<u>**Original Research Article**</u>

Observational Study of Suspected Cases of the Abdominal Tuberculosis on the Basis of Cartridge Based Nucleic Acid Amplification Test (CBNAAT) Compared with Histopathology Examination

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Abstract

Background: Tuberculosis is a chronic granulomatous infectious disease, primarily affecting the lungs. However, it is a systemic infection and may involve any organ. Most of the abdominal tuberculosis cases are either missed or diagnosed late, both this late and missed diagnosis contributes to high mortality and morbidity.

Aim: Comparison of diagnostic accuracy of CBNAAT and Histopathological examination in suspected case of abdominal tuberculosis.

Methods: This is a prospective observational study on 37 operative cases with sub-acute intestinal obstruction, intestinal stricture, intestinal adhesion, appendicular lump, intestinal perforation and mesenteric lymphadenopathy with consecutive sampling during the period of 2 years (January 2021– December 2022) conducted in the department of surgery, JLN Hospital Ajmer.

Results: Mean age of study population was 41.58±22.01 yrs. (age range of 7 month -76 yrs.). Adhesion (35.14 %) was found to be the most common intra operative finding followed by Intestinal perforation (32.43%), SAIO, or RIF mass (32.43%). About 73% patients were found to be tuberculosis positive in histopathology examination whereas only 24 % of the patients were found to be microbiologically confirmed for mycobacterium tuberculosis on CBNAAT. For CBNAAT sensitivity was 88.88% and specificity was 32.14%. Positive predictive value was 29.62% and negative predictive value was 90%. Mean length of hospital stay was 15.43±5.96 days. 2.70% had recurrence after discharge from hospital.

Conclusion: In abdominal tuberculosis, CBNAAT had high sensitivity and low specificity, making it more a screening tool than a diagnostic tool.

Keywords: Abdominal tuberculosis, CBNAAT, Histopathology.

Introduction

Tuberculosis is a chronic granulomatous infectious disease, primarily affecting the lungs. However, it is a systemic infection and may involve any organ. Major portion of the global TB burden (56%) is represented by South East Asia and Western Pacific regions. Among these, India itself accounts for one-fourth of the cases.[1] In India, 550,000 deaths happen due to TB each year.[2] Abdominal TB constitutes 12% of all extra-pulmonary TB cases and is one of the most common forms of extra-pulmonary TB. Gastrointestinal (GI) tuberculosis (TB) accounts for 1% to 3 % of all TB cases worldwide.[3] Patients with abdominal tuberculosis presents with wide variety of symptoms ranging from fever, abdominal pain, weight loss, loss of appetite, diarrhoea, constipation, bleeding per rectum.[4] The above constellation of symptoms overlaps with lot of other diseases which makes the diagnosis of abdominal tuberculosis very difficult.[5]

Its non - specific and protean clinical manifestations cause of intestinal tuberculosis to be confused with many other diseases especially Crohn's disease and intestinal neoplasms. The symptoms and sign often quite vague and laboratory investigation and radiological findings are sometime non-conclusive. There is no single feature which is diagnostic for Gastrointestinal tuberculosis. In case of any localized involvement of the structures of the abdomen the presenting clinical picture will mimic the disease of that organ only. It continues to challenge the diagnostic acumen and therapeutic skills of the present-day surgeon.

World Health Organisation has recommended Xpert MTB/ RIF as the newer replacement for the initial diagnostic modality to be used in case of tuberculosis.[6] The intervention was implemented with an objective of decreasing the time of diagnosis and decentralising the diagnosis of resistant mycobacterium. It is looked as one of the novel interventions placed in the path of eradicating mycobacterium tuberculosis. Though many studies have documented the efficacy of Gene Xpert for pulmonary tuberculosis, very few studies have been done with an objective of finding out the efficacy of CBNAAT in extra-pulmonary samples. This is a prospective observational study conducted for comparison of diagnostic accuracy of CBNAAT and Histopathological examination in suspected case of abdominal tuberculosis.

Material & Methods

This was a prospective observational study on 37 operative cases with sub-acute intestinal obstruction, intestinal stricture, intestinal adhesion, appendicular lump, intestinal perforation and mesenteric lymphadenopathy with consecutive sampling during the period of 2 years (January 2021–December 2022) at department of surgery JLN Hospital Ajmer. Patient with intraoperative finding of peptic perforation, blunt trauma abdomen were excluded.

After obtaining permission from Ethical Committee and informed written consent of study population selected through analyzing inclusion and exclusion criteria and with help of consecutive sampling, the questionnaire was administered to the study subjects. All patients undergo through clinical examination and base line investigations which include CBC, BT, CT, RFT, LFT, Serum electrolyte, HIV, HbsAg, ESR, Chest X-RAY, FPA, USG Abdomen and MANTOUX TEST. Then proper written and informed consent for surgery was taken. Laprotomy was done & Intraoperative finding was noted. Sample for CBNAAT sent in falcon tube with normal saline to microbiology lab. Sample for histopathology sent in formalin to pathology lab.

Statistical Analysis

All the data collected was entered into excel spread sheet. Descriptive statistics like proportions and percentages were employed for describing the qualitative data and whenever quantitative data was encountered, they were expressed using mean and standard deviation. For comparing the diagnostic accuracy of the tests, the results were obtained after obtaining the distribution into medcalc's diagnostic test evaluation calculator. The results consisted of sensitivity, specificity, predictive values and diagnostic accuracy. In order to find out the agreement in diagnosis between two modalities kappa statistics were employed. A p value of less than 0.05 was taken as statistically significant result.

Results

In our study, 21.62% of the patients were up to 20 year and 51–60 years age group followed by 18.92% of the patients were in 21-30 year age group. Mean age of study population was 41.58±22.01 years with age range of 7 month to 76 years. Maximum patients (35.41 %) belong to economic productive age group (21-50 year age group). 56.76% of the patients were male and 83.78% were from rural population. Mean BMI of study population was 23.35 ± 3.29 kg/m^2. 54.05% of the patients belong to lower class (<1230rs) followed by (35.14%) lower middle class (1230 – 2464rs) whereas few of the patients 2.70% had upper class (4110 – 8219rs. (Table 1)

Table 1 : Sociodemography

Age (yrs)	Number	Percentage
Up to 20	8	21.62
21 – 30	7	18.92
31 – 40	2	5.41
41 – 50	4	10.81
51 – 60	8	21.62
61 – 70	5	13.51
71 – 80	3	8.11
Sex		
Male	21	56.76
Female	16	43.24
Residence		
Rural	31	83.78
Urban	6	16.22

In male, the most common presenting complain was abdominal distension (85.71%) followed by abdominal pain (80.95%) whereas in female, the most common presenting complain was abdominal pain and vomitting (75%%) followed by abdominal distension (68.75%) The difference was not statistically significant. (p>0.05) (Table 2)

Table 2 : Presenting complaints

Complaint	Male (n = 21)		Female (n =16)		Total
	No.	%	No.	%	
Pain abdomen	17	80.95	12	75.00	29
Fever	8	38.10	5	31.25	13
Vomiting	15	71.43	12	75.00	27
Distension	18	85.71	11	68.75	29

Mass abdomen	10	47.62	8	50.00	18
Loss of weight	10	47.62	7	43.75	17
Loss of appetite	10	47.62	8	50.00	18

Only 16.22% of the patients were sputum positive for AFB and 35.14% of the patients were mantoux test positive. 13.51% of the patients had positive past history or family history for tuberculosis. only 24.32% of the patients were found to be microbiologically confirmed for mycobacterium tuberculosis on CBNAAT. Drug resistance was not found in any patient on CBNAAT in our study. Most of the patients (72.97%) were found to be positive for tuberculosis on histopathology. Maximum duration at hospital was found to be > 25 day's for 3 patient with mean duration of hospital stay with 15.43±5.96.

Adhesion (35.14 %) was found to be the most common intra operative finding followed by Intestinal perforation (32.43%), SAIO, or RIF mass (32.43%). (Figure 1)
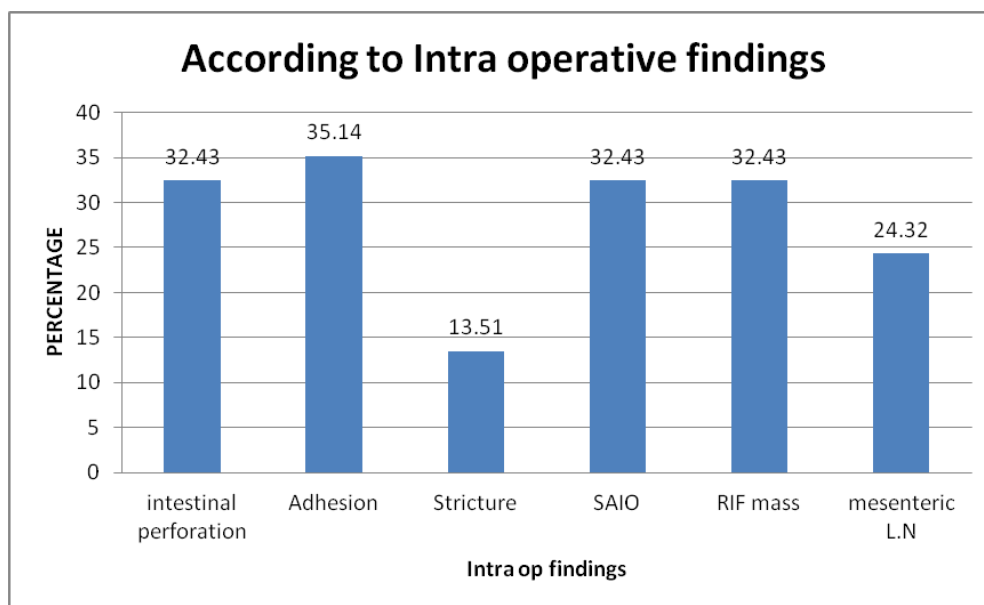

Figure 1: Intra operative findings

In our study, 43.24% of the patients developed surgical site infection, whereas 54.05% had no complications after laparotomy. Only one patient was died due to cardio-pulmonary complication. In our study, at the time of discharge 94.60% of the patients were recovered whereas 2.70% of the patients had recurrence after discharge from hospital. (Figure 2)
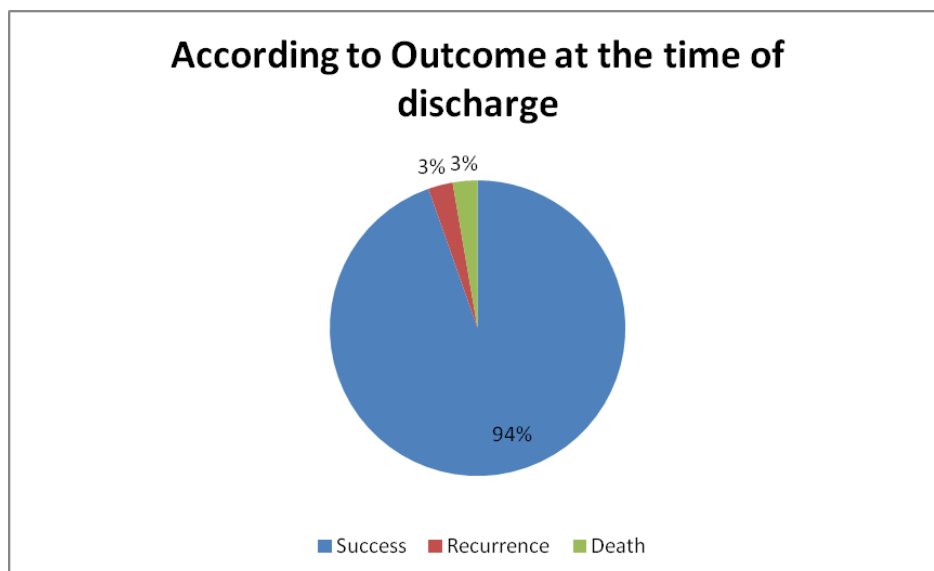
Figure 2 : Outcome at the time of discharge

In our study, as per CBNAAT we observed, true positive were 8 cases and true negative were 9 cases so the sensitivity was 88.88% and specificity was 32.14%. Positive predictive value was 29.62% and negative predictive value was 90%. The difference between Histopathology and CBNAAT were found to be statistically significant. (p<0.05) (Table 3)

Table 3 : Correlation between Histopathology & CBNAAT

Histopathology	CBNAAT		
	Positive	Negative	Total
Positive	8	19	27
Negative	1	9	10
Total	9	28	37
P value	=0.0001		

Discussion

In our study, 21.62% of the patients were up to 20year and 51 – 60 years age group followed by 18.92% of 21 – 30 years age group. Mean age of study population was 41.58 ± 22.01 years with age range of 7 month -76 years and 56.76% of the patients were male. Similar results were found by Monika Keena et al. (2021).[7]

The most common presenting symptoms in our study was pain abdomen or distension in 78.38% followed by vomiting in 72.97% while 35.14% of patients presented with fever followed by loss of weight. Similar study was done by Monika Keena et al. (2021)[7] found that the most common presenting symptom was abdominal pain which was seen in 82.8% (n = 116) of the patients, followed by fever in 65.6% (n = 92) cases. similar results were also found in a study by Balaji L Bellam, Harshal S Mandavdhare et al. (2019)[8] that abdominal pain was present in 33 (88.5%) patients and diarrhea in 12 (30%). According to intra operative findings, about 35.14% of the patients had adhesion followed by 32.43% had perforation, SAIO, RIF mass each whereas only 13.51% had stricture followed by 24.32% mesenteric lymph nodes. Similarly study done by Alaknanda Dasgupta, Navjeevan Singh.et al. (2009)

found that Perforations were present in 39 out of 49 (79.6%) intestinal tissues.

In our study, only 24.32% cases were found to be microbiologically confirmed for tuberculosis on CBNAAT. Similarly study done by N Nishal *et al*. (2022)[9] found abdominal TB in 33.3% cases.

In our study, 72.97% of the patiens were found to be positive for tuberculosis on histopathology. Similarly study done by Raheel Ahmed, Mehwish Changeez.*et al*. (2018)[10] out of the total 21 samples analyzed, all were positive for tuberculosis (TB) by histopathology.

In our study, mean length of hospital stay was 15.43±5.96 days. 43.24% of the patient developed surgical site infection whereas 54.05% had no complications. Only one patient was reported to death in our study after laparotomy. At the time of discharge 94.59% patient were recovered whereas 2.70% patient had recurrence after discharge and 2.70% patients was dead after Laparotomy.

In our study as per CBNAAT we observed, true positive were 8 cases and true negative were 9 cases so the sensitivity was 88.88% and specificity was 32.14%. Positive predictive value was 29.62% and negative predictive value was 90%. Similarly study done by N Nishal *et al*. (2022)[9] sensitivity of CBNAAT was 32.3%.

Also Kaviya N (2020) *et al*.[11] found that the sensitivity of CBNAAT was found to be 63.3% while the specificity was found to be 83.3%. Also Raheel Ahmed, Mehwish Changeez.*et al*. (2018)[10] found that the sensitivity of CBNAAT was 28.57% and specificity was 0%. The positive predictive value was 100%.

Conclusion

In abdominal tuberculosis, CBNAAT had high sensitivity and low specificity, making it more a screening tool than a diagnostic tool. CBNAAT have to be combined with other modalities like histopathological examination or Culture to make it better diagnostic tool. The diagnostic accuracy of the above-mentioned combinations has to be evaluated through further studies.

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