

Original Research Article

A comparative study of serum ascitic fluid albumin gradient with ascitic fluid total protein in evaluating the etiology of ascites

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ABSTRACT

Background: The traditional method of classification of ascites by AFTP offers little insight into the pathophysiology of ascites formation and it has many drawbacks. In order to overcome it, the classification of ascites based on SAAG has emerged. Even SAAG has some draw backs like non correlation with ascites due to non-alcoholic cirrhosis and difficulty in identifying the ascites due to mixed etiology. This study is conducted to compare the diagnostic accuracies of SAAG and AFTP in identifying the pathophysiology of ascites.

Methods: A total of fifty patients who were admitted with ascites were included in the study. Ascitic fluid total protein and SAAG were calculated. They were classified on the basis of SAAG into High SAAG and Low SAAG and on the basis of AFTP into Transudate and Exudate. After the etiology of ascites evaluated by various diagnostic procedures, the sensitivity, specificity and diagnostic accuracy of SAAG and AFTP in identifying the pathophysiology of ascites calculated separately. The diagnostic accuracies of SAAG and AFTP were compared statistically.

Results: The sensitivity of SAAG was found to be 86.84% and that of AFTP 60%. The specificity of SAAG was found to be 83.33% and that of AFTP was found to be 60%. The diagnostic accuracy of SAAG was found to be 86% and that of AFTP was found to be 60%. The diagnostic accuracy of SAAG and AFTP for individual etiologies of ascites were found and compared. SAAG was found to be superior to AFTP with a P value of <0.01 which was statistically significant.

Conclusions: The sensitivity and specificity of SAAG was superior to AFTP in identifying the etiology of ascites.

Keywords: Ascitic fluid total protein, Cirrhosis, Exudate, Serum ascites albumin gradient, Transudate

INTRODUCTION

Ascites is one of the most common clinical problems which a physician confronts, and it can be effectively diagnosed by ascitic fluid analysis.¹ The ascites is classified traditionally based on estimation of ascitic fluid total protein into 'exudative' and 'transudative' ascites.¹ The ascitic fluid total protein is, ≥ 2.5 g/dl in exudate and < 2.5 g/dl in transudate. Clinically when it is used, it has

many pitfalls, especially in cardiac ascites, cirrhotic patients on prolonged diuretic therapy, 1/3rd patients of malignant ascites, sometimes even in cirrhotic patients' ascitic fluid and in spontaneous bacterial peritonitis where it cannot identify the pathophysiology of ascitic fluid formation properly.²⁻⁶ In order to overcome this, SAAG (Serum Ascitic Albumin Gradient) was introduced. The difference between the serum and ascitic albumin concentration was used to differentiate ascitic

fluid into two categories : gradient ≥ 1.1 g/dl in cases with portal hypertension and < 1.1 g/dl in ascites unrelated to portal hypertension.¹ Even SAAG has some limitations; like difficulty in identifying ascites due to non-alcoholic cirrhosis, difficulty in identifying ascites due to mixed etiology, and it could not differentiate between ascites due to malignancy and tuberculosis.⁷⁻⁹ As both the methods AFTP and SAAG has drawbacks there is a need for a study to compare the diagnostic accuracy of SAAG and AFTP in identifying the pathophysiology causing ascites thereby helping in evaluating the etiology of ascites.

METHODS

The present study was a prospective single center observational hospital based study done in the General Medicine wards of Mahatma Gandhi Medical College and Research Institute, Pondicherry, involving 50 patients with ascites whose etiology is previously unknown with normal coagulation parameters. Serum and ascitic fluid obtained simultaneously for serum albumin, ascitic fluid albumin and ascitic fluid total protein estimation. The Serum Ascitic Fluid Albumin Gradient (SAAG) is calculated by the difference between serum albumin and ascitic fluid albumin concentration. All the patients were divided in to two entities, one based on AFTP into Transudate and Exudate and another one based on SAAG into High SAAG and Low SAAG. Once the etiology of ascites is determined by other investigations Viz. USG, LFT etc. the diagnostic accuracy of the SAAG and AFTP in evaluating the etiology of ascites is found and compared statistically.

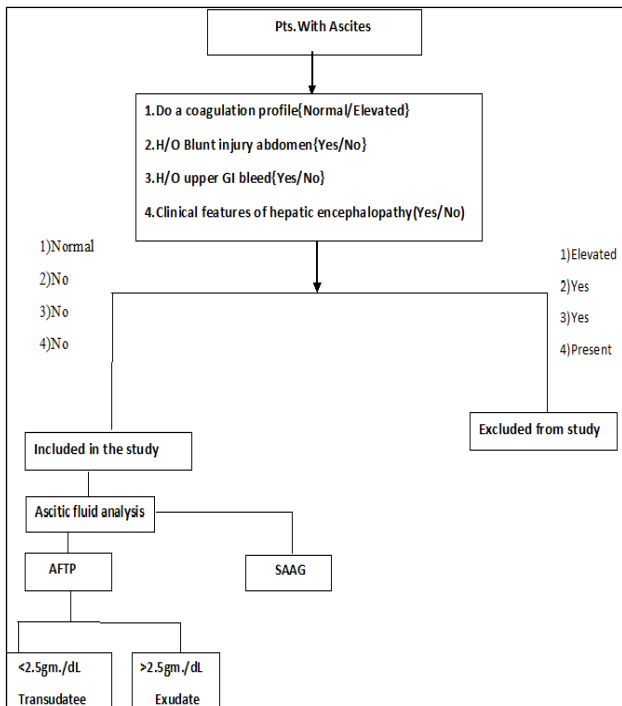


Figure 1: Algorithm of the methodology.

RESULTS

Out of the fifty patients 74% were males while 26% were females with sex ratio of 2.84 between males and females. The mean age of the patients in the study is about 51.46 ± 12.84 years. Cirrhosis is found to be the major cause of ascites followed by congestive cardiac failure and tuberculous ascites while liver metastasis and hypothyroidism were found to be the least common causes of ascites in the patients studied. Cirrhosis was found to be the major cause of ascites in both males and females. Among the ascites caused by cirrhosis, alcoholic liver disease is found to be the major cause followed by Hepatitis B virus and Cryptogenic.

The sensitivity, spescificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy for both AFTP and SAAG was found and is given in the table below.

Table 1: Diagnostic Accuracy of SAAG and AFTP.

Parameters	SAAG	AFTP
Sensitivity	86.84%	60%
Specificity	83.33%	60%
Positive predictive value	94.28%	27.27%
Negative predictive value	64.66%	85.71%
Diagnostic accuracy	86%	60%

The diagnostic accuracy for individual etiology of ascites by AFTP and SAAG is found and compared and the p value was found to be less than 0.05 which was statistically significant and is shown in the table below.

Table 2: Diagnostic accuracies of individual etiologies of Ascites.

Etiology	SAAG	AFTP
Cirrhosis	85.19%	62.96%
CCF	88.89%	44.44%
TB ascites	80%	60%
Nephrotic syndrome	75%	75%
Miscellaneous	100%	60%

DISCUSSION

The sensitivity and specificity of SAAG was found to be superior to the AFTP in evaluating the etiology of ascites in the present study and is similar to the findings obtained by Younas et al, Das et al, and Rana SV et al.

The PPV was found to be superior for SAAG when compared to AFTP and is similar to the findings obtained by, Rana SV et al, Das et al, and Younas et al.¹⁰⁻¹²

The oncotic pressure gradient between the plasma and ascitic fluid has to be raised to counter balance the high hydrostatic pressure which drives the fluid into the intraperitoneal cavity, in the presence of portal

hypertension.¹³ The single most major determinant of oncotic pressure is albumin and the difference between the serum albumin and ascitic fluid albumin is used to differentiate ascites pathophysiologically as ascites with and without portal hypertension.¹³ The saag is found to classify ascites pathophysiologically better than the traditional concept of transudate and exudative ascites which is based on ascitic fluid total protein concentration.

According to traditional concepts infected ascites is considered to be exudative even though low albumin is a major risk factor for infection and it develops in patients with cirrhosis who have low protein and is considered as transudative according to traditional concept which is contradictory while the newer SAAG concept holds its significance even in infected ascites.¹⁴

The negative predictive value of SAAG and AFTP was found to be 64.66 and 85.71% respectively. This is consistent with the findings of Das et al with SAAG had negative predictive value of 85% while that of AFTP was 92%.¹¹ This is contradictory to the findings obtained by Rana SV et al and Younas et al where the negative predictive value of AFTP was greater than that of SAAG.^{10,12} The low negative predictive value of SAAG to AFTP is due to more false negatives of SAAG value in this study.

Out of the five false negative, 4 (80%) is of ascites due to cirrhosis while 1 (20%) is of ascites due to cardiac etiology. Out of the four false negatives among ascites due to cirrhosis all the four are due to non-alcoholic etiology. This observation is similar to that of Kajani et al which suggested that the SAAG value correlated well with the portal venous pressure in case of cirrhosis due to alcoholic liver disease but not due to cirrhosis due to non-alcoholic liver disease.⁷

The diagnostic accuracy of SAAG was found to be superior to AFTP and is similar to the findings of Younas et al, Das et al and Rana SV et al.¹⁰⁻¹²

CONCLUSION

The above study reinforces the superiority of SAAG to AFTP in diagnostic accuracies of evaluating the etiology of ascites. The utility of SAAG in non-alcoholic liver disease is debatable and needs further studies. The SAAG entity should replace the traditional concept of transudative and exudative ascites as the former classifies the ascites much more physiologically than the later.

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