Section: General Surgery

Original Research Article

CHANGE IN LFT WITH INCREASED SIZE OF LIVER ABSCESS- AN OBSERVATIONAL PROSPECTIVE COHORT STUDY IN A TERTIARY CARE CENTRE

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ABSTRACT

Background: A liver abscess, categorized into amoebic and pyogenic types, has seen significant evolution in understanding, diagnosis, and management. Recent trends show an increase in occurrence, attributed to factors like inadequate sanitation and high population density. Pyogenic liver abscess (PLA) has a higher prevalence in Western countries, with mortality rates reduced due to advancements in medical imaging and drainage techniques. However, morbidity remains substantial, necessitating effective management strategies. This retrospective analysis aims to explore the relationship between liver function test (LFT) parameters and abscess volume to facilitate early identification of high-risk patients. **Aim of the Study:** The primary aim is to delineate the association between liver abscess volume and various LFT indicators, contributing to a better understanding of disease impact and optimizing treatment protocols.

Material and Methods: Data from 100 patients over eighteen months were collected, approved by the institution's ethics committee. Eligible participants aged 18 and above, exhibiting liver abscess symptoms confirmed through imaging, were enrolled. Demographics, symptoms, laboratory results, treatment approaches, and outcomes were analyzed. Statistical examination using correlation coefficient techniques was performed on collected data.

Results: The study included predominantly male participants with amoebic liver abscesses. Risk factors included alcohol consumption, smoking, and diabetes mellitus. Fever and abdominal pain were common symptoms, with hepatomegaly frequently observed. Elevated ALP, INR, and SGOT/SGPT levels, alongside hypoalbuminemia, correlated positively with abscess volume. Serum bilirubin levels showed no significant correlation.

Conclusion: In regions like India, liver abscesses pose significant health concerns. Understanding the association between abscess size and LFT parameters can aid in timely detection and treatment. Elevated ALP, INR, SGOT/SGPT, and hypoalbuminemia serve as valuable indicators of abscess severity, emphasizing the importance of LFTs in disease assessment and prognosis prediction.

Keywords: Liver Abscess, Liver Function Test (LFT), Pyogenic Liver Abscess (PLA)

INTRODUCTION

A liver abscess is characterized by the accumulation of pus within the liver's tissue, with classifications primarily divided into amoebic and pyogenic types. Over the last century, there has been a significant evolution in the understanding, diagnosis, and management of this condition.[1-2] Contributing

factors to the heightened incidence of liver abscesses in regions like India include inadequate sanitation practices, high population density, and suboptimal nutritional standards.[3]

Pyogenic liver abscess (PLA) presents as an infrequent yet notable condition, exhibiting a higher prevalence in Western countries. Statistics indicate an annual incidence rate of approximately 3.6 cases per 100,000 people in the United States, contrasting with a significantly higher rate of 17.6 per 100,000 observed in Taiwan.[4] Advances in medical imaging technologies, such as ultrasound and computed tomography, have been instrumental in localizing and draining abscesses, thus reducing the mortality rate to between 2% and 12%.[5] The management of liver abscesses presents a dilemma for medical professionals, torn between therapeutic aspiration and conservative approaches. This retrospective analysis seeks to investigate how liver function test (LFT) parameters correlate with the abscess volume.[6-15] The study focuses on examining alkaline phosphatase (ALP), serum albumin, International Normalized Ratio (INR), total serum bilirubin (SBT), and liver enzymes (SGOT, SGPT), as these indicators are thought to reflect the severity of the condition and predict potential complications. By identifying correlations between abscess volume and LFT parameters, the study endeavors to facilitate the early identification of patients at high risk, enabling the initiation of prompt and effective interventions to mitigate morbidity.[16-22]

Aim and Objectives

This investigation's primary objective is to delineate the association between the volume of liver abscesses and various liver function indicators, thereby contributing to a more nuanced understanding of the disease's impact on patient health and optimizing treatment protocols.

MATERIAL AND METHODS

Patient data for this study was collected from the Department of General Surgery at our institute, FHMC Agra, spanning an eighteen-month duration. The institutional Hospital Research and Ethics Committee granted approval for the study's methodology and design with reference number – FHMC/IEC/R. Cell/2024/34. A total of 100 patients were enrolled in the research based on their willingness to participate and fulfillment of the specified eligibility criteria.

The Criteria for Participation Included

- Individuals aged 18 years and older who provided their consent
- Patients exhibiting symptoms indicative of a liver abscess
- Confirmation of liver abscess through imaging techniques such as Ultrasound or CT scans.

Patients were excluded from the study if they declined to provide consent. An analysis of medical records was conducted to gather information on patient demographics, pre-existing health conditions, initial symptoms, laboratory test results, findings from imaging and microbial studies, treatment approaches, and outcomes concerning morbidity and mortality rates.

The collected data was meticulously documented in Excel spreadsheets and subjected to statistical analysis, specifically using correlation coefficient techniques to assess relationships within the data.

Data on patients was systematically gathered from those presenting to the emergency department and those admitted for inpatient care, covering a diverse range of ages, genders, backgrounds, and socioeconomic statuses. A comprehensive collection of each patient's medical history was conducted alongside a detailed clinical evaluation.

The laboratory evaluations encompassed a full blood count, a suite of liver function tests (LFTs) such as alkaline phosphatase (ALP), serum albumin, total serum bilirubin (SBT), and liver enzymes (SGOT, SGPT), in addition to prothrombin time, INR, serology tests for amoebic antigen, fecal occult blood tests, and standard diagnostic procedures including chest X-rays and abdominal ultrasounds. Regular clinical follow-ups were conducted every 4th day with abdominal ultrasound assessments.

For the purpose of data analysis, information was organized and stored in Excel spreadsheets and subjected to statistical examination using the correlation coefficient (R) to investigate the relationship between the abscess volume/size and various LFT parameters (including bilirubin, ALP, INR, liver enzymes, and albumin). The resulting R values were then compared against a predefined table to determine the level of correlation. [Table 1]

RESULTS

In this study involving a sample size of 100, we found that 80% of the participants were male and 20% were female, with an average age of presentation at 41.24 years (ranging from 18 to 68 years). A significant portion of the patients, 88%, was diagnosed with amoebic liver abscesses, while the remaining 12% had pyogenic abscesses. These classifications were determined through amoebic serology and pus culture analyses. Predominant risk factors identified included alcohol consumption in 48% of cases, smoking in 42%, and diabetes mellitus in 18%, with 8% of patients reporting both diabetes and a history of alcoholism. [Table 2 and Table 3]

The most frequently observed clinical symptoms were fever, present in 96% of patients, and abdominal pain, noted in 92%. Physical examinations most commonly revealed hepatomegaly in 88% of individuals and abdominal tenderness in 64%. Clinical complications were observed in a minority of cases, with right-sided pleural effusion occurring in 10% of patients and ascites in 4%. [Figure 1]

An analysis of liver function tests (LFTs) indicated that the most prevalent abnormality was elevated alkaline phosphatase (ALP) levels, observed in 94% of patients. Additionally, 90% of the study group exhibited low serum albumin levels, while 60% had deranged International Normalized Ratios (INRs). Elevations in SGOT and SGPT levels were noted in 52% and 54% of patients, respectively. [Table 4]

Ultrasonographic evaluations revealed that 27% of cases had an abscess volume exceeding 200 cc. [Table 5] Statistical analyses demonstrated a significant positive correlation between abscess volume and several parameters, including INR (R=0.54), alkaline phosphatase (R=0.40), SGOT (R=0.41), and SGPT (R=0.39), alongside a negative correlation with serum albumin levels (R=-0.28). There was found to be no significant correlation between the size of the abscess and total bilirubin levels (R=0.073). [Table 6]

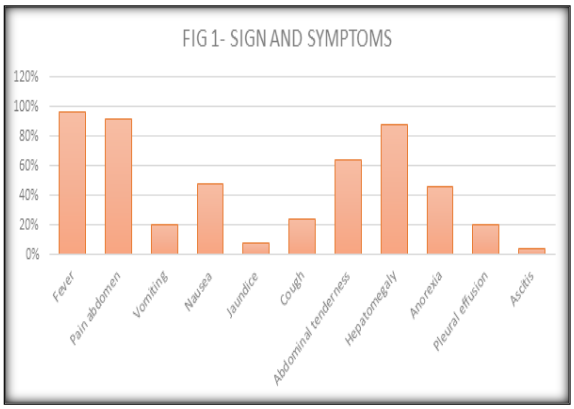

Figure 1: Sign and Symptoms

Table 1: Correlation interpretation by value of R.

Correlation Interpretation	Value of R (Positive)	Value of R (Negative)
No correlation	0 to 0.1	0 to -0.1
Weak correlation exists	0.1 to 0.3	-0.1 to -0.3
Medium correlation exists	0.3 to 0.6	-0.3 to -0.6
Strong correlation exists	0.6 to 1	-0.6 to -1

Table 2: Demographic profile of liver abscess patients.

Cases	100
Average Age	41.24 years
Age Range	18 to 68 years
Sex Distribution	
Male	80
Female	20

Table 3: Risk Factor Profile of Patients

Risk Factor	Cases (Out of 100)	Percentage
Alcohol	48	48%
Smoking	42	42%
DM (Diabetes Mellitus)	18	18%
Alcohol + DM	8	8%

Table 4: LFT Profiles for patient (According to percentage)

Biochemical Parameters	Cases (Out of 100)	Percentage
ALP > 100	95	95%
SGOT > 45	51	51%
SGPT > 45	55	55%
Albumin < 3.5	91	91%
INR > 1.2	62	62%
Total bilirubin > 1.2g/dl	35	35%

Table 5: USG findings

Size	Cases (Out of 100)	Percentage
<200 CC	48	48%
200-400 CC	36	36%
>400 CC	21	21%

Table 6: Statistical analysis of LFT parameters with abscess volume. (According to correlation coefficient)

Biochemical Parameters	Correlation Coefficient (R)	Inference
Total Bilirubin	0.073	No correlation
Alkaline Phosphatase	0.40	Medium correlation
INR	0.54	Medium correlation
SGOT	0.41	Medium correlation
SGPT	0.39	Medium correlation
Albumin	-0.28	Negative correlation

DISCUSSION

Liver abscesses are more prevalent in tropical regions, with Entamoeba histolytica (amoebic) and various bacteria (pyogenic) being the predominant causative agents. This research aligns with multiple studies from developing countries, indicating an amoebic origin in the majority of cases.[6]

The average age of onset observed was 41.24 years, consistent with findings from other Indian research by Ghosh et al., Sharma et al., and Mukhopadhyay et al., which reported similar age ranges. The distribution of pyogenic liver abscesses (PLA) showed no particular age preference, though the peak incidence of amoebic liver abscesses occurred in the fifth decade.[7-9]

A distinct predominance of male patients was noted in this study, mirroring the gender distribution patterns found in research conducted by Sharma et al., Mukhopadhyay et al., and Ghosh et al. Conversely, studies by Pang et al. and Heneghan et al. presented a less pronounced male dominance.[7-11]

Alcohol consumption emerged as a significant risk factor, noted in 48% of cases as shown in figure. This observation is supported by Ghosh et al., who reported a higher percentage of alcohol-related cases in their study. The detrimental impact of alcohol on liver abscess development is multifaceted, including impairment of Kupffer cell functions and the exacerbation of invasive amoebiasis due to high levels of free iron in country-made liquor.[13]

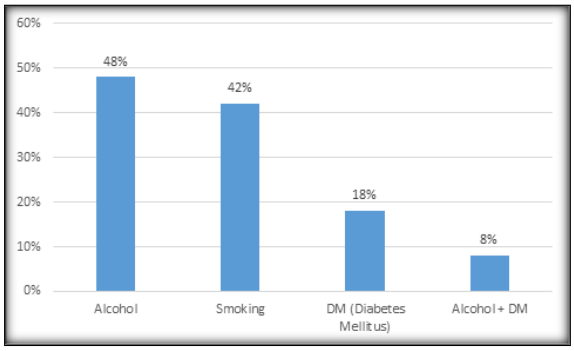

Figure 2: Risk Factors

Diabetes mellitus was identified in 18% of participants, showcasing variability when compared to other studies. Ghosh et al. and Das et al. reported different incidences, highlighting the diverse impact of diabetes on liver abscess risk. Thomsen et al. found diabetic individuals to be at significantly increased risk of developing PLA.

Fever and abdominal pain were the most common presenting symptoms, a finding that aligns with other studies, including that of Ghosh et al. Hepatomegaly was a prevalent feature, closely matching our findings and contrasting with Das et al., who reported a lower prevalence.[9,14]

Elevated alkaline phosphatase (ALP) levels, increased INR, and hypoalbuminemia were the primary laboratory findings. High ALP levels were noted in a significant majority of cases, suggesting its reliability as a biochemical marker. This correlation with abscess volume is consistent with literature suggesting ALP's association with disease duration and severity. Elevated INR showed a strong correlation with abscess volume, indicating its utility in assessing disease impact alongside SGOT and SGPT levels, which also correlated with abscess severity.[9-14]

Hypoalbuminemia was significantly correlated with larger abscess volumes, underscoring the clinical relevance of serum albumin levels in disease assessment. In contrast, serum bilirubin levels were mildly elevated but did not correlate with abscess volume, aligning with findings from Kemparaj et al. The study also considered multiple factors, including bilirubin levels and hypoalbuminemia, as significant predictors of mortality, further emphasizing the importance of these parameters in evaluating liver abscess outcomes.[16-19]

CONCLUSION

In regions such as India, which are still developing, the issue of liver abscesses holds critical importance. Timely detection and immediate treatment are essential to minimize the disease's impact on patients' health. The dimensions of the abscess play a crucial role in determining the patient's outlook, with other significant factors including the abscess's location within the liver (left or right lobe), its proximity to the liver capsule, the presence of any concurrent health conditions, signs of sepsis, and the potential for multiple organ complications.

This research aimed to explore the relationship between the size of the liver abscess and various liver function test (LFT) parameters. Findings indicated a clear positive association between the size of the abscess and both the International Normalized Ratio (INR) and levels of alkaline phosphatase and liver enzymes (SGOT, SGPT). A notable negative association was also observed between the size of the abscess and serum albumin levels. However, no link was found between the abscess size and total bilirubin levels.

The study underscores the value of LFTs (INR, SGOT, SGPT, ALP) as an accessible, affordable, and dependable diagnostic tool. Such tests can aid healthcare providers in estimating the abscess's size, thereby informing predictions regarding the disease's severity and the patient's prognosis.

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