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Role of Diagnostic Laparoscopy in Patients Suspected Of Abdominal Tuberculosis

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Abstract:
Background :*Tuberculosis (TB) is a life-threatening disease causing million deaths every year and is one of the commonest causes of death in the young making it a global emergency. A large number of these patients present with acute abdomen and are diagnosed on exploratory laparotomy only. These laparotomies could be easily avoided had there been an efficient and reliable method to diagnose abdominal tuberculosis early.*
Materials and Methods: *This prospective observational study included 50 people. In this study, patients suspected of tuberculosis were subjected to ESR, Mantoux test, Ultrasound, CECT – Abdomen and Diagnostic laparoscopy. The study observed the sensitivity and specificity of these tests and compared the positive and negative predictive values of one another in diagnosing abdominal tuberculosis.*
Results: *After the study, Tubercle and diseased omental deposit, lymph node biopsy with CBNAAT analysis of ascitic fluid were considered as the best laparoscopic finding to confirm Abdominal Tuberculosis as these have statistically significant P value. It was also inferred that diagnostic laparoscopy with clinical and radiological evidences have 100% sensitivity with 66% PPV, suggesting some tissue diagnosis is essential to confirm the diagnosis of tuberculosis and start definitive treatment at the earliest.*
Conclusion: *Laparoscopy combined with biopsy is the most sensitive and a quick method for diagnosing abdominal tuberculosis. Hence early diagnosis with the help of diagnostic laparoscopy should be promoted as it allows an early initiation of anti-tubercular therapy and avoids the morbidity and mortality associated with laparotomy in these patients.*
Key Word: *Abdominal tuberculosis, Diagnostic Laparoscopy*

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I. Introduction

Abdominal tuberculosis which involves the bowels, peritoneum, lymph node or solid viscera, constitutes up to 12% of extrapulmonary tuberculosis. Only 15-20% patients of abdominal tuberculosis have active pulmonary tuberculosis. [1,2] Abdominal tuberculosis can infect any part of the gastrointestinal tract, including the peritoneum and pancreato-biliary system. [3] The presentation of abdominal tuberculosis always mimics many other conditions like inflammatory bowel diseases and other similar conditions.[4]

This state of confusion usually leads to an undue delay in diagnosis and treatment plan and thus further increases the overall morbidity. A large number of these patients present with acute abdomen and are diagnosed on exploratory laparotomy only. The laparotomies could be easily avoided had there been an efficient and reliable method to diagnose abdominal tuberculosis early. This actually led to the consideration of diagnostic laparoscopy in all patients with suspected abdominal tuberculosis to find out tuberculous lesions and to take biopsy of any such foci.[5,6] Hence we prospectively assessed the role of diagnostic laparoscopy in patients with suspected abdominal TB.

Abdominal tuberculosis tends to present with non-specific clinical feature and is difficult to diagnose in early stage. Imaging studies and serological tests provide only indirect evidence of the underlying disease.[1]This study was focused on the possible role of laparoscopy to establish the histopathological diagnosis / laboratory evidence of tuberculosis in patients having a high degree of suspicion. Early diagnosis and starting early anti-tubercular treatment can decrease morbidity and can facilitate an early recovery and return to work. This has a lot of benefits to the patient, the community and a major cut short on the burden of health facility.[7]
This prospective study was performed to find out an efficient and practical tool for diagnosing this problem.

II. Aim and Objectives

1.The aim of this study is to know the Role of the diagnostic laparoscopy in patients suspected of abdominal tuberculosis.
2.The objectives of this study being the establishment of gross laparoscopic features of abdominal tuberculosis and to assess the sensitivity and specificity of the diagnostic tool in comparison to other methods.

III. Materials And Methods

This prospective comparative study was carried out on patients of Department of general Surgery at Deen Dayal Upadhyay Hospital, Hari Nagar, New Delhi, India from October 2017 to May 2020. A total of 50 subjects (both male and females) of aged > 12 years were for in this study.
Study Design: Prospective open label observational study.
Study Location: This was a tertiary care teaching hospital based study done in Department of General Surgery, at Deen Dayal Upadhyay Hospital, Hari Nagar, New Delhi, India.
Study Duration: October 2017 – May 2020.
Sample size: 50 patients.
Study population: Patients with clinical suspicion of abdominal tuberculosis reporting to the Department of Surgery, Deen Dayal Upadhyay Hospital, New Delhi
Sample size calculation: A prospective audit of the use of diagnostic laparoscopy to establish the diagnosis of abdominal tuberculosis was studied by J. Islam, D. Clarke, S. R. Thomson, D. Wilson, H. Dawood.[8]The study observed the sensitivity and specificity of mass, tubercles and omentum, for identifying tuberculosis was (27% and 89%),(31%,86%), and (61%,94%)respectively and prevalence of tuberculosis was 68%. Taking these values as reference, the minimum required sample size with 5% level of significance was 38 patients. So total sample size taken was 50.
Formula used :-

		Disease +	Disease -
Test	+	*a*	*b*
	-	*c*	*d*
		(a+c)	*(b+d)* *N*

$$n = \frac{Z^2 * P(1-P)}{\Delta^2} \qquad (1)$$

n will be $(a+c)$ if we use Sensitivity as P, and n will be $(b+d)$ if we use Specificity as P in formula (1).

$$N = \frac{(a+c)}{\text{Prevalence}} \qquad (2)$$

$$N = \frac{(b+d)}{(1-\text{Prevalence})} \qquad (3)$$

Where Z is value of Z at two sided alpha error of 5% and is desired precision.

Selection of patients:

Inclusion criteria:
1) Patients with abdominal pain and a history of weight loss, loss of appetite & prodromal symptoms for more than two weeks (dry type).
2) Patients with ascites, known case of Pulmonary TB and history of weight loss, loss of appetite & excessive night sweats for more than two weeks (wet type).
3) Patients with history of chronic abdominal pain for longer than 3 months with positive family history of TB.
4) Patients with ascites of unknown origin with equivocal biochemical findings.
5) Patients with Ultrasonological and / or CT finding suggestive of Tuberculosis.

Exclusion criteria:
1) Pregnancy
2) Patient unfit for General Anaesthesia as per ASA guidelines.
3) Patients with 2 severe comorbid condition.

4) Patients with acute abdomen
5) Diagnosed cases of abdominal Tuberculosis by other means like CBNAAT

Outcome variables:
Per operative diagnosis of abdominal tuberculosis were made on the basis of presence of any or all of the operative (laparoscopic) findings such as
1) Multiple peritoneal adhesions,
2) Fibrous bands
3) Whitish peritoneal tubercles
4) Omental thickening, Lymph node enlargement, strictures and ascites.

All the 50 people in this study were subjected to Chest X-Ray, ESR, Mantoux test, Ultrasound, CECT-whole abdomen and Diagnostic laparoscopy. Diagnosis was confirmed with histopathology of peritoneal tissue biopsy. Also the biochemical analysis of ascitic fluid was routinely performed if any ascites present and CBNAAT studies of tissue / ascitic fluid.

IV. Results

Majority of the patients (44 %) were in the age group of 21-30 years and 87% of cases in the age group of 11-20 years were positive for tuberculosis. ESR was found to be raised in (70%) 35 patients in this study. 21 cases of raised ESR were Histo-pathologically confirmed Tuberculosis cases. ESR in this study had an accuracy of 60% (21 out of 35).

In this study, only in (63.16%) 12 out of 19 Mantoux positive patients, Mantoux findings corroborated with histopathological diagnosis of TB. USG abdomen was able to suggest 39 patients as tubercular abdomen. In among these 39 patients diagnosis of TB was corroborated with histopathological diagnosis of TB in 24 patients only. Thus in the diagnosis of TB, USG was helpful in 24(61.54%) patients as true positive TB case but in 15 patients (38.46%) as false positive case. P value was not statistically significant.
CECT abdomen was able to suggest 31 patients as tubercular abdomen. In the diagnosis of TB, CECT was helpful in 27 patients(87.10%) as true positive TB cases and P value was not statistically significant.

Table no 1: Shows Correlation between Laparoscopic findings and HPE

LAPAROSCOPIC FINDINGS	HPE		Total
	-	+	
+	17 (34.00%)	33 (66.00%)	50 (100.00%)
Total	17 (34.00%)	33 (66.00%)	50 (100.00%)

Diagnostic laparoscopy was done in all the patients. Mesentric lymph node and biopsy from other site was taken in all 50 patients. In 17 cases findings were Normal and 33 patients HPE findings were suggestive of TB.

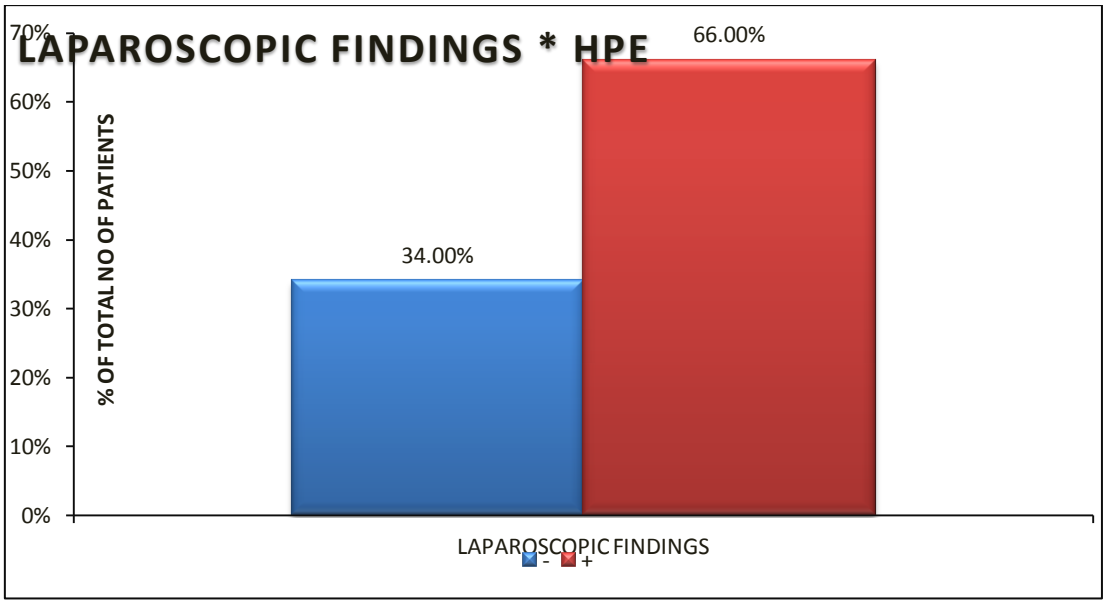
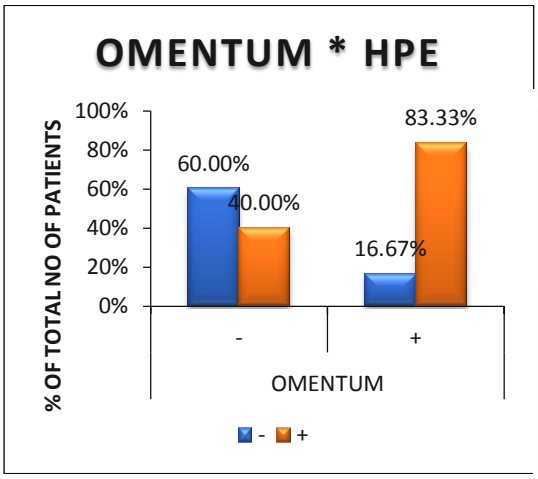


Table no 2: Shows Tubercles/nodules findings over peritoneum, omentum, small bowel in relation with HPE findings:

TUBERCLES / NODULES (Peritoneum, Omentum, small Bowel)(LAPAROSCOPIC FINDINGS)	HPE		Total	P value
	-	+		
-	13 (50.00%)	13 (50.00%)	26 (100.00%)	0.018
+	4 (16.67%)	20 (83.33%)	24 (100.00%)	
Total	17 (34.00%)	33 (66.00%)	50 (100.00%)	

Tubercles were seen in 24 cases of which 20(83.33%) cases were histologically proven TB. It has a P value of 0.018 suggestive of statistically significant. Adhesions, bands and conglomerated bowel mass(cocoon) seen in 24 patients of which 19 (79.17%) patients corroborated with histological findings of TB. It has a P value of 0.059 s/o statistically not significant finding.



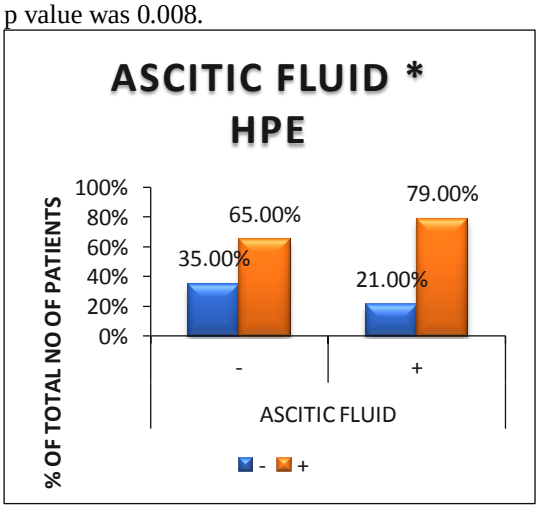
Multiple tubercles and deposits over omentum, peritoneum and small bowel

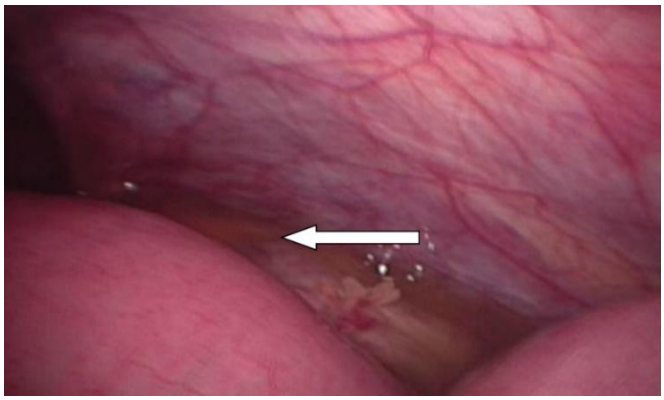
Omental deposits were seen in 30 patients, out of which 25(83.33%) cases were histologically proven TB. Its P value is 0.002, statistically significant.

Table no 3: Shows Ascitic fluid's analysis in comparison to HPE:

ASCITIC FLUID	HPE		Total	P value
	-	+		
-	15 (35.00%)	28 (65.00%)	43 (100.00%)	0.008
+	2 (21.00%)	5 (79.00%)	7 (100.00%)	
Total	17 (34.00%)	33 (66.00%)	50 (100.00%)	

Of the 7 patients with ascites, 5 patients were CBNAAT positive and these 5 patients were HPE proven TB. 79% of ascetic fluid was found to be positive and was HPE proven and the data was **statistically significant** as p value was 0.008.





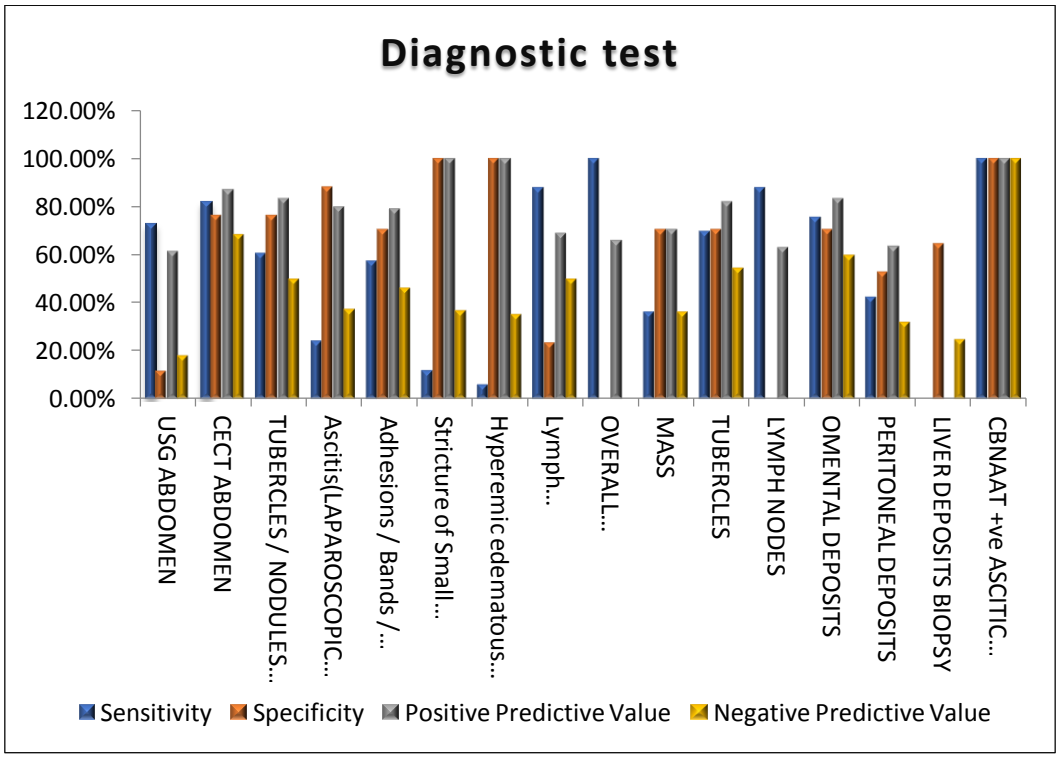
Photograph showing Ascites

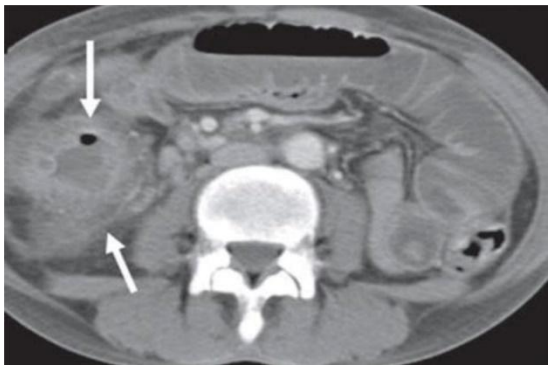
Table no 4: Shows USG Abdomen v/s Diagnostic Laparoscopy in HPE proven cases:

Method	Patients of 33 HPE proven TB	Percentage
USG +ve	24	72.7%
DL	33	100 %

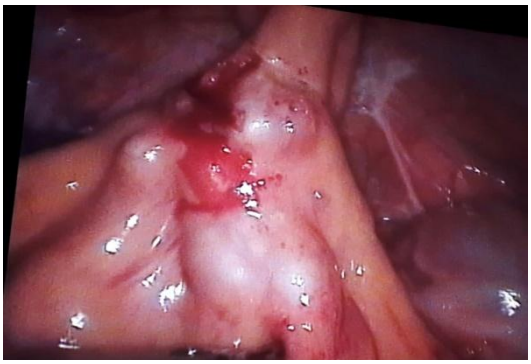
Table no 5: Shows CECT abdomen findings vs Diagnostic Laparoscopy in HPE positive TB cases:

Method	Patients of 33 HPE proven TB	Percentage
CECT +ve	27	87.1%
DL	33	100 %



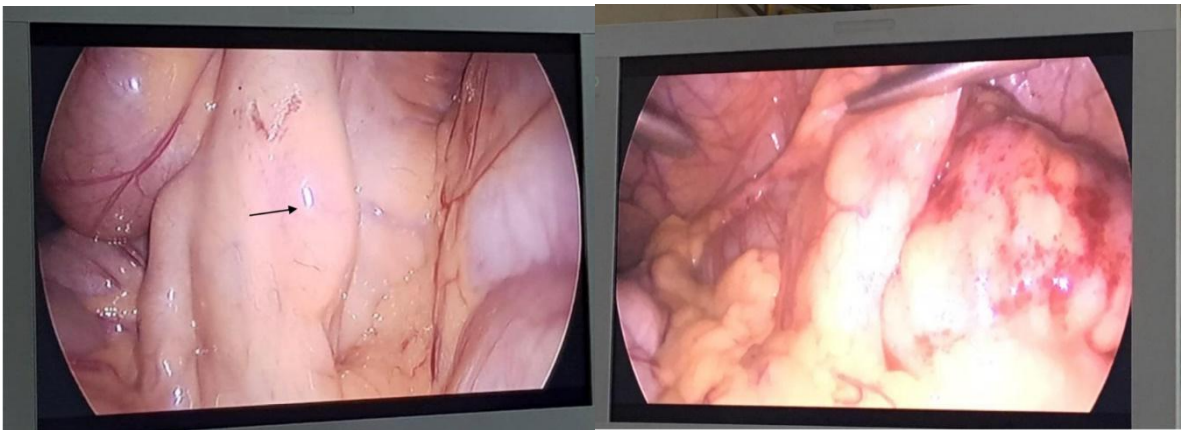


CT showing Ileocaecal thickening



Adhesion and conglomerated mass with mesenteric lymphadenopathy

Mesenteric lymph node biopsy being taken during laparoscopy



Mesenteric lymphadenopathy Hyperemic bowel with adhesions & tubercles

Amongst all the findings USG abdomen has 72.73% sensitivity, 11.76% specificity, PPV of 61.54% and NPV of 18.18% suggesting USG abdomen has a good sensitivity but poor specificity. CECT abdomen has 81.81% sensitivity, 76.4% specificity and PPV of 87.09% and NPV of 68.42%. Amongst all the laparoscopic findings ascitic fluids analysis using CBNAAT when compared with HPE, CBNAAT has 100% sensitivity and 100% specificity with 100% PPV and 100% NPV suggesting ascetic fluid analysis by CBNAAT to be the best finding for diagnosis. However, when the findings of ascetic fluid were compared with histopathological findings, it was found that simple ascitis have a sensitivity of 24.24%, specificity of 88.24%, PPV of 80% and NPV of 37.50%

Tubercles/ nodules over peritoneum, omentum, small bowel has sensitivity of 60.61%, specificity of 76.47% and PPV of 83.33% with P value of 0.018, statistically significant data suggesting it as one of the important laparoscopic finding consistent with TB. While **overall Tubercle and diseased omental deposit, lymph node biopsy with CBNAAT analysis of ascetic fluid were considered as the best laparoscopic finding to confirm Abdominal Tuberculosis** as these have statistically significant P value.

V. Discussion

Tuberculosis (TB) is the most important communicable disease world-wide.[9] Abdominal TB refers to TB infection of any organ in the abdominal cavity, including the gut and peritoneum. Abdominal TB is suspected in patient with abdominal pain, distension, fever, unexplained weight loss, chronic diarrhoea or an abdominal mass.[10]

CLASSIFICATION OF ABDOMINAL TUBERCULOSIS [11]

l. Peritoneal Tuberculosis

- Wet or Ascitic type
- Dry
- Fibrous

2. Gastrointestinal Tuberculosis

- Ulcerative
- Hyperplastic
- Ulcero-Hyperplastic

3. Tuberculosis of Solid Organs- liver, spleen, pancreas

Although multiple investigations were used in diagnosing abdominal tuberculosis, Diagnostic Laparoscopy remains the more efficient of them all as it allows direct observation of the entire peritoneal space and enables targeted biopsy of the suspicious lesion. The characteristic laparoscopic appearance as described by Bhargava et al.[12] , include three types:

1.Thickened, hyperemic peritoneum with ascites and whitish granular nodules (<5mm) scattered over the peritoneum.

2.Thickened, hyperemic peritoneum with ascites and adhesions.

3.Markedly thickened parietal peritoneum with possibly yellowish nodules and cheesy material along with multiple thickened adhesions (i.e., the fibro adhesive type).

Albeit all these investigations, Histopathology is considered as the gold standard for diagnosing abdominal tuberculosis.[13]

In this study, 50 patients suspected with abdominal tuberculosis were selected after taking informed consent. All of them underwent series of tests like ESR, Mantoux test, CBNAAT (in presence of ascitis), USG and CECT abdomen before undergoing diagnostic laparoscopy.In our study 50patients, who had radiological evidence with clinical suspicion of abdominal tuberculosis, underwent diagnostic laparoscopy and finding suggestive of TB was made in 50 patients (100%), which was proven as tuberculosis on biopsy in 33(66%) patients of chronic abdominal pain with unsettled diagnosis. The characteristic laparoscopic appearance of 50 patients included three types as classified by Bhargava et al.[12]

We interpreted that Conventional diagnostic tools are only suggestive of tuberculosis, they don't confirm tuberculosis in itself. Whereas, diagnostic laparoscopy with clinical and radiological evidences is essential to confirm the diagnosis of tuberculosis and start definitive treatment at the earliest. Moreover, diagnostic laparoscopy with ascitic fluid sampling / tissue sampling for histopathological confirmation avoids unnecessary use of ATT and its consequential disadvantages.

Laparotomy is associated with high morbidity and mortality rates and this is almost certainly due to the chronic nature of these infectious processes. We have shown that laparoscopy is a safe alternative to laparotomy, which provides meaningful information and allows for the diagnosis of tuberculosis to be confirmed and other alternative diagnoses to be excluded.

VI. Conclusion

Laparoscopy despite being distinctly better is still not popular and infrequently used as a diagnostic tool in evaluation of patients with nonspecific chronic abdominal pain. Our study underlined the importance of laparoscopy in management of these patients. Early diagnosis with the help of diagnostic laparoscopy should be promoted as it allows an early initiation of anti-tubercular therapy and avoids the morbidity and mortality associated with laparotomy in these patients. Laparoscopy combined with biopsy is the most sensitive and a quick method for diagnosing abdominal tuberculosis.

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