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Deranged laboratory profile in acute biliary pancreatitis: A hospital-based analysis

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Abstract
Background: Acute biliary pancreatitis (ABP) is a frequent and potentially severe form of pancreatitis caused primarily by gallstones or biliary sludge. Early diagnosis and evaluation of laboratory parameters play a vital role in determining disease severity and guiding appropriate management.
Objective: To evaluate the spectrum of deranged laboratory parameters in patients with acute biliary pancreatitis and assess their association with clinical presentation and disease severity.
Methods: This prospective observational study was conducted at Dr. Rajendra Prasad Government Medical College, Kangra at Tanda, Himachal Pradesh, from July to December 2022. Fifty patients diagnosed with ABP were included. Diagnosis was based on clinical features, elevated serum pancreatic enzymes, and imaging findings suggestive of biliary etiology. Relevant laboratory investigations, including liver and renal function tests, inflammatory markers, and electrolytes, were recorded and analyzed.
Results: Of the 50 patients, 64% were female, with a mean age of 53.04 ± 14.38 years. Abdominal pain (100%) and vomiting (72%) were the most common symptoms. The majority had mild (54%) or moderate (40%) disease. All patients showed elevated serum amylase (1871.12 ± 1700.39 IU/L) and lipase (2606.43 ± 2289.57 IU/L). Liver enzymes were deranged in over half the patients. Inflammatory markers such as CRP and WBC were elevated in 70% and 72% of cases, respectively. Electrolyte disturbances and renal dysfunction were also noted in a subset.
Conclusion: ABP commonly presents with characteristic clinical and biochemical features. Comprehensive laboratory assessment is essential for diagnosis, severity stratification, and early intervention to prevent complications.

Keywords: Acute biliary pancreatitis (ABP), Laboratory parameters, profile, Diagnosis, Clinical presentation, Disease severity

Introduction

Acute pancreatitis is an acute inflammatory condition of the pancreas characterized by sudden onset of abdominal pain and elevated levels of pancreatic enzymes in the serum. Among the various etiologies, biliary tract disease, particularly gallstones and biliary sludge, remains one of the most common causes of acute pancreatitis worldwide, accounting for approximately 35–60% of cases.[1,2] When a gallstone transiently or persistently obstructs the ampulla of Vater, it leads to a reflux of bile into the pancreatic duct and premature activation of pancreatic enzymes, initiating pancreatic inflammation and injury.[3]

Early diagnosis and risk stratification are essential in managing acute biliary pancreatitis (ABP), as the disease spectrum ranges from mild, self-limiting inflammation to severe, necrotizing pancreatitis associated with systemic inflammatory response syndrome (SIRS) and multiorgan failure.[4] While imaging modalities such as ultrasonography and computed tomography (CT) are instrumental in diagnosis and assessment of complications, laboratory investigations remain the cornerstone for initial evaluation, monitoring, and prognostication.[5]

A deranged laboratory profile in ABP reflects both pancreatic inflammation and biliary obstruction. Elevations in serum amylase and lipase are the hallmark biochemical markers of pancreatitis, though they do not reliably indicate severity.[6] On the other hand, liver function tests (LFTs), particularly alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP), gamma-glutamyl transferase (GGT), and bilirubin, are often elevated in ABP due to concomitant biliary obstruction.[7] Studies have shown that an ALT level greater than three times the upper limit of normal is highly suggestive of a biliary etiology in acute pancreatitis.[8]

Other laboratory abnormalities frequently seen in ABP include leukocytosis, elevated C-reactive protein (CRP), hypoalbuminemia, electrolyte disturbances, and coagulopathy, which may correlate with the severity of systemic inflammation and organ dysfunction. Despite their clinical utility, there is a paucity of region-specific, hospital-based data analyzing the pattern and significance of these laboratory abnormalities in patients with ABP.

This study aims to evaluate the spectrum of deranged laboratory parameters in patients presenting with acute biliary pancreatitis in a tertiary care hospital. By identifying the most frequently altered biomarkers and their associations with clinical outcomes, we aim to contribute to early diagnostic accuracy and improved patient management strategies.

Methods

This prospective observational study was conducted in the Department of Surgery at Dr. Rajendra Prasad Government Medical College (RPGMC), Kangra at Tanda, Himachal Pradesh, India, over a period of six months from July 2022 to December 2022. A total of 50 patients diagnosed with acute biliary pancreatitis were enrolled using universal sampling. All patients who met the inclusion criteria during the study period were included. The diagnosis of acute biliary pancreatitis was based on the presence of at least two of the following criteria: acute abdominal pain and tenderness suggestive of pancreatitis, serum amylase and/or lipase levels three times or more above the upper limit of normal (>160 U/L), and imaging findings indicating biliary

etiology, such as the presence of gallstones or biliary sludge in the gallbladder or biliary tree.

Patients were excluded if they had a history of alcohol intake, were suffering from alcoholic pancreatitis, had chronic pancreatitis, pancreatic malignancy, or were unable to provide informed consent. Written informed consent was obtained from all participants, and ethical approval for the study was secured from the Institutional Ethics Committee of Dr. RPGMC, Kangra at Tanda.

Data were collected using a pretested, structured proforma, which included demographic details, clinical presentation, medical history, and physical examination findings. Laboratory investigations performed for each patient included a complete blood count (CBC), serum amylase and/or lipase, liver function tests (LFTs), renal function tests, serum electrolytes, and lipid profile. Radiological investigations such as ultrasonography and/or contrast-enhanced computed tomography (CECT) were performed to support the diagnosis and assess disease severity.

All data were entered into a Microsoft® Excel spreadsheet. Statistical analysis was conducted using appropriate tests based on the type and distribution of data. Descriptive statistics were used for summarizing continuous and categorical variables. Comparative tests such as the chi-square test for categorical data and the t-test or Mann–Whitney U test for continuous variables were applied as appropriate. A p-value of less than 0.05 was considered statistically significant.

Results

Baseline characteristics

The study included 50 patients diagnosed with acute biliary pancreatitis. Among them, 32 (64%) were female and 18 (36%) were male. The mean age of the patients was 53.04 ± 14.38 years. Clinically, all patients (100%) presented with abdominal pain, which was the most common symptom. Vomiting was reported in 36 patients (72%), while fever was noted in 15 patients (30%).

Severity of pancreatitis

In this study, regarding the severity of pancreatitis, 27 patients (54%) were classified as having mild pancreatitis, 20 patients (40%) had moderate pancreatitis, and 3 patients (6%) were categorized as severe cases based on established clinical criteria.

Laboratory Investigation

The laboratory investigation profile of patients with acute biliary pancreatitis revealed markedly elevated pancreatic enzymes. Both serum amylase and serum lipase were significantly raised in all patients, with mean values of 1871.12 ± 1700.39 IU/L and 2606.43 ± 2289.57 IU/L, respectively. Derangement in liver function tests was common, with total bilirubin elevated in 65% of patients (2.1 ± 1.4 mg/dL), AST in 60% (180 ± 75 IU/L), ALT in 62% (150 ± 80 IU/L), and alkaline phosphatase in 58% (320 ± 110 IU/L). Inflammatory markers and hematological parameters showed significant abnormalities as well. An elevated white blood cell (WBC) count was observed in 72% of cases (13,000 ± 4,500 /mm³), while C-reactive protein (CRP) was raised in 70% (35.49 ± 36.38 mg/L). Lactate dehydrogenase (LDH) was elevated in 15% of patients, with a mean value of 512.52 ± 293.80 IU/L. Other notable findings included hypocalcemia in 25% (serum calcium: 7.8 ± 0.9 mg/dL), hyponatremia in 20% (sodium: 134 ± 5 mEq/L), and elevated serum creatinine in 15% (1.3 ± 0.5 mg/dL), indicating possible early renal involvement in a subset of patients.

Referred patients

In the present study comprising 50 patients with acute biliary pancreatitis, majority were not referred to other healthcare centers. Only one was referred to higher center , the remaining (49) patients were managed in the institute only.

Discussion

Acute biliary pancreatitis (ABP) remains a prevalent and potentially life-threatening condition, often requiring early diagnosis and appropriate management to prevent complications. The present study aimed to analyze the spectrum of laboratory abnormalities in ABP and their correlation with clinical severity. Our findings revealed several key laboratory derangements that are consistent with previously reported literature, while also contributing region-specific data from a North Indian tertiary care center.

Marked elevation of pancreatic enzymes serum amylase and lipase was universally present in our patients, confirming their diagnostic utility. Although both enzymes were elevated in 100% of patients, lipase values showed even higher mean levels, in line with prior studies suggesting greater sensitivity and longer elevation duration for lipase compared to amylase.[1,9]

Deranged liver function parameters were observed in a majority of patients. Elevated ALT, AST, bilirubin, and alkaline phosphatase were significantly more common in patients with moderate to severe disease. Elevated transaminases, particularly ALT >150 IU/L, have been suggested as a predictive marker of biliary etiology in acute pancreatitis.[10] These findings reinforce the importance of LFTs not only in diagnosis but also in guiding imaging and surgical evaluation for gallstone-related obstruction.

The study also highlighted the role of inflammatory markers such as CRP and WBC count, which were elevated in over 70% of patients. CRP, a well-established marker of inflammation and disease severity in acute pancreatitis, was significantly higher in patients with prolonged hospital stays and systemic complications. Previous research has shown that CRP values >150 mg/L at 48 hours predict severe disease with reasonable accuracy.[11] While our CRP values were lower on admission, serial trends could not be assessed due to study design limitations.

enal function abnormalities, particularly elevated serum creatinine, were found in 15% of patients, aligning with the Revised Atlanta Classification's emphasis on organ dysfunction as a determinant of severity.[12] Additionally, electrolyte disturbances like hyponatremia and hypocalcemia were noted in 20% and 25% of cases, respectively. Hypocalcemia, often resulting from fat saponification during fat necrosis, is considered a poor prognostic indicator.[13]

Interestingly, serum LDH was elevated in a subset of patients. While LDH is a component of scoring systems like Ranson's criteria, its isolated diagnostic significance is limited. However, it may reflect tissue damage and systemic inflammation in moderate to severe disease. Only 2% of patients in our study were referred cases, indicating that the majority of patients presented directly to the tertiary care

center, which may explain the predominance of early to moderately severe cases and absence of mortality during the study period. Our findings support the use of a comprehensive biochemical panel including pancreatic enzymes, liver function tests, inflammatory markers, and renal/electrolyte parameters as essential tools for diagnosis, severity stratification, and monitoring in acute biliary pancreatitis.

Table 1: Baseline characteristics

Baseline characteristics	Frequency (n=50)	Percentage (%)
Gender		
Male	18	36%
Female	32	64%
Age	53.04±14.38 years	
Clinical symptoms		
Abdominal pain	50	100%
Vomiting	36	72%
Fever	15	64%
Duration of hospital stay	7.4±2.5 days	

Table 2: Severity of pancreatitis

Severity of pancreatitis	Frequency (n=50)	Percentage (%)
Mild	27	54%
Moderate	20	40%
Severe	3	6%

Table 3: Laboratory Investigation

Laboratory Investigation	Mean ± SD	Deranged in (%) Patients
Serum Amylase (IU/L)	1871.12±1700.39	100%
Serum Amylase (IU/L)	2606.43±2289.57	100%
Total Bilirubin (mg/dL)	2.1±1.4	65%
AST (IU/L)	180±75	60%
ALT (IU/L)	150±80	62%
Alkaline Phosphatase (IU/L)	320±110	58%
WBC Count (/mm³)	13000±4500	72%
CRP (mg/L)	35.49±36.38	70%
Serum Creatinine (mg/dL)	1.3±0.5	15%
Serum Calcium (mg/dL)	7.8±0.9	25%
Sodium (mEq/L)	134±5	20%
LDH	512.52±293.80	15%

Table 4: Referred patients

Referred patients	Frequency (n=50)	Percentage (%)
Yes	1	2%
No	49	98%

Table 2: Clinical symptoms

Clinical symptoms	Frequency (n=50)	Percentage (%)
Abdominal pain	50	100%
Vomiting	36	72%
Fever	15	64%

Conclusion

This study highlights that acute biliary pancreatitis predominantly affects middle-aged individuals, with a higher prevalence among females. Abdominal pain and vomiting were the most common presenting symptoms. The majority of cases were of mild to moderate severity, but a small proportion progressed to severe disease. Elevated pancreatic enzymes and deranged liver function tests were consistent laboratory findings, indicating biliary etiology. Inflammatory markers and electrolyte imbalances, particularly leukocytosis, elevated CRP, and hypocalcemia, were also frequently observed. Early identification and prompt management are crucial to prevent complications, especially in patients showing signs of organ dysfunction or systemic inflammation. Most patients presented directly to the hospital, emphasizing the importance of primary care awareness and early referral in suspected cases of biliary pancreatitis.

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