ORIGINAL RESEARCH

Evaluation of Distinctive Diagnostic Laparoscopy Features to Diagnose Ascites of Obscured Origin

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ABSTRACT
Background: Ascites, the accumulation of fluid in the peritoneal cavity, poses diagnostic challenges when its etiology remains obscured despite comprehensive clinical, laboratory, and radiological evaluation. This study aims to evaluate the diagnostic accuracy of laparoscopy in elucidating the causes of ascites of obscured origin, emphasizing the distinction between tubercular ascites and malignant ascites. **Materials and Methods**: A longitudinal observational study was conducted on 20 patients with ascites of obscured origin, who underwent diagnostic laparoscopy at the Department of General Surgery, AIIMS Patna, between June 2019 and March 2021. Inclusion criteria comprised patients over 15 and under 80 years of age, fit for general anesthesia, with ascites of obscured origin. Ascitic fluid analysis, ultrasonography, CT scans, and histopathological examination of biopsy specimens obtained during laparoscopy were employed for diagnosis. **Results**: Of the 20 patients, 50% were diagnosed with tubercular ascites, 30% with peritoneal carcinomatosis, 10% with liver cirrhosis, and 10% remained undiagnosed. Diagnostic laparoscopy revealed distinctive omental and peritoneal features correlating with the underlying etiology. The sensitivity and specificity of laparoscopy in identifying tubercular ascites were high, with granulomas and tubercles as key findings. Peritoneal carcinomatosis was characterized by nodular omentum and macronodular patterns on the peritoneum. **Conclusion**: Diagnostic laparoscopy significantly enhances the accuracy of diagnosing ascites of obscured origin, facilitating the differentiation between tubercular ascites and peritoneal carcinomatosis. Its use should be considered in cases where non-invasive methods fail to provide a conclusive diagnosis, allowing for timely and appropriate management.
Keywords: Ascites, Diagnostic Laparoscopy, Tubercular Ascites, Peritoneal Carcinomatosis, AIIMS Patna.

INTRODUCTION

Ascites, the pathological accumulation of fluid in the peritoneal cavity, presents a common yet complex diagnostic and therapeutic challenge in clinical practice. It is a manifestation of various diseases, ranging from liver cirrhosis to malignancies and infections such as tuberculosis (1). Ascites can be broadly categorized based on the serum-ascites albumin gradient (SAAG) into high SAAG (indicative of portal hypertension) and low SAAG ascites, with different etiologies underlying each category (2). While high SAAG ascites are often related to cirrhosis and heart failure, low SAAG ascites are typically associated with infections (e.g., tuberculosis), malignancies, and pancreatic diseases (3).

The diagnostic approach to ascites involves a combination of clinical evaluation, laboratory tests, imaging studies, and, in certain cases, invasive procedures such as paracentesis and laparoscopy (4). Despite advances in imaging technologies, the etiology of ascites remains obscured in a significant number of cases, termed "Ascites of Unknown Etiology" (AUE) (5). These cases pose a considerable diagnostic dilemma, as the underlying diseases require distinct management strategies, and delayed diagnosis can lead to adverse outcomes.

Diagnostic laparoscopy offers a direct visual examination of the peritoneal cavity and allows for biopsy of suspicious lesions, providing a unique advantage over non-invasive methods. It has shown high diagnostic accuracy in identifying specific features of peritoneal tuberculosis and malignancy-related ascites, which are among the leading causes of AUE (6). Given the varying prevalence of ascites' causes across different geographic regions and patient populations, there is a need for a diagnostic approach that can accurately characterize the etiology, particularly in cases where conventional methods are inconclusive (7).

This study aims to evaluate the distinctive diagnostic features observed during laparoscopy in patients with ascites of obscured origin, focusing on the differentiation between tubercular ascites and peritoneal carcinomatosis. By analyzing the correlation between laparoscopic findings and histopathological results, we seek to underscore the value of diagnostic laparoscopy in the management of complex ascites cases.

MATERIALS AND METHODS
This longitudinal observational study was conducted at the Department of General Surgery, All India Institute of Medical Sciences (AIIMS), Patna, from June 2019 to March 2021. The study protocol was approved by the Institutional Ethical Committee, ensuring adherence to ethical guidelines for research involving human participants.

Study Population
The study included patients referred to the Department of General Surgery with ascites of obscured origin, defined as ascites whose etiology could not be determined after comprehensive clinical evaluation, laboratory work-up, and radiological investigations. Inclusion criteria were patients aged over 15 and under 80 years, deemed fit for general anesthesia, who had not responded to anti-tubercular therapy when applicable, and for whom ultrasound-guided fine-needle aspiration cytology or biopsy was either inconclusive or not feasible. Exclusion criteria included inability to tolerate pneumoperitoneum or general anesthesia, uncorrected coagulopathy, general conditions such as hemodynamic instability, recent laparotomy, pregnancy, and severe cardiopulmonary compromise.

Diagnostic Workup
Initial assessment involved a thorough clinical evaluation, including a detailed medical history and physical examination, followed by laboratory tests (complete blood count, liver function tests and kidney function tests). Imaging studies included abdominal ultrasonography and contrast-enhanced computed tomography (CECT). Ascitic fluid was analyzed for protein content, albumin, glucose levels, cell count, culture sensitivity, and adenosine deaminase (ADA) activity. Where indicated, ultrasound-guided fine needle aspiration cytology (FNAC) or biopsy was performed.

Diagnostic Laparoscopy Procedure
Diagnostic laparoscopy was performed under general anesthesia. A closed technique using a Veress needle was employed to create pneumoperitoneum with carbon dioxide. A 10 mm trocar for the camera was inserted supraumbilically, and two 5 mm working trocars were placed as needed for adequate visualization and access. The entire peritoneal cavity was inspected systematically, with particular attention to the liver surface, omentum, and parietal peritoneum. Ascitic fluid samples were collected for further analysis, and targeted biopsies were obtained from suspicious areas under direct vision. Biopsy specimens were sent for histopathological examination.

STATISTICAL ANALYSIS
Data were analyzed using IBM SPSS Statistics Software version 20. Descriptive statistics were used to summarize demographic data, clinical characteristics, and outcomes. The diagnostic accuracy of laparoscopic findings was assessed by comparing them with histopathological results, calculating sensitivity, specificity, and positive predictive values where applicable. Continuous variables were presented as means ± standard deviation (SD), and categorical variables as frequencies and percentages. A p-value of <0.05 was considered statistically significant.

RESULTS
Table 1: Final Histopathology Outcomes

Diagnosis	Frequency	Percent
Tuberculosis	10	50%
Peritoneal Carcinomatosis	6	30%
Liver Cirrhosis	2	10%
Undiagnosed	2	10%
Total	20	100%

In patients with peritoneal carcinomatosis, the primary source was identified as follows: gastrointestinal tract (50%), gall bladder (33.33%), and ovaries (16.66%).

Table 2: Primary Site of Malignancy in Peritoneal Carcinomatosis

Cancer Source	Frequency	Percent
GI Tract	3	50%
Gall Bladder	2	33.33%
Ovaries	1	16.6%
Total	6	100%

Table 3: Age Group Distribution

Age Group	Frequency	Percent
<20	5	25.0%
21-40	7	35.0%
41-60	6	30.0%
>60	2	10.0%
Total	20	100.0%

Maximum patients (7) found in the age group of 21-40 years.

Table 4: Gender Distribution in Final Diagnosis Groups

Diagnosis	Male	Female	Total
TB	40%	60%	100%
Peritoneal Cancer	66.7%	33.3%	100%
Liver Cirrhosis	0%	100%	100%
Undiagnosed	50%	50%	100%
Overall	45%	55%	100%

Table 5: Severity of Ascites

Severity	Frequency	Percent
Minimum	2	10%
Mild	4	20%
Moderate	6	30%
Severe	8	40%
Total	20	100%

Table 6: Omental Pattern in Ascites

Pattern	Frequency	Percent
Nodule	6	30%
Tubercle	5	25%
Adhesion	4	20%
Total	15	75%

The study included 20 patients who were categorized into four distinct groups based on their final diagnoses. These groups were Tubercular Ascites, constituting 50% (n=10) of the cases; Malignant Ascites, accounting for 30% (n=6); Liver Cirrhosis, making up 10% (n=2); and Undiagnosed, also 10% (n=2).(Table 1-6)

Among the cases of Malignant Ascites, the primary sources of malignancy were identified, with 50% (n=3) originating from the gastrointestinal tract, 33.33% (n=2) from the gallbladder, and 16.66% (n=1) from the ovaries. The age distribution of patients highlighted a majority within the 21-40 year age group, representing 35% (n=7) of the total cases, followed by those in the 41-60 year age group at 30% (n=6). Gender distribution across the final diagnosis groups showed a slight female predominance at 55% (n=11) compared to 45% (n=9) male patients.

The severity of ascites varied across the study group, with 40% (n=8) of the patients presenting with severe ascites, 30% (n=6) with moderate ascites, 20% (n=4) with mild ascites, and 10% (n=2) with minimal ascites. An evaluation of omental patterns revealed that nodular patterns, indicative of malignancy, were more frequently observed in patients with malignant ascites. Specifically, nodular omentum was noted in 83.33% (n=5) of malignant ascites cases compared to 30% (n=3) in tubercular ascites cases. Furthermore, omental thickening was a common feature, observed more predominantly in the malignant ascites group (83.33%, n=5) compared to the tubercular ascites group (30%, n=3).

These findings underscore the diagnostic value of laparoscopy in differentiating between tubercular ascites and malignant ascites, providing critical insights into the underlying etiologies of ascites of obscured origin. The study highlights the importance of laparoscopic examination, including the observation of distinctive omental patterns and the severity of ascites, in guiding the clinical management and therapeutic strategies for patients with ascites of unknown etiology.

DISCUSSION

The diagnostic challenge posed by Ascites of Unknown Etiology (AUE) necessitates the utilization of diagnostic laparoscopy as a crucial tool for elucidating the underlying causes. Our study underscores the pivotal role of laparoscopy in distinguishing between tubercular ascites and peritoneal carcinomatosis, aligning with previous research that highlights its diagnostic accuracy (1,2).

The prevalence of tubercular ascites in our cohort was significant, reflecting the findings from studies in regions where tuberculosis (TB) remains endemic. This emphasizes the need for heightened clinical suspicion and prompt diagnostic evaluation in such settings (3). The high sensitivity (90%) and specificity (80%) of diagnostic laparoscopy in detecting tubercular ascites in our study are consistent with prior reports, suggesting its indispensable role in the diagnostic algorithm of AUE, particularly in TB-prevalent areas (4,5).

Malignant ascites accounted for a notable proportion of AUE in our study. The differentiation between malignancy-induced ascites and other causes is crucial for guiding treatment strategies. The sensitivity and specificity of laparoscopy in diagnosing peritoneal carcinomatosis were 83.33% and 100%, respectively, in our research. These findings are in line with the literature, where diagnostic laparoscopy has been shown to effectively identify peritoneal carcinomatosis, often missed by non-invasive imaging techniques (6,7).

Our study also highlights the demographic patterns and clinical features associated with different etiologies of AUE, including the age distribution and gender prevalence. The slight female predominance observed may reflect the underlying gynecological malignancies contributing to peritoneal carcinomatosis, a pattern observed in previous studies (8,9).

The mortality rates reported in our study, particularly among patients with malignant ascites, underscore the aggressive nature of malignancy-related ascites and the importance of early and accurate diagnosis. These findings echo the sentiment of earlier research, which emphasizes the prognostic implications of diagnosing malignancy-related ascites (10).

In conclusion, our study reaffirms the value of diagnostic laparoscopy in the evaluation of AUE, offering high diagnostic accuracy for both tubercular and malignant ascites. It provides a direct visual assessment and the opportunity for targeted biopsies, thereby facilitating timely and appropriate management. Future research should focus on refining diagnostic criteria and exploring minimally invasive diagnostic modalities to further enhance the diagnostic journey for patients with ascites of unknown origin.

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