# Diagnosis of Ascites

Pages with reference to book, From 283 To 286

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## Abstract

To determine the diagnostic significance of physical and biochemical studies, ascitic fluid (AF) of patients with cirrhosis, nephrotic syndrome, congestive cardiac failure, abdominal malignancy and tuberculous peritonitis was examined.
AF was colourless transudate in cirrhosis, nephrotic syndrome and congestive cardiac failure. Lowest values for proteins were observed in nephrotic syndrome and glucose in cirrhosis. AF level of chorides were highest in cirrhosis. Cell count was below 200 cmm in these disorders but lymphocyte count was low in nephrotics.
In malignancy AF was haemorrhagic and in tuberculous peritonitis, yellow to milky white. It was exudate, specific gravity varied from 1018-1022. Total leucocyte and lymphocyte count, total proteins, alpha , alphs2 and gamma globulin were high and AF glucose and chlorides were low in tuberculous ascites. In malignancy AF glucose was significantly elevated and alpha 2 globulin was high (JPMA 31:282, 1981).

## Introduction

There are three pathophysiological mechanisms for the collection of fluid within the peritonial cavity. They include elevation of hydrostatic pressure within the hepatic sinusoids (cirrhosis, congestive cardiac failure), increased permeability of peritoneal capillaries in neoplastic and inflammatory diseases of the peritoneum and diminution of plasma osmotic pressure in hypoalbuminaemic states like nephrotic syndrome. The physical and biochemical characteristics of AF due to various causes differ and can provide clues for the most probable diagnosis.
The present study was undertaken to evaluate the significance of simultaneous determination of physical, cytological and biochemical parameters of serum and AF in the differential diagnosis of ascites.

## Material and Methods

Fifty consecutive patients (23 males and 27 females) referred to PMRC Research Centre with ascites due to various causes were investigated. Their ages ranged from 12 to 75 years (mean 42 years). Biochemical values of serum were compared with those observed in 30 healthy subjects. Their ages ranged from 13-71 years (mean 38 years).
The appearance specific gravity, total and differential leucocyte count of all specimens of AF were determined.
The concentration of total serum and AF proteins was estimated by biuret method (Kings-ley, 1942) and its fractions by microzone technique of electrophoresis (Beckman Instruction RMIM-3, 1965) on cellulose acetate membrane. AF samples with protein concentration less than 3G% were concentrated without denaturation of protein.
Levels of glucose (Somogyi, 1952) chlorides (Scbales and Schales, 1941), sodium and potassium (Varley, 1962) were measured in sera of patients and controls and in AF.

**Results**

The findings of physical and cytological of AF are shown in Table I.

Table I Physical and Cytological Examination of Ascitic Fluid

| *Diagnosis* | *Colour* | *Specific gravity Mean± S.E.* | *Total WBC/CUMM Mean± S.E.* | *Differential Count* | |
|---|---|---|---|---|---|
| | | | | *Lymphocyte % Mean± S.E.* | *Various type of inflammatory cells % Mean± S.E.* |
| Cirrhosis | Straw, colourless and deep yellow (19) | 1.011± .0004 (19) | 144.0± 7 (19) | 88.0± 1 (19) | 12± 1 (19) |
| Congestive cardiac failure | Straw and yellow (10) | 1.013± .0007 (10) | 184.0± 12 (10) | 86.0± 2 (10) | 14± 2 (10) |
| Nephrotic syndrome | Colourless (2) | 1.008 (2) | 116.0 (2) | 74.0 (2) | 26 (2) |
| Malignancy | Haemorrhagic yellow and yellowish Green (14) | 1.018± .002 (14) | 880± 85 (14) | 90.0± 2 (14) | 10± 2 (10) |
| Tuberculous peritonitis | Milky white, brown and yellow (5) | 1.022± .0040 (5) | 12850± 408 (5) | 95.0± 2 (5) | 5± 2 (5) |

No. of patients are given in paranthesis.

In cirrhosis AF was straw coloured in 78.9% and deep yellow in 21.1%. It was colourless in patients with nephrotic syndrome, haemorrhagic in 43% cases of abdominal malignancy and milky white in 1 case of tuberculous peritonitis.

The specific gravity of AF in patients with cirrhosis, congestive cardiac failure and nephrotic syndrome varied from 1008 to 1013 and TB peritonitis and malignancy from 1018 to 1022.

Total leucocyte count and lymphocyte count was highest in TB peritonitis and lowest nephrotic syndrome.

The values of total serum and AF proteins and their component fractions are shown in Tables II and III.

Table II Mean Values of Serum Total Protein and Protein Fractions in Various Conditions

| *Diagnosis* | *Total protein Gm%* | *PROTEIN FRACTIONS gm% (Mean ± S.E.)* | | | | |
|---|---|---|---|---|---|---|
| | | *Albumin* | *Alpha-1* | *Alpha-2* | *Beta* | *Gamma* |
| Normal subjects | 7.40±0.55 (30) | 4.27±0.40 (30) | 0.29±0.11 (30) | 0.63±0.10 (30) | 0.79±0.15 (30) | 1.32±0.27 (30) |
| Cirrhosis | 6.52±0.70 (19) | 2.68±0.71 (19) | 0.28±0.21 (19) | 0.64±0.42 (19) | 0.81±0.33 (19) | 2.19±0.86 (19) |
| Congestive cardiac failure | 6.85±0.44 (10) | 2.97±0.32 (10) | 0.41±0.12 (10) | 0.56±0.12 | 0.84±0.13 (10) | 1.96±0.57 (10) |
| Nephrotic syndrome | 4.83 (2) | 1.62 (2) | 0.25 (2) | 0.83 (2) | 1.02 (2) | 1.13 (2) |
| Malignancy | 6.10±0.61 (14) | 2.58±0.49 (14) | 0.31±0.12 (14) | 0.75±0.12 (14) | 0.78±0.13 (14) | 1.59±0.40 (14) |
| Tuberculous peritonitis | 7.14±0.31 (5) | 2.73±1.63 (5) | 0.47±0.14 (5) | 0.96±0.45 (5) | 0.75±0.17 (5) | 2.24±0.52 (5) |

No. of observations are given in paranthesis.

# Table IV

## Serum(s) and Ascitic Fluid (AF) Glucose

| *Diagnosis* | *GLUCOSE mg% (Random)* | |
|---|---|---|
| | *Serum Mean ± S.E.* | *AF Mean ± S.E.* |
| Normal subjects | 82.11 ± 2.13 (30) | — |
| Cirrhosis | 99.2 ± 1.38 (19) | 104.2 ± 1.26 (10) |
| Congestive cardiac failure | 103.6 ± 1.53 (10) | 109.0 ± 2.08 (10) |
| Nephrotic syndrome | 107.5 ± (2) | 117.5 (2) |
| Malignancy | 106.21 ± 1.28 (14) | 132.92 ± 1.60 (14) |
| Tuberculous peritonitis | 94.8 ± 3.68 (5) | 90.6 ± 3.01 (5) |

No. of patients are given in paranthesis.

Levels of all fractions of serum and AF proteins were elevated in tuberculous peritonitis except betaglobulin. Serum betaglobulin was high in nephrosis and AF betaglobulin in malignancy. AF proteins were below 3G% in cirrhosis, nephrotic syndrome and congestive cardiac failure and above in malignancy and tuberculosis.

Table IV shows serum and AF levels of glucose. Values in serum were lower than those in AF except in

patients with tuberculous ascites. AF glucose levels were highest in malignancy and lowest in TB peritonitis.
Serum and AF Electrolytes are shown in table V. AF chloride levels were low in tuberculous peritonitis and high in cirrhosis. Both serum and AF sodium and potassium were low in cirrhosis and nephrotic syndrome as compared to other groups.

## Discussion

The value of AF examination in the diagnosis of various disorders were assessed in this study.
Ascitic fluid was deep yellow in cirrhosis with jaundice (Tavel, 1959) haemorrhagic in malignancy, and milky due to lymphatic obstruction in tuberculous peritonitis (Kelly and Butt, 1960).
Specific gravity was low in transudative peritoneal effusion in cirrhosis, congestive cardiac failure and nephrotic syndrome (Nath et al., 1968). Specific gravity of peritoneal exudate in malignancy and tuberculosis varied from 1018 to 1022.
Total leucocyte count below 200/cmm is found in transudate and above in exudate. A high leucocyte count with lymphocytosis and protein above 2.5G% are found in tuberculous peritonitis (Nwokolo, 1967; Borhanmanesh et al.,

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