



Correlation between Serum Ascites Albumin Gradient and Esophageal Varices in Patients of Chronic Liver Disease

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Abstract:

Introduction: Clinically significant portal hypertension is present in >60% of patient with liver cirrhosis. Ideally portal hypertension should be evaluated by actually measuring portal pressure, but it is invasive procedure and involves catheterization of hepatic vein not applicable on a routine basis. Ascites and esophageal varices both are the complication of portal hypertension. Therefore predicting the presence of varices by ascitic fluid examination may be helpful.

Aim of Study: To study the correlation between SAAG and presence and grades of esophageal varices in CLD.

Result: A total of 51 patients were studied which included 29 Alcoholic and 22 non Alcoholic CLD. These patients were divided into 3 groups - Group A with SAAG = 1.1-1.49 (6 patients), Group B with SAAG = 1.5-1.99 (21 patients) and Group C with SAAG > 2.0 (24 patients). In group A, 33% patient had varices, In group B, 76.1% had varices while in group C all the 24 patients (100%) had varices ($p < 0.05$). Among alcoholic 26 out of 29 patients had varices while among non-alcoholic 16 out of 22 patients had varices ($Z = 1.70$).

Conclusion: We concluded in our study that there was significant correlation between SAAG value and endoscopic parameter of portal hypertension manifested by presence of varices. But the SAAG value has no significant correlation with severity of varices. This correlation exist in both alcoholic as well non-alcoholic liver disease, though there is proportionate difference among both these group and correlation is weaker in non-alcoholic liver disease.

Keywords: SAAG, Portal Hypertension, Esophageal Varices, CLD, Liver cirrhosis.

INTRODUCTION

Ascites is pathological accumulation of excess fluid in the peritoneal cavity due to a combination of abnormally in renal function and portal and splanchnic circulation. More than 90% of cases are caused by liver cirrhosis (most common), neoplasm, congestive cardiac failure and tuberculosis. Previously ascites was classified into transudative and exudative type which is obsolete now since the introduction of concept of serum ascites albumin concentration gradient (SAAG). SAAG is calculated by measuring the albumin concentration of ascitic fluid and subtracting it from serum value of albumin obtained at the same time. On the basis of value of SAAG, ascites is classified as high gradient (≥ 1.1 g/dL) and low gradient (< 1.1 g/dL)^{1,2}. Various studies has proved that SAAG value ≥ 1.1 g/dl, is related with portal hypertension.^{3,4}

Portal hypertension is defined as portal vein pressure > 10 mmHg (normal PVP being 5-10 mmHg)⁵. This increased pressure results from a functional obstruction to blood flow from any point in the portal system origin (in the splanchnic bed) through the hepatic veins (exit into systemic circulation) or from an increase in blood flow in the system. Clinically significant portal hypertension is present in $> 60\%$ of patient with cirrhosis. Portal hypertension results from an interaction of abnormal intrahepatic resistance and increases in portal blood flow. The end result of these interactions is the development of increased portal pressure and portosystemic collaterals, the most important of which are esophageal varices. The rupture of esophageal varices is a devastating complication of portal hypertension. Variceal wall tension is the best single descriptor of risk from variceal hemorrhage⁶. Portal hypertension is contributing mechanism for the development of ascites and encephalopathy, and a direct cause for variceal bleeding. Variceal bleeding being most dramatic complication in gastroenterology with high mortality rate needs early detection in patients of CLD. Portal pressure was first measured intraoperatively in 1936 by Rousselot⁷

and by Thompson in 1937⁸. Hepatic vein catheterization was first developed in 1940 and lead to indirect method for measuring portal pressure by outflow occlusion⁹. Ideally portal hypertension should be evaluated by actually measuring portal pressure. Hepatic vein pressure gradient measurement is a safe and reproducible procedure. But it is invasive procedure and involves catheterization of hepatic vein not applicable on a routine basis, therefore alternate method may be useful.

Upper GI endoscopy has diagnostic as well as therapeutic utility in determining esophageal varices and variceal bleed. By upper GI endoscopy presence of varices, variceal size and grading of varices is clearly determined with satisfactory degree of accuracy. Screening of the patients with CLD for the presence of esophageal varices is important because detection of varices is helpful for providing the prophylactic therapy to reduce the complication which is hazardous.

Ascites and esophageal varices both being a complication of portal hypertension has definite correlation. Therefore predicting the presence of varices by ascitic fluid examination may be helpful and cost effective. 'Platelet count/spleen diameter ratio' has also been suggested as non-invasive parameter to predict the presence of oesophageal varices in patients with liver cirrhosis¹⁰.

AIM OF STUDY

To study the correlation between SAAG and presence and grades of esophageal varices in CLD.

MATERIAL AND METHOD

In this study we included adult patients of Chronic liver disease whether alcoholic or non-alcoholic presenting with ascites. Following patients were excluded from the study - Patients with Hepatic encephalopathy, active upper GI bleeding, CHF, Nephrotic syndrome, Protein losing enteropathy, patients with hepatic or extrahepatic metastasis, Other conditions with high SAAG (Budd chiarry

syndrome , Portal Vein thrombosis , Splenic vein thrombosis), Patients with evidence of peritonitis i.e. Tubercular peritonitis, secondary bacterial peritonitis

METHOD

All selected patients were evaluated for CBC, S.LFT , Viral marker (HbsAg, Anti HCV), USG Abdomen and upper GI Endoscopy. Patients were divided into two groups - alcoholic and non-alcoholic. Criteria for alcoholic was based on History of alcohol intake i.e. Intake of >60-80 g/day of alcohol for 10 years for men and >20-40 g/day of alcohol for 10 years for females. Diagnostic paracentesis was done for Ascitic fluid examination. SAAG value was calculated by subtracting ascitic fluid albumin from serum albumin level. On the basis of SAAG value patients were divided into three groups with SAAG 1.1-1.49 , 1.5-1.99 and >2.0. Upper GI Endoscopy of all patients done to determine the presence and grade of varices. Paquet's Grading¹¹ used for grading of varices : Grade I – Varices without luminal prolapsed , Grade II –Moderate sized varix showing luminal prolapse with

minimal obscuring of the GE Junction, Grade III – Large varix showing luminal prolapse substantially obscuring the GE Junction, Grade IV –Very large varix completely obscuring the GE Junction.

All statistical analysis were done using paired t test and Chi square test and Fisher's z test.

RESULTS

A total of 51 patients were studied which included 29 Alcoholic and 22 non Alcoholic CLD. Mean age of the patients was 45.39 ± 11.56 . Among these 42 were male (82.3%) and 9 were females (17.6%).The lowest age was 21 years and highest age was 70 years. According to SAAG value patients were categorized into 3 groups. Group A with SAAG = 1.1-1.49 included 6 patients (mean 1.36 ± 0.07) of which 4 were alcoholic and 2 were non-alcoholic. Group B with SAAG = 1.5-1.99 included 21 patients (mean 1.67 ± 0.11) of which 12 were alcoholic and 9 were non-alcoholic. Group C (SAAG > 2.0) included 24 patients (mean 2.16 ± 0.13) of which 13 were alcoholic and 11 non-alcoholic (Table 1)

Table 1: Distribution of Patients according to SAAG value

SAAG value	Total patients	Alcoholic	Non-Alcoholic
1.1-1.49	06	04	02
1.50-1.99	21	12	09
>2.0	24	13	11
	51	29	22

In group A 2 of the 6 patients (33%) have varices. In group B 16 of the 21 patients (76.1%) have varices while in group C all the 24 patients (100%) had varices($P < 0.05$). There was

significant correlation between SAAG value and presence of varices. This correlation was significant in both Alcoholic and non alcoholic ($P < 0.05$) . (Table 2)

Table 2: Distribution of patients according to presence of varices and SAAG value

SAAG value	Total patients	Varices	No varices
1.1-1.49	06	02	04
1.50-1.99	21	16	05
>2.0	24	24	00
	51	42	09

Among alcoholic 26 out of 29 patients had varices while among non- alcoholic 16 out of 22 patients had varices ($Z = 1.70$). So there was significant proportional difference among alcoholic and non alcoholic.

There was no correlation between SAAG value and Grading of varices ($P > 0.05$).

Table 3: Distribution of patients according to SAAG value and **grading** of varices

Grades of varices	SAAG value		
	1.1-1.49	1.5-1.99	>2.0
Grade 1	1	3	0
Grade 2	1	8	12
Grade 3	0	5	12
Grade 4	0	0	0

DISCUSSION

Hoefs et al and Rector et al in their studies have shown that an excellent correlation exist between portal hypertension and SAAG among alcoholic CLD^{12,3}. Contrary to this Kajani et al¹³ studied this correlation between patients with alcoholic cirrhosis and cirrhosis due to causes other than alcoholic cirrhosis. In this study a correlation was found between SAAG and either portal pressure ($r = 0.02$) or esophageal varices ($r = 0.53$) in alcoholic patients. But in patients with non alcoholic cirrhosis, no correlation was found between SAAG and portal pressure ($r = 0.39$), while correlation between SAAG and varices was found to be weaker ($r = 0.02$). This finding was similar to study of Al Knaway et al¹⁴ in which 5 patients of liver disease had SAAG < 1.1 g/dl despite the presence of esophageal varices by endoscopy, which indicates the presence of portal hypertension. Torres et al¹⁵ in there study found

that presence of EV in patients with ascites and high SAAG was directly related to the degree of SAAG. The size of the EV in patients with ascites and high SAAG was not associated with the degree of SAAG. A SAAG value of $>$ or $= 1.435 \pm 0.015$ g/dl was determined a useful means to predict the presence of EV in patients with ascites and EV were more prevalent in those with ALD. Gurubacharya DL et al¹⁶ found the similar result in their study as shown by Torres et al. Study by Demirel U¹⁷ et al supported the observation that SAAG value increases in ascites due to portal hypertension, but there is no close correlation between severity of esophageal varices and SAAG value. It was remarkable that all the patients with SAAG value > 2 had esophageal varices.

In our study we found significant correlation between SAAG value and presence of varices (p value < 0.05). We also found that all the patients with SAAG value > 2.0 had varices. Thus our

study supports the findings of Torres et al, Demirel U et al as well as Rector et al that SAAG value and presence of varices has significant correlation. There was significant correlation between SAAG and presence of varices among both alcoholic as well as non alcoholic CLD (p value < 0.05), though there was significant proportionate difference among both groups. We found no correlation between SAAG value and grading of varices (p value>0.05) similar to Efrain T et al¹⁸ and Demirel U et al.

Torres et al proposed that a SAAG value of > or =1.435 +/- 0.015 g/dl is a useful means to predict the presence of EV in patients with ascites. Goran Bjelakovic¹⁹ proposed new cut off value of SAAG for discriminating the patients with and without portal hypertension of 1.60 g/dl. This had high sensitivity and specificity. While Demirel U et al proposed that all the patients with SAAG value > 2.0 had varices. In our study we found that predicting the presence of esophageal varices on the basis of SAAG value > 1.5 have sensitivity of 95.2 % and specificity is 44.4 %. The positive predictive value is 88.8 % and negative predictive value is 66.6%. While applying the results of our study with the SAAG value of > 2.0 as cut off point have sensitivity 57 % and specificity is 100 %, positive predictive value is 100 % and negative predictive value is 33 %. The conclusion is that prediction of varices by cut off value of SAAG > 2.0 (mean= 2.16±0.13) is highly specific but less sensitive while applying SAAG value > 1.5 (mean 1.67±0.11) has high sensitivity but low specificity.

CONCLUSION

We concluded in our study that there is significant correlation between SAAG value and endoscopic parameter of portal hypertension manifested by presence of varices. But the SAAG value has no significant correlation with severity of varices. This correlation exist in both alcoholic as well non- alcoholic liver disease, though there is proportionate difference among both these group and correlation is weaker in non-alcoholic liver disease.

Presence of varices can be predicted by using SAAG value as screening test. Cut off value of SAAG >1.5 has high sensitivity while SAAG value >2.0 has high specificity. Screening of the patients for presence of varices by ascitic fluid examination is cost effective, easy to perform and may avoid unnecessary burden over endoscopy unit and can be a useful option in peripheral centres where endoscopy facility is still not available.

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