Section: Internal Medicine

Original Research Article

SENSITIVITY AND SPECIFICITY OF SERUM ASCITIC ALBUMIN GRADIENT IN DIFFERENTIATING ASCITES DUE TO PORTAL HYPERTENSION FROM OTHER CAUSES IN A TERTIARY CARE CENTER: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: The Serum-Ascites Albumin Gradient (SAAG) is a crucial diagnostic tool for distinguishing ascites due to portal hypertension from other causes. This study evaluates the sensitivity and specificity of SAAG in a tertiary care setting. **Materials and Methods:** A cross-sectional study was conducted at the Department of General Medicine, Government Medical College, Thiruvananthapuram, involving 128 patients with ascites. SAAG was calculated as serum albumin - ascitic fluid albumin. A high SAAG (≥1.1 g/dL) suggested portal hypertension-related ascites, while a low SAAG (<1.1 g/dL) suggested non-portal hypertension causes. **Result:** Among 128 patients, 75.8% had SAAG ≥1.1 g/dL (portal hypertension-related ascites), while 24.2% had SAAG <1.1 g/dL (non-portal hypertension causes). Alcoholic cirrhosis (44.5%) was the most common cause, followed by viral cirrhosis (21.9%) and hepatocellular carcinoma (8.6%). SAAG demonstrated 93.6% sensitivity and 73.5% specificity for diagnosing portal hypertension-related ascites. **Conclusion:** SAAG is highly sensitive and moderately specific for diagnosing ascites due to portal hypertension. Its cost-effectiveness and reliability make it a valuable diagnostic tool, particularly in resource-limited settings. Further studies are needed to validate its role in guiding patient management.

INTRODUCTION

Ascites, the accumulation of fluid in the peritoneal cavity, is a major complication of chronic liver disease, particularly cirrhosis.[1] It significantly affects morbidity and mortality, often leading to complications such as hepatorenal syndrome, spontaneous bacterial peritonitis, and hepatic encephalopathy.[2]

Historically, ascitic fluid was classified based on total protein concentration into transudate and exudate.[3] However, the Serum-Ascites Albumin Gradient (SAAG) is now the preferred classification method, as it correlates more accurately with portal hypertension and ascitic fluid etiology.[4]

- High SAAG (≥1.1 g/dL): Indicates portal hypertension, commonly due to cirrhosis, cardiac failure, and Budd-Chiari syndrome.[5]
- Low SAAG (<1.1 g/dL): Suggests non-portal hypertension causes, including tuberculosis, peritoneal carcinomatosis, and nephrotic syndrome.[6]

The goal of this study is to evaluate the diagnostic sensitivity and specificity of SAAG in differentiating ascitic fluid causes in a tertiary care setting.

MATERIALS AND METHODS

Study Design and Population: A cross-sectional study was conducted at the Department of General Medicine, Government Medical College, Thiruvananthapuram, Kerala.

Inclusion Criteria

Patients >12 years with clinically and radiologically confirmed ascites.

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Exclusion Criteria

Critically ill patients unable to provide consent.

Sample Size Calculation: Based on previous studies, a sample size of 128 patients was determined to provide statistically significant results.

Data Collection

All patients Underwent

1. Clinical history and physical examination (jaundice, hepatomegaly, splenomegaly).
2. Laboratory tests:
   - Serum albumin
   - Ascitic fluid albumin
   - SAAG calculation = Serum albumin - Ascitic albumin
3. Ultrasonography to assess portal hypertension and liver pathology.
4. Diagnostic Classification:
   - High SAAG (≥1.1 g/dL): Portal hypertension-related ascites.
   - Low SAAG (<1.1 g/dL): Non-portal hypertension causes.

RESULTS

The study included 128 patients, with a mean age of 53.98 ± 6.19 years (range: 30–68 years). Males accounted for 67.2% (86 patients), reflecting the higher prevalence of liver disease in men.

Table 1: Causes of Ascites Based on SAAG Levels

Etiology	High SAAG (≥1.1 g/dL)	Low SAAG (<1.1 g/dL)	Total (%)
Alcoholic Cirrhosis	52	5	44.5%
Viral/Autoimmune Cirrhosis	23	5	21.9%
Hepatocellular Carcinoma	9	2	8.6%
Congestive Heart Failure	6	2	6.3%
Tuberculous Peritonitis	2	4	4.7%
Peritoneal Carcinomatosis	1	8	7.0%
Pancreatitis	1	5	4.7%

Table 2: Diagnostic Accuracy of SAAG.

Parameter	Value (%)
Sensitivity	93.6
Specificity	73.5
Positive Predictive Value (PPV)	90.7
Negative Predictive Value (NPV)	80.6
Accuracy	88.3

DISCUSSION

The high sensitivity of SAAG (93.6%) confirms its reliability as a first-line diagnostic test for identifying ascites due to portal hypertension.[7] Its moderate specificity (73.5%) suggests that while a high SAAG strongly indicates portal hypertension, a low SAAG should be evaluated with additional tests to confirm non-portal causes.[8]

Comparison with Previous Studies: Several studies have validated SAAG as a superior diagnostic tool compared to total protein-based classification. Runyon et al. demonstrated a sensitivity of 97% and specificity of 90% for SAAG in differentiating portal hypertension-related ascites.[9] Other studies reported similar findings, confirming that SAAG correlates well with hepatic venous pressure gradients and provides a more reliable classification.[10]

Strengths and Limitations of SAAG

SAAG offers several advantages over traditional methods:

1. **Higher diagnostic accuracy:** Compared to total protein-based classification, SAAG provides a more precise differentiation between ascitic fluid types.[11]
2. **Cost-effectiveness:** SAAG is widely available and does not require advanced laboratory techniques.[12]
3. **Correlation with disease severity:** Higher SAAG values have been associated with worse portal hypertension and increased risk of complications.[13]

However, certain limitations must be acknowledged:

- Lower specificity: While highly sensitive, SAAG has moderate specificity, leading to potential false positives in conditions like malignancy-related ascites.[14]
- Influence of serum albumin fluctuations: Hypoalbuminemia due to malnutrition or systemic illness can affect SAAG values, leading to potential misclassification.[15]

Clinical Relevance and Future Directions

Given its diagnostic utility, SAAG should be incorporated into routine ascitic fluid evaluation. Further research should focus on:

- SAAG-guided therapeutic decisions, such as predicting response to diuretics or transjugular intrahepatic portosystemic shunt (TIPS) placement.[16]
- Longitudinal studies assessing patient outcomes based on SAAG values.[17]
- Combination with other biomarkers to improve specificity in diagnosing non-portal hypertensive causes of ascites.[18]

CONCLUSION

SAAG is highly sensitive and specific for diagnosing ascites due to portal hypertension. Its cost-

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effectiveness and simplicity make it an essential tool in clinical practice, particularly in resource-limited settings. Future research should explore its role in guiding patient management and treatment strategies.

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