91% of their patients with tubercles.[13,23] Adhesions were present in 12 patients (31.57%) in our series which was less than in the series by Nafeh et al (42%) and Al-Mulhim et al (52%) and more than in study by Islam J et all (22%).[13.23.30]

The most tuberculosis positive histology specimens are tubercles (82.35%) and lymph nodes (74.07%). The most sensitive specimen is omentum (84%) and the most specific specimen is omentum (100%). The least sensitive specimen is peritoneal aspirate (40%).Thirteen patients had diagnosis other than tuberculosis (34.21%) and these 13 patients would have been started on anti-tuberculosis therapy based on clinical and radiological findings.

Our main concern is these 13 patients (34.21%) who are tuberculosis negative and had no other alternative diagnosis. 12 of them had non-specific chronic inflammation (31.57%) and one had no pathology (2.6%). Al-Mulhim et al had 19% non-specific chronic inflammation, Nafeh et al had 3% of their patients with non-specific chronic inflammation and 7% with unsatisfactory biopsy and Islam J et al had 18% non-specific chronic inflammation.[23,13,30]

Three patients (7.89%) had peri operative complications e.g. bleeding and difficult access and had to be converted to laparotomy. These laparotomies are for bleeding and adhesions both (7.89%). Mimica et al reported 16% conversion rate to laparotomy due to adhesions while

Islam J et al reported conversion rate (11%) to laparotomy due to bleeding (33%), adhesions (22%), bowel perforation (22%) and technical difficulties (22%).[19,30]

CONCLUSION

This study has shown the feasibility of performing laparoscopy in the majority of patients with suspected abdominal tuberculosis. It has a high yield to establish the diagnosis of abdominal tuberculosis (65.78%) by sampling macroscopically pathological tissues.

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Ethical approval: The study was approved by the institutional ethics committee

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