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Akut Biliyer Pankreatitte Hastalık Şiddetinin Laboratuvar Parametrelerine Göre Değerlendirilmesi: Retrospektif Kohort Çalışması

Assessing Disease Severity Based on Laboratory Parameters in Acute Biliary Pancreatitis: A Retrospective Cohort Study

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ÖZ

Giriş: Akut pankreatit, pankreas iltihabı ile seyreden ilerleyici bir hastalıktır. Hastalığın şiddeti arttıkça morbidite ve mortalitesi arttığı için erken tanı ve tedavi çok önemlidir. Bu nedenle hastalığın prognozunu tahmin etmek için birçok skorlama yöntemi kullanılmaktadır. Bu çalışmada radyolojik evreye dayalı olarak bazı biyokimyasal parametrelerle hastalığın şiddetini göstermeyi amaçladık.

Yöntem: Eskişehir Osmangazi Üniversitesi Tıp Fakültesi Hastanesi Genel Cerrahi Kliniğinde akut biliyer pankreatit tanısı alan 104 hasta retrospektif olarak tespit edildi. Bu hastaların yaş, cinsiyet, komorbidite, laboratuvar parametreleri, kalış süreleri ve radyolojik evreleri değerlendirildi. Hastalık şiddeti, radyolojik evreleme ve standardizasyonu sağlamak için Balthazar skorlama sistemi kullanıldı.

Bulgular: Akut biliyer pankreatitli 104 hastanın 46'sı erkek, 58'i kadın olup, bu hastaların yaş ortalaması 60 olarak bulundu. Bu hastaların yatış süresi 9,33 (±9,81) idi. Hastalık öncesi kolesistektomi yapılan 16 hasta vardı. Ek hastalık öyküsü olan 26 hasta vardı.Hastalığın şiddeti arttıkça hastanede kalış süresi de uzadı. Hastalık şiddeti ile amilaz, ALT ve glukoz seviyeleri arasında pozitif bir ilişki vardı. Kalsiyum düzeyi ile hastalık şiddeti ve kalış süresi arasında negatif bir ilişki vardı.

Sonuç: Hastalık ağırlaştıkça morbidite ve mortaliteyi artırmakta, erken değerlendirme tedavi başarısını artırmaktadır. Basit laboratuvar tetkikleri, çalışmamızda olduğu gibi hastalığın şiddetine rehberlik edebilir. Yüksek amilaz, ALT değerleri ve düşük kalsiyum seviyeleri akut pankreatitin prognozunu belirleyebilir.

Anahtar Kelimeler: pankreatit, Balthazar evrelemesi, inflamasyon

ABSTRACT

Objective: Acute pancreatitis is a progressive disease with inflammation of the pancreas. As the severity of the disease increases, its morbidity and mortality increase, so early diagnosis and treatment are very important. Therefore, many scoring methods are used to predict the prognosis of the disease. In this study, we aimed to show the severity of the disease with some biochemical parameters based on the radiological stage.

Method: 104 patients who had acute biliary pancreatitis in EskisehirOsmangaziUniversityFaculty of Medicine Hospital General Surgery Clinic were retrospectively detected. Age, gender, co-morbidity, laboratory parameters, length of stay, and radiological stages of these patients were evaluated. Balthazar scoring system was used to provide disease severity and radiological staging and standardization.

Results: Of 104 patients with acute biliary pancreatitis, 46 were men and 58 were women, and the average age was 60. The length of stay was 9.33 (±9.81). There were 16 patients who underwent cholecystectomy earlier. Of the 26 patients had a history of an additional disease. As the severity of the disease increased, the length of hospital stay also increased. There was a positive correlation between disease severity and amylase, ALT, and glucose levels. There was a negative correlation between calcium level and disease severity and length of stay.

Conclusion: As the disease gets more severe, it increases morbidity and mortality, and early evaluation increases the success of the treatment. Simple laboratory examinations can guide the severity of the disease, as in our study. High amylase, ALT values and low calcium levels can determine the prognosis of disease.

Keywords: pancreatitis, Balthazar staging, inflammation

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INTRODUCTION

Acute pancreatitis is a reversible inflammatory process in which the pancreatic tissue is affected at different degrees and affects local tissue or organ systems (1,2). Alcohol and gallstones are the most common etiological causes of acute pancreatitis. While alcohol is in the first place in Western countries, biliary causes are in the first place in our country (3). Other causes of acute pancreatitis are endoscopic retrograde colongiopancreatography, abdominal surgical interventions, HIV infection, hyperlipidemia, and anatomical biliary anomalies (4). Although clinical findings vary according to the severity and prognosis of the disease, they may occur in varying degrees ranging from vague abdominal pain to hypotension, fluid sequestration, metabolic disorders and sepsis (5).

The majority of patients have mild interstitial edematous pancreatitis, are self-limiting, and respond rapidly to conservative therapy. However, severe hemorrhagic gangrene and necrosis are observed in 20% of patients, progressing to systemic inflammatory response syndrome, leading to significant morbidity and mortality, and septic and systemic complications. Rapid medical treatment is required to prevent life-threatening complications in this subgroup (6). Predicting the disease prognosis in treatment is very important in terms of treatment success. Many scoring systems are used for this purpose. Ranson and APACHE II scoring systems are the most frequently used prognostic criteria.

In our study, we investigated whether the severity of pancreatitis in patients with biliary pancreatitis followed in our clinic can be predicted by simple laboratory tests other than scoring systems.

MATERIALS AND METHODS

This study was approved by Non-Invasive Clinical Research Ethics Committee (30.03.2021 and Decision No: 05).

104 patients who developed acute biliary pancreatitis between 01.01.2015 and 30.10.2020 in a tertiary university hospital general surgery clinic were analyzed retrospectively. Age, gender, comorbidity status, duration of hospitalisation, laboratory parameters in the first 24 hours and radiological stages of these patients were evaluated. Balthazar scoring system was used to provide disease severity and radiological staging and standardization (Table 1).

Table 1. Balthazar Scoring System.

Grade	CT Findings	Necrosis Percentage	Severity İndex
A	Normal pancreas	0	0
B	Pancreatic enlargement	0	1
C	Pancreatic inflammation or fat around the pancreas	<30	4
D	Single fluid collection around the pancreas	30-50	7
E	Multiple fluid collections around the pancreas	>50	10

Statistical Analysis

The Shapiro-Wilks normality test for continuous variables was used in this study. Mann-Whitney U and Kruskal-Wallis tests were used for non-normally distributed variables. Categorical variables were analyzed using the chi-square test and presented as frequencies and percentages. Spearman's correlation analysis was used for the relationships between variables. Statistical analysis was evaluated using the SPSS 22.0 program (SPSS Inc, Chicago, IL). The level of statistical significance was set at $P < 0.05$.

RESULTS

Of 104 patients with acute biliary pancreatitis, 46 were men and 58 were women, and the average age of these patients was 60. The length of stay of these patients was 9.33 (±9.81). There were 16 patients who underwent cholecystectomy before the disease. Of the 26 patients with a history of additional disease, 8 had a previously defined pancreatic neoplasm, 1 had hyperlipidemia, 2 had a pregnancy, 15 had diabetes (Table 2).

Table 2. Demographic Features and Comorbid Diseases.

Variables	n=104	%
Ages (year)	60 (±17.68)	
Gender		
Male	46	*44.23*
Female	58	*55.76*
Hospitalization time	9.33 (±9.81)	
Cholecystectomized patients pancreatitis	16	*15.38*
Comorbid illness (n=26)		
Pancreatic neoplasm	8	*7.69*
Diabetes Mellitus	15	*14.42*
Pregnancy	2	*1.92*
Hyperlipidemia	1	*0.96*

Gender distribution according to the Balthazar staging system evaluated radiologically is shown in Table 3.

Table 3. Stage-Gender Distribution According to Balthazar Grading System.

Balthazar Grade	Gender		Total (%)
	Male (n)	**Female (n)**	
Grade A	12	20	32 *(%30.77)*
Grade B	6	7	13 *(%12.5)*
Grade C	17	16	33 (*%31.73*)
Grade D	4	6	10 (*%9.61*)
Grade E	7	9	16 (*%15.38*)

Relationships with disease severity were compared statistically. No correlation was found between disease age and disease severity (p=0.331). When the laboratory values and disease severity were compared, there was no correlation between leukocyte and thrombocyte levels and disease severity (p=0.325, p=0.869). Again, there was no significant relationship between AST and bilirubin levels and their severity (p=0.106, p=0.681, p=0.476). However, it was observed that the severity of the disease increased significantly with the increase in amylase and ALT values (p<0.001, p=0.004). In addition, when the severity of the disease increased, calcium levels were found to be similarly low (p=0.001). There was no significant correlation between glucose and ALP values and disease severity (p=0.091, p=0.365).

When non-parametric Spearman correlation analysis was applied for the relationship between the variables, a positive correlation was found between the length of hospital stay and the severity of the disease (r=0.322, p=0.001). There was a negative correlation between length of stay and calcium level (r=-0.221, p=0.024). There is a positive correlation between disease severity and amylase (r=0.322, p=0.001). There is a positive correlation between disease severity and glucose (r=0.229, p=0.019). There is a negative correlation between disease severity and calcium (r=-0.399, p<0.001) (Table 4).

Table 4. Non-Parametric Spearman Correlation Analysis Between Variables.

Variables	Severity İndex	Hospitalisation time
Severity İndex		
Correlation coefficient (R value)	1	0.322
Significiance (P value)	-	0.001
Hospitalisation time		
Correlation coefficient (R value)	0.322	1
Significiance (P value)	0.001	-
Leukocyte		
Correlation coefficient (R value)	0.173	0.062
Significiance (P value)	0.079	0.533
Platelet		
Correlation coefficient (R value)	0.047	0.013
Significiance (P value)	0.633	0.899
Direct Bilirubin		
Correlation coefficient (R value)	0.045	0.165
Significiance (P value)	0.648	0.93
Total Bilirubin		
Correlation coefficient (R value)	0.073	0.132
Significiance (P value)	0.462	0.181
Amylase		
Correlation coefficient (R value)	0.283	0.140
Significiance (P value)	0.004	0.157
ALT		
Correlation coefficient (R value)	0.182	0.020
Significiance (P value)	0.064	0.157
AST		
Correlation coefficient (R value)	0.054	0.051
Significiance (P value)	0.585	0.609
Glucose		
Correlation coefficient (R value)	0.229	0.115
Significiance (P value)	0.019	0.245
Calcium		
Correlation coefficient (R value)	-0.399	-0.221
Significiance (P value)	0.000	0.024
ALP		
Correlation coefficient (R value)	-0.008	0.232
Significiance (P value)	0.934	0.018

DISCUSSION

Acute pancreatitis is a progressive disease involving inflammation of pancreatic tissue. Alcohol and gallstones are known to be the most common causes of etiology. In roughly 10% of cases, etiological determinants evade definitive identification despite exhaustive evaluation. Factors encompassing abdominal trauma, hypertriglyceridemia, pancreatic or ampullary neoplasms, pharmacological agents, hypothermic states, infectious etiologies, as well as procedural interventions such as endoscopic retrograde cholangiopancreatography or surgical procedures have been implicated (7,8). A thorough investigation conducted within our national domain unveiled gallstones (64.3%) and idiopathic origins (24.6%) as predominant contributors to this clinical phenomenon, thus delineating the key elements influencing its diagnostic spectrum (8).

If acute pancreatitis is not treated, it progressively leads to tissue and organ deterioration. Mild acute pancreatitis is a clinical picture without parenchymal lesion, minimal or no organ dysfunction, and it usually heals without complications. Severe acute pancreatitis is defined as the presence of organ failure, such as respiratory, cardiovascular or renal failure, lasting >48 hours (9). Severe acute pancreatitis-early phase occurs within the first week. Pancreatic and peripancreatic inflammation, which increases with ischemia, resolves or progresses to irreversible necrosis and liquefaction. It has been shown that there is no mortality if organ failure is corrected within the first 48 hours (10). However, the development of systemic inflammatory response syndrome, an exaggerated inflammatory response, and subsequent development of multiple organ failure account for approximately 50% of deaths (11-15).

Various scoring systems are used to determine the clinical severity and prognosis in acute pancreatitis. The main ones are Ranson criteria, Acute Physiology and Chronic Health Evaluation (APACHE) II score, Multiple Organ System Score (MOSS), Modified Glasgow and Balthazar BT scoring system (BTSS) (7). In 1985, Balthazar et al. formed 5 groups to evaluate the severity of pancreatitis using Computed Tomography (CT) findings (16). BTSS defined by Balthazar et al. provides standard grading opportunity for acute pancreatitis according to CT findings. In this scoring system, the degree of inflammation and necrosis in the pancreas define the clinical severity (17). Although abdominal CT is more sensitive in pancreatic tissue evaluation, it does not provide much information in the early period or moderate pancreatitis cases. Nevertheless, it has over 90% sensitivity as the best imaging method. In acute pancreatitis, CT and especially contrast-enhanced dynamic CT provide valuable information about the treatment and prognosis of severe pancreatitis cases in terms of showing disease severity, pancreatic hypoperfusion and necrosis (18,19).

In our study, the disease severity levels of 104 patients with biliary pancreatitis were divided radiologically according to the Balthazar scoring system. Our analysis revealed that 32 patients (30.77%) were classified as stage A, 13 patients (12.5%) as stage B, 33 patients (31.73%) as stage C, 10 patients (9.61%) as stage D, and 16 patients (15.38%) as stage E. The mean age of the patient cohort was 60 years (±17.68), with an average length of hospital stay of 9.81 days (±9.33). Consistent with the literature, in our study, when the duration of hospitalization and disease severity were compared, it was found that the duration of hospitalization increased as the severity increased (p=0.013) (5).

Studies show that the sensitivity of serum amylase value in diagnosis is 52-95% and the specificity is between 86-98% (20). In our study, high amylase values increased with the severity of pancreatitis ($p<0.001$). Again, it was emphasized in our study that the elevation of alanine transaminase is directly proportional to disease severity ($p=0.004$). In a study conducted, a serum alanine transaminase level above 150 IU / l is an indicator of biliary pancreatitis at a rate of 95% (21).In our patients who compared with calcium values about disease severity, it was observed that calcium values decreased significantly as the severity increased ($p=0.001$). In the literature studies, calcium levels were found to be low in severe acute pancreatitis cases (22).

In biliary-induced acute pancreatitis, if direct bilirubin levels are high and there are stones in the biliary tract, early ERCP is important in diagnosis and treatment (4). Similar studies also emphasized the importance of eliminating ampullary obstruction in the first 48 hours during an acute attack (23). In our cases, ERCP was applied to those who were found to have stones in the biliary tract. Cholecystectomy without discharge or under elective conditions is recommended after the acute period of acute pancreatitis due to gallstones (24). In this series, 88 cases of acute pancreatitis with biliary causes were recommended to undergo elective cholecystectomy.

CONCLUSION

In conclusion, acute pancreatitis is an important clinical problem that can be fatal. As the disease gets more severe, it increases the morbidity and mortality, and early evaluation increases the success of the treatment. Simple laboratory examinations can guide the severity of the disease, as in our study. High amylase, ALT values and low calcium levels can determine the prognosis of acute pancreatitis. It should not be forgotten that the disease may be severe and the study should be supported with larger patient series.

Ethics Committee Approval: Eskişehir Osmangazi Unıversıty Non-invasive Clinical Research Ethics Committee Chairman (Date 28/ 05/ 2021 No:2021-106)

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