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Original Article

Pattern of Cytology, Chemistry and ADA in Pleuro- peritoneal and Cardiac Tuberculosis in a Tertiary Care Hospital

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Abstract

Introduction: *Tuberculosis (TB) is a infectious disease caused by Mycobacterium tuberculosis. The disease primarily affects lungs, although involvement of other tissues is common especially pleura and peritoneum. In areas with high prevalence of tuberculosis , body fluid analysis for cells , chemistry and ADA can avoid the use of invasive and expensive investigations.*

Aims and Objectives: *To study the Fluid analysis of Pleuro-Peritoneal and Cardiac Tuberculosis patients at SKIMS, a tertiary care hospital of Kashmir valley.*

Methods and Materials: *The fluid analysis was done in tubercular serositis (pleural, ascitic and pericardial fluid) along with detection of Adenosine Deaminase levels.*

Results and Observation: *A total of 74 patients with 35,33 and 6 patients of pleural, abdominal and pericardial tuberculosis respectively were part of study. The cytology showed a mean lymphocyte count of around 78%,77% and 76% respectively in them .Mean protein of around 4.9g/dl ,5.1g/dl and 4.8g/dl was respectively seen in pleural, ascitic and pericardial fluid. Mean LDH of 464, 383 and 616 IU was respectively found in them. Mean ADA in pleural fluid was 72.8(26-150), in ascitic fluid 71 (16-201) and in Pericardial fluid of 77.8(12-81).*

Conclusion: *The present study shows that a simple, rapid and inexpensive investigations using fluid cytology and chemistry with added advantage of highly sensitive and specific ADA can reduce the burden of using more expensive, time consuming and invasive investigations for diagnosing tuberculosis, especially in resource limited developing countries.*

Keywords: *Tuberculosis; Serositis; Diagnosis.*

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by Mycobacterium tuberculosis. The disease primarily affects lungs, although involvement of other tissues is common especially pleura and peritoneum. A third of the world's population is

thought to be infected with M. tuberculosis, and new infections occur at a rate of about one per second[1]. Extra-pulmonary TB can present with non-specific symptoms such as

- Unintentional weight loss (more than 1.5 kg in a month),
- Night sweats and
- Fever for more than 2 weeks.

Other symptoms depend on the site or organ affected. The diagnosis of a tuberculous serous effusion requires a positive culture (from fluid or tissue) or histopathological examination of the tissue[2]. However in areas with high prevalence of tubercular serous involvement and where pleural biopsy is not easily available it would be possible to establish the diagnosis of tuberculosis without the need for Biopsy, by analyzing fluid for cells , chemistry and ADA. Pleural biopsy should be reserved for patients with a low pleural fluid ADA, negative cytology and a high suspicion of a neoplasm.[3]

AIMS AND OBJECTIVES

To study the Fluid analysis for cytology, chemistry and ADA of Pleuro-Peritoneal and Cardiac Tuberculosis patients at SKIMS, a tertiary care hospital of Kashmir valley.

MATERIALS AND METHODS

Inclusion Criteria

All patients > 18 years of age suffering from Tuberculosis (pleural, peritoneal, and pericardial effusion) who attended OPD or were admittedin the infectious disease department, division of Internal Medicine, Sher-i-Kashmir Institute of Medical Sciences, Soura, Srinagar from June 2013 to May 2015. after taking consent from them. Serosal Tuberculosis was diagnosed on the basis of

- Detailed history and Physical examination
- Fluid analysis

Exudative lymphocytic pleural fluid
ADA level
PCR MTB
Pleural fluid for AFB staining and culture
Pleural biopsy if needed
HPE and AFB staining of biopsy specimen was done in case if other tissues of abdomen was involved

Investigations

All patients were subjected to following investigations:

- CBC
- Complete biochemistry
- Urine examination
- Chest x-ray
- ECG
- USG Abdomen
- HIV

Other investigations were done according to a case of tuberculosis

- Sputum for AFB
- Sputum culture for AFB
- MRI chest/abdomen
- CT chest/abdomen

Exclusion Criteria –Diagnosed cases of infectious mononucleosis, enteric fever, leprosy, viral hepatitis, HIV, solid organ malignancies and haematopoetic malignancy. ADA Estimation was done by GALANTI and GIUSTI Method.

RESULTS AND OBSERVATION

The results of fluid analysis were as follow: In Pleural fluid mean TLC was 1061.49±1090.45 /ul,range 60-4800/ul. Mean neutrophil count was 21.11±11.767/ul %, range 2-44/ul. Mean lymphocyte count was 78.80±11.634/ul%, range 56-95/ul. Mean protein level was 4.92±.929 g/dl ,range 2.21-6.32 g/dl. Mean sugar level was 86.03±33.004 mg/dl range 11-190 mg/dl.Mean LDH level was 464.40±291.363IU,range 98-1410IU. (table 1) AFB staining was positive (table 3) in 2 patients. The mean pleural fluid ADA was 72.8 IU with standard deviation of 32.029(table 2)
In Ascitic fluid mean TLC was 854.36±950.293/ ul, range 45-4000/ul. Meanneut-rophil count was 22.85±10.692 /ul%, range 2-44/ul. Meanlymp-hocyte count was 77.15±10.692 /ul,%range 60-

95/ul. Mean protein level was 5.177±1.00263 g/dl, range 1.40-6.50g/dl. Mean sugar level was 84.85±25.49mg/dl, range 6-156mg/dl. Mean LDH level was 383.45±164.602U range 182-839IU. (table 1) AFB staining was positive in 1 patient. (table 3) The mean ADA Level was 71IU with standard deviation of 44.68.(table 2)

In Pericardial fluid the mean TLC was 581.67±632.690/ul,range 210-1850/ul.Mean neutrophil count was 23.50±13.172/ul,% range 10-40/ul. Mean lymphocyte count was 76.50±13.172/ul, % range 60-90/ul. Mean protein level was 4.8050±.4561g/dl, range 4.300-5.400/g/dl. Mean sugar level was 105.50-48.67mg/dl, range 60-200mg/dl. Mean LDH level was 616.67±412.030IU, range 243-1330 IU.(table 1).The mean ADA level in pericardial fluid in cardiac tuberculosis was 77.80 IU with standard deviation of 39.423.(table 2)

Table 1: Cell Type and Basic Characteristics of Pleural Fluid

Cell Type / Chemistry	Type of fluid	Number of patients	Mean	Standard Deviation	Range
TLC /ul	Pleural	35	1061.49	1090.455	60-4800
	Ascites	33	854.36	950.293	45-4000
	Pericardial	6	581.67	632.690	210-1850
Neutrophils (%)	Pleural	35	21.11	11.767	2-44
	Ascites	33	22.85	10.692	5-40
	Pericardial	6	23.50	13.172	10-40
Lymphocytes(%)	Pleural	35	78.80	11.634	56-95
	Ascites	33	77.15	10.692	60-95
	Pericardial	6	76.50	13.172	60-90
Protein(g/dl)	Pleural	35	4.9202	.92989	2.21-6.32
	Ascites	33	5.1778	1.00263	1.40-6.50
	Pericardial	6	4.80	.4561	4.300-5.400
Sugar(mg/dl)	Pleural	35	86.03	33.004	11-190
	Ascites	33	84.85	25.492	6-156
	Pericardial	6	105.50	48.673	60-200
LDH (IU)	Pleural	35	464.40	291.363	98-1410
	Ascites	33	383.45	164.602	182-839
	Pericardial	6	616.67	412.030	143-1330

Table 2 : Fluid analysis of patients for ADA in different types of tuberculosis in our study(n=74)

Fluid analysis (ADA)	Mean	Standard deviation	Range
Pleural(n=35)	72.8	32.029	26-150
Ascitic (n=33)	71.00	44.681	16-201
Pericardial (n=6)	77.80	39.423	40-130

Table 3 : AFB Analysis of tuberculosis patients in our study(n=74)

AFB Analysis	Positive	Percentage
Pleural Fluid for AFB	2	6.0
Ascitic Fluid for AFB	1	3%
Pericardial fluid for AFB	0	0%

Table 04: Baseline characteristic of tuberculosis patients in our study(n=74).

Baseline Investigations	Minimum	Maximum	Mean	Standard Deviation
Hb	3.50g/dl	15.6g/dl	11.2	2.33
TLC	3.7×10^3/ul	17.44×10^3/ul	7.63	2.79
ESR mm/hr	12	70	43.2	12.50
Neutrophils	33.00%	90.00%	70.11	11.63
Lymphocytes	3.00%	56.00%	17.98	10.7
PLT	11×10^3/ul	500×10^3/ul	222.27	100.1
Urea (mg/dl)	13	270	35.11	30.05
Creatinine (mg/dl)	0.1	10.60	1.00	1.21
Bilirubin(mg/dl)	0.2	1.44	.46	0.34
AST (U/L)	9	100	30.98	16.08
ALT(U/L)	10	111	33.29	15.65
ALP	50	222	110.26	37.76
Protein(g/dl)	3.0	8.63	6.49	.856
Albumin(g/dl)	2.0	5.2	4.04	.756
LDH(U/L)	56	345	207.63	51.35
Glucose(mg//dl)	78	209	110.33	18.32

Discussion

The present study was conducted in the Infectious disease division of General Medicine department Sheri-I-Kashmir Institute Of Medical Sciences Jammu and Kashmir. In this study 74 patients were enrolled .Use of ADA in serosal fluid for the diagnosis of a tuberculous effusion is increasing, analysis of biopsy tissue is often considered obligatory for the definitive diagnosis[4].In hospitals where pleural biopsy is not always available use of fluid analysis can aid in diagnosis without biopsy. Diagnostic value of ADA in diagnosing tuberculosis in serous fluid is highly accurate and able to avoid biopsy in young patients from areas with high prevalence of tuberculosis.[5,6,7]. As ADA determination is not available every country, especially poor underdeveloped countries[8] with high prevalence of tuberculosis tuberculosis can be diagnosed from a series of clinical features, radiological variables, and the biochemical analysis of the pleural fluid.[9,1]

Patients were diagnosed to be having tuberculosis after correlating clinical examination, radiological imaging and fluid analysis. The cytological analysis revealed a predominant lymphocytic response in serous fluid with a mean lymphocyte count of around The cytology showed a mean lymphocyte count of around 78%,77% and 76% in pleural, ascitic and pericardial fluid respectively. This has been studied previously where in case of tubercular pleural effusion clinical suspicion and lymphocyte percentage of >30% had a sensitivity of 95.2 and specificity of 94.3%[10]. Mean protein of around 4.9g/dl ,5.1g/dl and 4.8g/dl was respectively seen in pleural, ascitic and pericardial fluid. One of the important marker of serosal tuberculosis is LDH. Very high concentration has a high negative predictive valve and occur in malignancies and pyogenic infections. In our study the mean LDH level was 464 (98-1410), 383(182-839) and 616 (143-1330) in pleural, ascitic and pericardial fluids respectively. AFB were documented less frequently as already documented in literature. The emergence of ADA in diagnosing tubercular serositis has revolutionized the management as it is less invasive, quick, cost effective and has high sensitivity and specificity. In our study, mean ADA level in pleural effusion was 72.8±32.029 (range 26-150), in tubercular ascites it was

71.00±44.681(range 16-201), in pericardial fluid it was 77.80±39.942(range 40-130).P.C. Mathur et al (2006)[11] have found the ADA level in tubercular pleural effusion ranges from 45-160 U/L with a mean level of 100U/L with a sensitivity and specificity of 100%,in tubercular peritoneal effusion ranged from 35-135U/L with a mean of 92U/L and sensitivity and specificity of 100% and 95%, in tubercular pericardial effusion ranged from 63-117 U/L with a mean level of 90U/L and sensitivity and specificity of 100% and 83% respectively.

Conclusion

The present study was conducted in a tertiary care hospital of a developing country with high prevalence of tuberculosis and with limited resources. Main aim was to find the use easily available and less invasive investigations to help in diagnosing tubercular serous effusions especially in poor resource countries and with a high prevalence of tuberculosis. The present study showed that simple, inexpensive investigations using fluid cytology and chemistry with added advantage of highly sensitive and specific ADA can reduce the burden of using more expensive, time consuming and invasive investigations for diagnosing tuberculosis

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