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TO STUDY THE ROLE OF ASCITIC FLUID CHOLESTEROL IN DIFFERNTIAL DIAGNOSIS OF ASCITES

KEYWORDS: Ascitic fluid cholesterol, biochemical parameter, transudative ascites, tubercular ascites, malignant ascites

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ABSTRACT

Ascites is defined as the presence of free fluid within peritoneal cavity. In most cases ascites appears as a part of well recognized illness i.e. cirrhosis, congestive heart failure, tubercular peritonitis, nephrosis, disseminated carcinomas, etc.

AIMS AND OBJECTIVES- To study ascitic fluid cholesterol levels in various types of ascites , to study SAAG (serum ascites albumin gradient) in various types of ascites ,to compare diagnostic values of ascitic fluid cholesterol levels v/s SAAG and to find out specificity & sensitivity of ascitic fluid cholesterol levels in differential diagnosis of ascites.

MATERIAL AND METHODS- The study was conducted on 100 patients of ascites of different etiologies admitted in Govt. Medical College and associated group of Hospitals, Kota of 15-65 years of either sex. The following study groups were made viz.:-

Group I 25 Cases of ascites caused by cirrhosis of liver

Group II 25 cases of ascites caused by Tuberculosis

Group III 25 cases of ascites caused by Malignancies

Group IV 25 cases of ascites caused by others (e.g. CHF, CRF, Nephrotic Syndrome, Anemia-hypoproteinemia, Bacterial Peritonitis, etc.)

The paracentesis was performed after proper positioning of patient . 150 ml. of ascitic fluid was drawn and examined for gross appearance, total protein, albumin, adenosine deaminase (ADA) (when indicated), sugar, cholesterol, total cell count, cell type, malignant cells, acid fast bacilli (AFB), Gram staining, aerobic and anaerobic culture (when indicated). Liver function test, Serum cholesterol, Sputum for AFB and culture (When indicated), ECG, Chest X-ray, X-ray abdomen, Ultrasonography of abdomen: Histopathological examination, Upper GI endoscopy, Ascitic fluid examination-Gross appearance, Colour, Total protein (Both Ascitic fluid and serum) estimated through Biuret method (Wottern, 1964) Albumin (Both for ascitic fluid and serum) By Dumans et al (Bromocresol Dye Method) Globulin Sugar Cholesterol Ascitic fluid cytology (Kolmer and Boerner) were also done when indicated. EXCLUSION CRITERIA - Following patients were excluded from the study :- Haemodynamically unstable patients: Blood pressure less than 90 mmHg. Arterial hypotension may result in a decrease in the portal pressure and a narrowing of the SAAG, Bleeding abnormality: Coagulopathy, When there is clinically evident fibrinolysis or clinically evident disseminated intravascular coagulation.

CONCLUSION- Ascitic fluid cholesterol is an easy, cheap and reliable biochemical parameter to differentiate (cirrotic) transudative and other ascites from malignant ascites but is not useful in differentiating cirrhotic (transudative) and others from tubercular ascites

INTRODUCTION- Ascites is defined as the presence of free fluid with in peritoneal cavity . In most cases ascites appears as a part of well recognized illness i.e. cirrhosis, congestive heart failure, tubercular peritonitis, nephrosis, disseminated carcinomas, etc. Ascites can only be treated by correction of underlying cause.

Thus evaluation of a patient with ascites is incomplete unless the cause of ascites is established.[1] Unless a positive diagnosis of malignancy or infection is confirmed by cytology or culture, a definite cause cannot be firmly established by conventional analysis of ascitic fluid. False negatives are a significant problem if this test is to be relied upon.[2] The absence of malignant cells in ascitic fluid does not exclude malignancy. Malignant tumors may produce ascites without shedding malignant cells into ascitic fluids, e.g. blocking lymphatic or blood vessels or by setting up inflammation of the peritoneum . Malignant cells are rarely found in patients with diffuse hepatic metastasis in the absence of peritoneal implants and in patients with hepatocellular carcinoma superimposed on cirrhosis with portal hypertension. Low ascitic fluid volume has small yield & poor preservation of cell. At the same time, benign mesothelial cells may be growth stimulated & resulting "mesotheliosis" is sometimes impossible to distinguish from malignant cells by routine morphology alone.

Both malignant and tubercular ascites are exudative in nature with lymphocytic predominance and low SAAG values and cannot be differentiated easily from each other.[1] Ascitic fluid ADA is significant high in tubercular peritonitis than due to other causes. Level above 32 mcg/L in ascitic fluid and above 54 mcg/L in serum suggest tuberculosis with a sensitivity of 100% & specificity of 92- 100%. Ascitic fluid ADA is high in malignancies of Breast, Esophagus, Liver, Colorectum.[3-8] Studies have shown that parameters like ascitic fluid fibronectin and cholesterol are found superior to the conventional methods of ascitic fluid analysis in differentiating ascites caused by malignancies from others.[9,10,11] Estimation of ascitic fluid cholesterol has been found useful in differentiating various types of ascites especially maligant ascites from tubercular ascites.[12] The pathogenesis of high ascitic fluid cholesterol is not clear. It is not a reflection of serum cholesterol concentration as the serum ascites cholesterol difference did not yield a better discrimination than the ascitic fluid cholesterol alone.[13] The increased concentration of cholesterol in effusion is more specifically related to tumor involvement of the serosal cavity. This can be the result of various mechanisms that act together. The cholesterol may originate in cell membrane, perhaps as a result of disintegration of tumor cells and / or surrounding benign cell. It can also enter the cavity from the interstitial space because of obstructed lymph vessels or be related to increased permeability of the carcinomatous serous membrane or due to enhanced movement of plasma liporproteins into the peritoneal cavity. Raised cholesterol concentrations have also been reported in inflammatory conditions involving the peritoneum, acute pancreatitis and chronic cardiac congestion.

Ascitic fluid cholesterol has higher sensitivity in differentiating etiology of ascites when compared to fibronectin levels in ascitic fluid (100 vs 93%) in diagnosis of malignant ascites.[14]

The present study was performed to evaluate the role of ascitic fluid

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cholesterol estimation as a diagnostic tool in establishing the etiology of ascites.

AIMS AND OBJECTIVES

1. To study ascitic fluid cholesterol levels in various types of ascites.
2. To study SAAG (serum ascitis albumin gradient) in various types of ascites.
3. To compare diagnostic values of ascitic fluid cholesterol levels v/s SAAG.
4. To find out specificity & sensitivity of ascitic fluid cholesterol levels in differential diagnosis of ascites.

MATERIAL AND METHODS

The study was conducted on 100 patients of ascites of different etiologies admitted in Govt. Medical College and associated group of Hospitals, Kota.

100 cases of ascites of varied etiology were selected in the age group of 15-65 years of either sex.

The following study groups were made viz.:-

Group I 25 Cases of ascites caused by cirrhosis of liver
Group II 25 cases of ascites caused by Tuberculosis
Group III 25 cases of ascites caused by Malignancies
Group IV 25 cases of ascites caused by others (e.g. CHF, CRF, Nephrotic Syndrome, Aneia-hypoproteinemia, Bacterial Peritonitis, etc.)

The paracentesis was performed after proper positioning of patient from left lower abdominal quadrant. By using aseptic technique 150 ml. of ascitic fluid was drawn and examined for gross appearance, total protein, albumin, adenosine deaminase (ADA) (when indicated), sugar, cholesterol, total cell count, cell type, malignant cells, acid fast bacilli (AFB), Gram staining, aerobic and anaerobic culture (when indicated). EXCLUSION CRITERIA - Haemodynamically unstable patients: Blood pressure less than 90 mmHg, Bleeding abnormality: Coagulopathy, When there is clinically evident fibrinolysis or clinically evident disseminated intravascular coagulation.Peripheral venous blood was taken from patients just prior to paracentesis and sent for investigations for routine blood investigation,Liver function test , Serum cholesterol, Sputum for AFB and culture (When indicated), ECG , Chest X-ray , X-ray abdomen, Ultrasonography of abdomen, Histopathological examination, Upper GI endoscopy, Ascitic fluid examination(Gross appearance,Colour, Total protein (Both Ascitic fluid and serum) estimated through Biuret method (Wottern, 1964),Albumin (Both for ascitic fluid and serum) By Dumans et al (Bromocresol Dye Method),Globulin,Sugar,Cholesterol, Ascitic fluid cytology (Kolmer and Boerner)

DATA ANALYSIS AND RESULT

A cut off value for each parameter was calculated by following formula (Martin Prieto (1985), R. Garg et al. (1993)

Cut off value =(2xSD) ± (mean value)
Cut off value = (2xSD) ± (mean value)

P value less than 0.05 was considered statistically significant

TABLE 1 AGE AND SEX DISTRIBUTION

Group	Age range (Years)												Age (Years) Mean ± S.D.		
	20-30		31-40		41-50		51-60		>60		Total				
	M	F	M	F	M	F	M	F	M	F	M	F	Male	Female	Total
I	1	2	4	2	9	2	4	1	-	-	18 (72%)	7 (28%)	45.05±9.27	39.71±15.41	43.56±11.16
II	4	2	5	2	5	3	3	0	1	-	18 (72%)	7 (28%)	41.22±11.48	36.43±10.12	39.88±11.3
III	-	-	1	3	4	2	6	6	1	2	12 (48%)	13 (52%)	52.67±9.96	52.69±8.35	52.68±8.87
IV	4	7	4	2	1	1	2	-	2	2	13 (52%)	12 (48%)	41.62±9.78	34.91±11.32	38.4±9.10

Out of 25 patients in group (cirrhotic), 18 (72%) were male and 7 (28%) were female. Amongst 25 patients of group (tubercular ascites), 18(72%) were male and 7 (28%) were female. In group (malignant ascites), out of 25 patients, 12 (48%) were male and 13 (52%)were females. Out of 25 patients in group (others), 13 (52%) were male and 12 (48%) were female.

The highest number of cases in group and were in the age group of 41-50 years (11& 8 respectively). In group, the highest number of cases were in age group of more than 51 years (15 cases). While in group , age group of 20-30 years had maximum cases (11).

The mean age among patients of group was 43.68.89 years, in group, 39.9 8.14 years, in group, 52.710.76 years, while in group it was 38.47.8 years.

TABLE 2 VARIOUS CAUSES DETECTED IN CAUSATION OF MALIGNANT ASCITES (GROUP) SUBJECTS

Group N=25	Diagnosis	Male	Female	Total
-A	Ovarian carcinoma with or without peritoneal implant	-	7 (28%)	7 (28%)
-B	Secondaries in liver with peritoneal implant (Ca.Lung,Buccal Ca., Adenocarcinoma of colon)	4 (16%)	-	4 (16%)
-C	Carcinoma of gallbladder with peritoneal implant	1 (4%)	1(4%)	2 (8%)
-D	Carcinoma of gastrointestinal tract with peritoneal implant	2 (8%)	3(12%)	5 (20%)
-E	Hepatoma	1 (4%)	-	1 (4%)
-F	Uterine carcinoma with peritoneal implant	-	1(4%)	1 (4%)
-G	Renal cell carcinoma with peritoneal implant	2 (8%)	-	2 (8%)
-H	Unknown tumor with peritoneal implant	2 (8%)	1 (4%)	3 (12%)

Out of 25 cases of malignant ascites ,7(28%) had ovarian carcinoma, 4 (16%) had secondaries of liver with primaries from carcinoma lung, buccal carcinoma, adenocarcinoma of colon. 2 (8%) had gall bladder carcinoma, 5 (20%) had gastrointestinal tract (gastric ca., ca. ampula of vator), 1 patient (4%) had hepatoma,3 (12%) had metastatic carcinoma of peritoneum of unknown origin,2 patients (8%) had renal cell carcinoma &1 patient (4%) had uterine carcinoma.

TABLE 3 ASCITIC FLUID, PHYSICAL APPEARANCE AND CYTOLOGICAL EXAMINATION

Group	Physical Appearance		Cell Count/ cumm (mean S.D.)	Predominant Cells		Malignant cell positive	AFB Positivity
	Types	No. Of cases		Types	No. Of cases		
Group N=25	Clear Turbid/ Opalescent Haemorhagic	23 2 -	84.12 ± 68.759	Polymorphs Lymphocyte RBC	2 (8%) 8 (32%) -	Nil	Nil

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Group N=25	Clear Turbid/ opalescent Haemorhagic	7 15 3	709.68 ± 352.642	Polymorphs Lymphocyte RBC	8 (32%) 25(100%) 5 (20%)	Nil	4 (16%)
Group N=25	Clear Turbid/ opalescent Haemorhagic	10 3 11	897.44 ± 581.629	Polymorphs Lymphocyte RBC	3 (12%) 21(84%) 22 (88%)	11 (44%)	Nil
Group N=25	Clear Turbid/ opalescent Haemorhagic	25 - -	59.44 ± 32.56	Polymorphs Lymphocyte RBC	- 18 (72%) 3 (12%)	Nil	Nil

Most of the patients in group showed clear fluid having mean cell count 84.12 ± 68.759 with predominant cell type lymphocytes (32%), while in group, 15 patients ascitic fluid was opalescent / turbid with mean cell count 709.68 ± 352.642 and predominance of lymphocytes (100%) with AFB positivity in 4(16%)cases. In group physical appearance was mostly haemorrhagic with mean cell count 897.44 581.629 with predominantly RBC (88%) including malignant cells in 11(44%) cases.

All age groups also reveals some cases having straw,yellow amber, bile stained fluids. However haemorrhagic fluid was absent in group & group while group showed 3 cases and group showed 11 cases of haemorrhagic fluid. AFB negativity was found in group ,group and group

TABLE -4 A COMPARISION OF TOTAL PROTEIN VALUES OF ASCITIC FLUID V/S SERUM

Group	Ascitc fluid total protein (gm / dl)	Serum total protein (gm /dl)	A/S total protein ratio
Group (n=25)	1.77 ± 0.652	6.124 ± 0.687	0.296 ± 0.109
Group (n=25)	3.43 ± 0.883	6.084 ± 0.708	0.551 ± 0.117
Group (n=25)	3.76 ± 0.880	5.99 ± 0.886	0.605 ± 0.105
Group (n=25)	2.82 ± 0.721	5.48 0.825	0.488 ± 0.111

TABLE 4-B EXUDATIVE V/S TRANSUDATIVE

Group	Ascitc fluid total protein (gm / dl)		A/S total protein ratio	
	No. of pt.s with > 2.5	No. of pt.s with < 2.5	No. of pt.s with > 0.5	No. of pt.s with < 0.5
Group	4(16%)	21(84%)	1(4%)	24(96%)
Group	22(88%)	3(12%)	19(76%)	6(24%)
Group	22(88%)	3(12%)	20(80%)	5(20%)
Group	9(36%)	16(64%)	8(32%)	17(68%)

The mean value of ascitic fluid total proteins, serum total protein and ascitic fluid total proteins and serum total protein ratio were 1.77 ± 0.652, 6.124 ± 0.687 and 0.296 ± 0.109 respectively in cirrhotic ascites while in tubercular ascites the mean values were 3.43 ± 0.883, 6.084 ± 0.708 and.605 ± 0.117 respectively.

These mean values were 3.76 ± 0.880, 5.99 ± 0.896 and. 605 ± 0.105 respectively in malignant ascites while in ascites due to others were 2.82 ± 0.721, 5.48 ± 0.825 and.488 ± 0.111 respectively. The statistical evaluation has also been depicted.

TABLE -5 INCIDENCE OF POSITIVITY OF MALIGNANT CELLS IN ASCITIC FLUID IN RELATION TO NATURE/SITE OF MALIGNANCY

S. NO.	Etiology (N=25)	Malignant cells present	Malignant cells absent
1	Ovarian carcinoma with or without peritoneal implant. N 1 =7 (28%)	4(57%)	3(43%)
2	Secondaries in liver with peritoneal implant (Lung Ca., Buccal Ca., Adenocarcinoma of colon) N2 =4 (16%)	2(50%)	2(50%)
3	Carcinoma of gallbladder with peritoneal implant n3 =2 (8%)	1(50%)	1(50%)
4	Carcinoma of gastrointestinal tracts with peritoneal implant. N 4 =5 (20%)	2(40%)	3(60%)
5	Hepatoma N 5 =1 (4%)	-	1(100%)
6	Uterine carcinoma with peritoneal implant. N 6 =1 (4 %)	-	1(100%)
7	Renal cell carcinoma with peritoneal implant N7 =2 (8%)	1(50%)	1(50%)
8	Unknown tumor with peritoneal implant N 8 =3 (12%)	1(33%)	2(67%)

Out of 25 cases of malignant ascites, which were proved by histo pathological examination, only 11 patients (44%) had evidence of malignant cells in ascitic fluid and rest of 14 cases did not demonstrate microscopic evidence of malignant cells. Thus microscopic examination of ascitic fluid does not exclude the diagnosis of malignant ascites especially in freshly detected cases.

TABLE -6 Comparative values of presence /absence of malignant cells in Ascitic fluid with levels of serum cholesterol, ascetic fluid cholesterol and SAAG

Group 3	Cytological examination	Ascitic fluid cholesterol (mg/dl)	Serum cholesterol (mg/dl)	SAAG (gm/dl)
3-A	Malignanat cell present (n1=11, 44%)	84.31 +_ 23.84	179.82+_ 23.28	0.94 +_0.22
3-B	Malignant cells not present (n2=14,56%)	78.62+_ 24.22	188.23+_ 20.98	0.84+_0.29
Statistical significance 3-A v/s 3-B		P>0.05(NS)	P>0.05(NS)	P>0.05(NS)

TABLE-7 DISTRIBUTION OF SAAG

SAAG (gm/dl)	Group-1	Group-2	Group-3	Group-4
	No. of patients	No. of patients	No. of patients	No. of patients
0-1.1	1(4%)	23(92%)	23(92%)	3(12%)
>1.1	24(96%)	2(8%)	2(8%)	22(88%)

TABLE -8

Group	Serum cholesterol (mg/dl) (Mean +_ S.D)		
	Male	Female	Total
Group –I	169.07+_ 25.36	191.43 +_ 13.31	175.33+_ 24.34
Group II	168.22+_16.50	185.71+_31.12	173.12+_21.15
Group III	185.76+_17.43	183.38 +_ 27.50	184.53+_ 22.89
Group IV	167.45 +_ 19.47	159.75+_15.74	163.76 +_ 17.78

There was no significant difference among all groups studied (P>0.05). Similarly there was no significant difference between males and females among all the groups studied (P>0.05).

TABLE -9 Distribution of ascitic fluid cholesterol

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ascitic fluid cholesterol (mg/dl) (Range)	Group I N=25	Group II N=25	Group III N=25	Group -IV N=25
	No. of patients	No. of patients	No. of patients	No. of patients
<25	2(8%)	7	-	1(4%)
26-47	22(88%)	14	1(4%)	20(80%)
48-60	1(4%)	3	4(16%)	2(8%)
>60	-	1	20(80%)	2(8%)

TABLE 10 DIAGNOSTIC VALUE OF INDIVIDUAL SCREENING TEST FOR DIFFRENTIATION OF CIRRHOTIC ASCITES FROM TUBERCULAR ASCITES

Parameters	Cut off value	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)	D.A. (%)
Total protein	2.5gm/dl	50	95	90.00	65.51	72.50
A/S total protein ratio	0.5gm/dl	65	95	92.85	73.07	80
Cytology	AFB	20	100	100	55.55	54
SAAG	1.1	90	95	94.73	90.47	92.50
Cholesterol	48mg/dl	15	95	75	52.77	50.50
A/S cholesterol	0.29	5	95	50	50	50.50

D.A.: Diagnostic Accuracy

TABLE - 11 DIAGNOSTIC VALUE OF INDIVIDUAL SCREENING TEST FOR DIFFRENTIATION OF CIRRHOTIC ASCITES FROM MALIGNANT ASCITES

Parameters	Cut off value	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)	D.A. (%)
Total protein	2.5gm/dl	80	95	94.11	82.60	87.50
A/S total protein ratio	0.5gm/dl	80	95	94.11	82.60	87.50
Cytology	Malignant cells	44	100	100	64.51	72.50
SAAG	1.1	90	95	94.73	90.47	92.50
Cholesterol	48mg/dl	95	95	95	95	95.00
A/S cholesterol	0.29	80	90	88.88	81.81	85.00

TABLE 12 DIAGNOSTIC VALUE OF INDIVIDUAL SCREENING TEST FOR DIFFRENTIATING OF TUBERCULAR ASCITES FROM MALIGNANT ASCITES

Parameters	Cut off value	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)	D.A. (%)
Total protein	2.5	5	95	50	50	50
A/S total protein ratio	0.5	20	90	66.66	52.94	55
Cytology	Malignant cells	45	100	100	64.51	72.5
SAAG	1.1	10	90	50	50	50
Cholesterol	48	95	95	95	95	95
A/S cholesterol	0.29	75	95	93.75	79.16	85

DISCUSSION

Ascites appears as a part of well recognized illness i.e. cirrhosis, congestive heart failure, tubercular peritonitis, nephrosis, disseminated carcinomas, etc.

Evaluation of a patient with ascites is incomplete unless the cause of ascites is established.

Certainly estimation of SAAG has more discriminatory power in differentiating transudative (cirrhotic and others) from exudative (tubercular and malignant) ascitis than the ascitis total protein concentration and ascitic serum cholesterol ratio, while estimation of ascitic fluid cholesterol is a simple biochemical parameter of great diagnostic value at a cut off value of > 48mg/dl to differentiate malignant from cirrhotic, tubercular from other ascites. However , histopathological confirmation is required in all the case of final diagnosis.

In our study male and female had almost equal incidence of malignant and other ascites , which was similar to Garg R et al and Sood et al in cirrhotic and tubercular ascites ,while higher incidence of malignant ascites in female than male. [15,12] Predominant cell type in ascitic fluid was lymphocyte in all groups, except in group –III where it was RBC which was similar to the study by Simon B et al. [16]

Similarly cytological ecamination for malignant cells in group –III was positive in 11 out of 25(44%) patients whereas sensitivity, specificity , positive predictive value, negative predictive value and diagnostic accuracy was 44%100%, 100%, 64.51%, and 72.5% respectively. Although the specificity was very high (100%) but the sensitivity was very low (44%). Though cytological examination of malignant cells is considered as the gold standard in terms of diagnostic specificity but with low negative predictive value (64.51%), it cannot be used as a good screening diagnostic tool. These results are comparable with studies of Gerber AL et al . Rommette et al , R Garg et al , Giuseppe Castardo et al. [17,18,15,19]

The cytological examination for AFB in group -II was positive in -IV out of 25 (16%) patients, whereas sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy was 20%, 100%, 100%, 55.55% and 54% respectively. The specificity was very high (100%) but the sensitivity was very low (54%). Thus it cannot be used as a good screening diagnostic tool. Our study is comparable with study of Gonella JS et al . [20] Direct smear of ascitic fluid for AFB gives poor results.

The sensitivity, specificity, positive predictive value, negative preductive value and diagnostic accuracy of ascitic fluid total protein was 50%, 95%, 90.90%, 65.51% and 72.5% respectively and of ascites/ serum total protein ratiowas 65%, 95%, 92.85% 73.07% and 80% respectively in differentiating cirrhotic from tubercular ascites.

Ascitic fluid : serum total protein has low diagnostic accuracy and sensitivity in comparison of cirrhotic with tubercular and malignant ascites. The serum ascites albumin gradient was >1.1gm / in cirrhotic ascites and other ascites while it was < 1.1 gm/ dl in tubercular and malignant ascites. Similar observation was noted by Pierre Pare et al.[21]

The ascitic fluid cholesterol estimation at the cut off value of 48 mg/dl had lowest sensitivity (15%) and diagnostic accuracy (50.50%) which has no diagnostic importance in differentiating cirrhotic from tubercular ascites, while at same cut off value of 48 mg/ dl it showed highest sensitivity (95%) and diagnostic accuracy (95%) in differentiating cirrhotic from malignant ascites. This result is similar to the observation made by Garg R et al and Gupta R et al. [15]

There was no significant difference in the serum cholesterol level in group I, group II, group III and group IV and there was no correlation between serum and ascitic fluid cholesterol. Similar findings are sustained by Mortenson PB et al, where as Martin Prieto et al and Guiseppe Castaldo et al have found high concentration of serum cholesterol in malignant ascites group than non malignant ascites group. [14,11,19]

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CONCLUSION – Asitic fluid cholesterol is an easy, cheap and a reliable biochemical parameter to differentiate (cirrhotic) transudative and other ascites from malignant ascites but is not useful in differentiating cirrhotic (transudative) and others from tubercular ascites.

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