

Use of Ascetic Fluid Cholesterol as a Marker to Differentiate between Types of Ascetic Fluid

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Abstract

Background:- Cholesterol is high in ascetic fluid due to malignancy and other causes of exudates.

Objective:- To use cholesterol as a marker to differentiate between exudative and transudative ascetic fluid and to compare that with other routine parameters.

Methods:- Twenty eight patients were included in this study 17 females with mean age of 41.9 years, 11 males with mean age of 48.2 years. The patients were divided in group I suspected transudate, and group II suspected exudate according to history and clinical examination.

Ascetic fluid samples were sent for total protein, albumin, and cholesterol measurement blood samples were sent for serum protein and albumin measurement.

Results:- In this study ascetic fluid cholesterol was fit with history and clinical examination to differentiate between exudative and transudative ascetic fluid.

Cholesterol was a good marker when compared with ascetic fluid total protein and ascetic serum protein ratio in group I, but not in the others.

Conclusion: - cholesterol can be used as a marker for the diagnosis of a cites cases but a large number of patients is important for accurate results

Key word:- Ascites, exudate, transudate, cholesterol

Al-Kindy Col Med J 2008; Vol.4 (2) P68-71

Introduction

Cholesterol is a precursor to many physiologically important steroids⁽¹⁾. Cholesterol synthesis initially involves the conversion of acetate to mevalonic acid; the rate-limiting step is catalysed by the enzyme, B-hydroxy B-methyl glutaryl, Co-enzyme A (HMGCOA) reductase, the activity of which is controlled by negative feedback by the intracellular cholesterol concentration⁽¹⁾.

Ascites is one of the most common amongst the various clinical problems confronting physicians, and ascetic fluid analysis in an effective way to diagnose it⁽²⁾.

The increased concentration of cholesterol in ascetic fluid is more specifically related to neoplastic involvement of the serosal cavity⁽³⁾.

Raised cholesterol concentration have also been reported in inflammatory conditions involving the peritoneum and with chronic cardiac congestion^(4,5).

This can be a result of various mechanisms that act together, the cholesterol may originate in cell membranes perhaps as a result of disintegration of tumor cells⁽⁶⁾.

Cholesterol can also enter the cavity from the interstitial space because of obstructed lymph vessels or may be related to increased permeability of the carcinomatous serous membrane⁽⁷⁾.

In recent, years the pleural fluid cholesterol of more than 45 mg/dl and ascetic fluid cholesterol of more than 70 mg/dl suggests exudative fluid, and this indicator is likely to replace traditional parameters because it is more accurate and cost effective and do not require simultaneous measurement of serum values^(4,7,22).

The traditional classification of ascites into exudative and transudative involves estimation of ascetic fluid total protein (AFTP) which is >3 gm/dl in exudate and <3 gm/dl in transudate⁽⁸⁾.

Serum - as cites albumin gradient < 1.1 mean exudates while > 1.1 mean transudate⁽²⁾.

Ascetic / serum protein ratio more than 0.5 indicate exudates and less than 0.5 mean transudate⁽⁹⁾.

This classification however can identify the etiological factors responsible for its causation,^(10,11) and has been challenged on various occasions in different patients especially in cirrhotic patients on prolonged diuretic therapy⁽¹²⁾, patients with chronic cardiac failure and ascites⁽¹³⁾, one third of malignant ascites⁽¹⁴⁾, spontaneous bacterial peritonitis⁽¹⁵⁾ and some time even in normal ascetic fluid, so these drawbacks lead to development of a new approach to classify of ascites by estimation ascetic fluid cholesterol⁽¹⁷⁾.

Methods

In this prospective study 28 patients were included, 17 females with mean age of 41.9 years, and 11 males with mean age of 48.2 years.

All of the patients have ascites, collected from the gastrointestinal tract clinic, in Asseder teaching hospital in Najaf from March to October 2006.

The patients were divided into tow groups according to history and clinical examination.

- Group I : suspected having transudative ascites includes 11 patients,

- Group II: suspected having exudative ascites includes 17 patients.

Ascetic fluid samples were sent for total protein, albumin and cholesterol measurement. Blood samples were sent for serum protein and albumin measurement.

All samples were collected at the same time. Serum and ascetic fluid albumin concentration were estimated by the bromocresol green method (19).

Serum and ascetic fluid protein concentration were estimated by the Biuret method (20).

Ascetic fluid cholesterol concentration was estimated by the cholesterol estrase and oxidase reagen (21), keeping in mind that the level of ascetic fluid cholesterol of more than 70mg/dl was considered as exudative ascites and < 70 mg/dl was considered as transudative ascites (4,7).

Both chi- square and F-yats correction were used in the statistics of this study. P value of < 0.05 is significant.

Results

In this prospective study, 28 patients were included 17 females (mean age 41.9 years) and 11 males (mean age 48.2 years) the patients were divided into group I(suspected transudative ascetic fluid) and group II (suspected exudative ascetic fluid).

The following results were obtained in this study (Table -1)

The characteristic of both study groups (IandII) using (AFTP, SAAG, A/S protein ration, ascetic fluid cholesterol)

A) In group I, the total numbers of patients were (11)

AFTP was >3 g/dl in 8 patients 61%

< 3g/dl in 3 patients 39%

SAAG was > 1.1 in 9 patients 82%

< 1.1 in 2 patients 18%

A/S protein ratio > 0.5 in 6 patients 34%

< 0.5 in 5 patients 45.5%

Ascetic fluid cholesterol > 70 mg/dl in 2 patients 18%

< 70 mg/dl in 9 patients 82%

B) In group II , the total number of patients were (17)

AFTP was >3 g/dl in 12 patients 70.5%

< 3g/dl in 5 patients 29.5%

SAAG was > 1.1 in 5 patients 29.5%

< 1.1 in 12 patients 70.5%

A/S protein ration > 0.5 in 13 patients 76.5%

< 0.5 in 4 patients 23.5%

Ascetic fluid cholesterol > 70 mg/dl in 15 patients 88%

< 70 mg/dl in 2 patients 12%

Table (2)

The comparison between AFTP and ascetic fluid in both study groups (I and II) which was statistically significant in group I. P-value < 0.05.

Table (3)

The comparison between SAAG and ascetic fluid cholesterol in both study groups, which was not significant statistically P-value > 0.05

Table (4)

The comparison between A/S protein ratio and ascetic fluid cholesterol in both study groups (I and II) which was significant statistically in group I. P-value < 0.05.

Table (5)

The comparison between history and clinical diagnosis of ascites and ascetic fluid cholesterol > 70mg/dl, which was statistically significant in both study group I and group II. P-value < 0.05, X²= 10.96 using F-yat’s correction

In this study the use of ascetic fluid cholesterol was superior to AFTP and A/S protein in suspected transudative ascetic fluid only.

High ascetic fluid cholesterol > 70 mg/dl was well correlated with history and clinical examination classification of ascites in (both groups I and II).

(Table-1)
Characteristic of both study group (I and II) using AFTP, SAAG, A/S Ratio and Ascetic fluid cholesterol

Groups	No.	AFTP g/dl		SAAG		A/S ratio		Ascetic fluid cholesterol	
		>3g/dl	<3g/dl	<1.1	>1.1	>0.5	<0.5	>70mg/dl	<70mg/dl
I suspected transudate group	11	8	3	2	9	6	5	2	9
II suspected exudates group	17	12	5	12	5	13	4	15	2
Total	28	20	8	14	14	19	9	17	11

1. AFTP =Ascitic fluid total protein

2. SAAG = Serum – Ascities albumin gradient
3. A/S ratio = Ascites / serum protein ratio

Table (2)

The comparison between AFTP and Ascetic fluid cholesterol in both study group (I and II)

	Group (I) suspected transudative No.= 11		Group(II) suspected exudative No.= 17	
	> 3g	< 3g	> 3g	< 3g
AFTP g/dl	8	3	12	5
Ascetic fluid cholesterol mg/dl	>70mg	<70mg/dl	>70 mg/dl	<70mg
	2	9	15	2
p- value	<0.05		>0.05 (N.S)	

* AFTP = Ascetic fluid total Protein

(Table -3)

comparison between SAAG and Ascetic fluid cholesterol in both study groups (I and II)

	Group (I) Transudative No.= 11		Group(II) Exudative No.= 17	
	< 1.1	> 1.1	<1.1	> 1.1
SAAG	2	9	12	5
Ascetic fluid cholesterol mg/dl	>70mg/dl	<70mg/dl	>70 mg/dl	<70mg/dl
	2	9	15	2
p- value	>0.05		>0.05	

SAAG= Serum- Ascetic albumin gradient

(Table -4)

Comparison between A/S Protein Ratio and Ascetic fluid cholesterol in both study group (I and II)

	Group (I) Transudative No.= 11		Group(II) Exudative No.= 17	
	>0.5	<0.5	>0.5	<0.5
A/S protein ration	6	5	13	4
Ascetic fluid cholesterol mg/dl	>70mg/dl	<70mg/dl	>70 mg/dl	<70mg/dl
	2	9	15	2
p- value	<0.05		>0.05	

A/S ratio = Ascetic/ serum protein ratio

(Table -5)

Comparison between clinical and history diagnosis of ascites and ascetic fluid of >70 mg/dl cholesterol

	Group (I) Transudative	Group(II) Exudative
Clinical diagnosis of Ascites	11	17
Ascetic fluid cholesterol >70 mg/dl	2	15

X² = 10.96 p<0.05, F – yat’s, correction

Discussion

Ascites is one of the most common amongst the various clinical problems confronting physicians, and ascetic fluid analysis is effective way to diagnose it ⁽²⁾. There is no biochemical marker that allows complete discrimination between transudative and exudative ascetic fluid ⁽¹⁷⁾. In most hospitals, only ascetic fluid total protein is measured routinely to classify the fluid as a transudate or exudates.

The measurement of serum- ascites albumin gradient, ascites/ serum protein ratio and ascetic fluid cholesterol improves the diagnostic classification of ascites as transudate or exudates, thus aiding clinical diagnosis ⁽¹⁷⁾. Ascetic fluid cholesterol measurement is likely to replace the traditional parameters because it is more accurate and cost effective and do not require simultaneous measurement of serum values ^(4, 7, 22). Some disorders with transudative ascetic fluid (congestive heart failure, liver cirrhosis) may

present with high protein ascetic fluid (exudate), by using traditional methods (AFTP, A/S protein, SAAG) but not with measurement of ascetic fluid cholesterol.⁽²²⁾

In this study the ascetic fluid cholesterol is well correlated with the clinical and history classification of ascetic fluid as exudates and transudate (**Table-5**) Other results of this study, the ascetic fluid cholesterol was superior to (AFTP) and A/S protein ratio, in suspected transudate group only, but not superior when compared with SAAG in both groups.

In Castaldo G *et al*, study the ascetic fluid cholesterol and LDH association, correctly identified 100% of malignant ascites and hepatocellular carcinoma, so this association can be used as a primary tool to differentiate between type of ascites⁽³⁾. This result seems similar to that of our study in (**Table -5**).

In Paramothayan and Barron study the measurement of fluid cholesterol have no advantage over the measurement of ascetic fluid or fluid total protein,⁽¹⁷⁾ A/S protein ratio or fluid LDH values, this result differ with our results, (**Table- 2**) and 4 which indicate the need for more work in this fluid.

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Al-Kindy Col Med J 2008; Vol.4 (2) P-71

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Received 15th April .2007 Accepted 30th Jan 2008.