Available online at www.medicinescience.org

ORIGINAL ARTICLE

Medicine Science International Medical Journal

Medicine Science 2024;13(1):39-42

Evaluation of prognostic and etiological factors in patients with acute pancreatitis

Musa Ak[1], Oguzhan Yildirim[2]

[1]Malatya Training and Research Hospital, Department of Internal Medicine, Malatya, Türkiye
[2]İnönü University, Faculty of Medicine, Department of Gastroenterology, Malatya, Türkiye

Received 04 December 2023; Accepted 03 January 2024
Available online 10.01.2024 with doi: 10.5455/medscience.2023.11.223

Abstract

Acute pancreatitis (AP) is an acute inflammatory disease of the pancreas that varies from a mild and self-limiting disease to a fulminant disease with significant morbidity and mortality. The study aims to examine the clinical and etiological factors determining acute pancreatitis's severity and prognosis. A total of 709 patients with acute pancreatitis were analyzed retrospectively. The study evaluated the association between disease severity, etiological factors, demographic characteristics, hospitalization length, and prognosis. The clinical features of the patients were determined based on the severity of AP (mild, moderate, and severe) and mortality rates. 290 (40.9%) male and 419 (59.1%) female patients were included in the study, and the mean age was 62.5±18.6. The most common cause was biliary pancreatitis (44.6%). Of the patients, 520 (80.2%) were mild, 130 (18.4%) were moderate, and 59 (8.3%) were severe pancreatitis. The mortality rate was (%4,5). In addition, mortality was higher in the severe pancreatitis group. No significant difference was observed in demographic variables. There was a significant correlation between the increase in the score in Atlanta and SIRS grading and mortality. The complexity of acute pancreatitis persists, exhibiting a spectrum of severity. A moderately dependable prognosis can be derived within a few days of onset by embracing multiparametric criteria and morphological assessment. However, this current approach may provide insight into designing a comprehensive and timely therapeutic strategy.

Keywords: Acute pancreatitis, severity, mortality, prognosis

Introduction

Acute pancreatitis (AP) is a pathological condition characterized by inflammatory changes within the pancreatic parenchyma and is attributable to a diverse range of etiological factors. The diagnostic criteria for AP include the presence of a minimum of two distinctive clinical indicators, namely acute-onset abdominal pain, a notable elevation in serum amylase and lipase levels exceeding three times the normal range, and discernible heterogeneity in the pancreatic parenchyma as observed through radiological imaging, coupled with contamination of the adjacent fatty tissue [1]. Although gallstones and alcohol consumption represent the foremost etiological contributors to AP, the condition encompasses various other causative factors, including hypertriglyceridemia, specific drugs (such as incretin mimetics), genetic predispositions, autoimmune mechanisms, and instances related to post-endoscopic retrograde cholangiopancreatography (ERCP) [2]. The clinical course of AP exhibits a spectrum, ranging from a self-limiting mild presentation to a severe systemic manifestation that may culminate in fatality [3]. AP constitutes a significant portion of gastrointestinal-related hospital admissions, with an incidence ranging from 4.9 to 35 cases per 100,000 individuals. Correspondingly, mortality rates fluctuate between 3% and 17% [4,5]. The disease manifests in diverse forms, ranging from mild clinical presentations such as edematous pancreatitis to more severe manifestations like necrotizing pancreatitis, thus imparting a variable prognosis. In the realm of contemporary medical practice, multiple severity scores and markers have been developed to identify individuals at an early stage who are at an elevated risk of progressing toward life-threatening forms of pancreatitis. Established scoring systems, including Ranson, Apache II, the Bedside Index for Severity in Acute Pancreatitis (BISAP), Modified Marshall, and Balthazar, are employed to predict the course of AP [6].

CITATION
Ak M, Yildirim O. Evaluation of prognostic and etiological factors in patients with acute pancreatitis. Med Science. 2024;13(1):39-42.

Corresponding Author: Oguzhan Yildirim, İnönü University, Faculty of Medicine, Department of Gastroenterology, Malatya, Türkiye
Email: droguzhanyildirim@hotmail.com

DOI: 10.5455/medscience.2023.11.223

This study aims to analyze factors influencing mortality in patients diagnosed with AP and to evaluate the predictive value of various parameters in determining the prognosis of the disease.

Material and Methods

A retrospective analysis was conducted on 709 patients diagnosed with AP and admitted to the Gastroenterology clinic of Inonu University Faculty of Medicine, Gastroenterology Department, between 2009 and 2021. Patient data were obtained from the electronic patient record system. A comprehensive study form was employed to document admission complaints, demographic details, vital signs, duration of hospitalization, intensive care requirements, laboratory results, and radiological findings. AP was diagnosed based on the presence of abdominal pain consistent with the disease, the presence of abdominal pain constant with the disease, coupled with serum amylase and lipase levels exceeding three times the average values and characteristic findings on abdominal imaging. The duration of hospitalization was defined as the period from admission to discharge from the gastroenterology service. The study scrutinized complications arising during hospitalization and reports of imaging examinations, including CT scans, abdominal ultrasonography (USG), and magnetic resonance imaging (MRI). At admission, the Atlanta classification and Systemic Inflammatory Response Syndrome (SIRS) scores were computed for each patient. Following classification according to the etiology of AP, patient outcomes, survival rates, and mortality rates were documented. The study explored the interplay between disease severity, etiology, demographic factors, laboratory values, and prognosis.

Statistical analyses were performed using the SPSS (Statistical Package for Social Sciences; SPSS Inc., Chicago, IL) version 22. Descriptive data were presented as n and % values for categorical variables and mean standard deviation values for continuous variables. Categorical variables were compared between groups using the Chi-square analysis (Pearson Chi-square). The normal distribution of continuous variables was assessed using the Kolmogorov-Smirnov test. The student t-test was employed for pairwise group comparisons for normally distributed variables, while the Mann-Whitney U test was used for non-normally distributed variables. Pearson correlation analysis was utilized for normally distributed variables, and Spearman correlation analysis was used for non-normally distributed variables to compare measurement data. Receiver Operating Characteristic (ROC) curves were generated to assess the diagnostic value of various parameters in determining the severity of AP. The threshold for statistical significance was set at $p<0.05$. All procedures followed were followed by the responsible committee's ethical standards (Inonu University Scientific Research and Publication Ethics Board) and with the Helsinki Declaration of 1975, as revised in 2008. Ethics committee approval was granted from our institution on 29/03/2022 with protocol number 2022/3049.

Results

A total of 709 patients with AP were enrolled in the study, comprising 290 (40.9%) males and 419 (59.1%) females. The average age of the patients was 62.5±18.6 years (range: 18-115). Analysis of patient etiologies revealed that 167 (23.6%) cases were idiopathic, 316 (44.6%) were biliary, 30 (4.2%) were drug-related, 38 (5.4%) were malignant, 55 (7.8%) were alcohol-related, 20 (2.8%) were associated with hyperlipidemia, 1 (0.1%) was attributed to pancreatic divisum, and 82 (11.6%) were post-ERCP pancreatitis (Table 1). The distribution of patients and duration of hospitalization according to Atlanta classification are shown in Table 2. Severity assessment according to the Atlanta classification showed that 520 (80.2%) cases were mild, 130 (18.5%) were moderate, and 59 (8.3%) were severe (Table 3). Thirty-two of the patients (4.5%) died. Significant differences were observed in terms of age ($p=0.714$) and gender ($p=0.150$) regarding patient outcomes, whereas a significant association was noted between mortality and etiological factors ($p=0.02$) (Table 3). Mortality rates varied significantly across Atlanta classification categories, with 2.7% for mild cases, 5% for moderate cases, and 75% for severe cases, demonstrating a significant correlation ($p<0.001$). Stratification based on SIRS scores revealed mortality rates of 1.7% for a score of 0, 1% for a score of 1, 28% for a score of 2, 66.7% for a score of 3, and 75% for a score of 4, highlighting a significant association between SIRS scores and mortality ($p<0.001$) (Table 3). Analysis based on both Atlanta classification and SIRS scoring demonstrated a notable increase in mortality with escalating disease severity and SIRS scoring ($p<0.001$) (Table 4).

Table 1. Demographic and Etiological data of patients with acute pancreatitis

Variables		Total (n)	%
Age, Mean±SD		62.5±18.6	
Gender	**Male**	290	40.9
	Female	419	59.1
Etiology			
Idiopathic		187	26.3
Biliary		323	45.6
Medicine		30	4.2
Malignancy		38	5.4
Alcohol		55	7.8
Hyperlipidemia		20	2.8
Pancreatic divisum		1	.1
Post-ERCP pancreatitis		55	7.8

Table 2. Distribution of patients and duration of hospitalization according to Atlanta classification

Patients		Total (n)	%
Atlanta classification	**Mild**	520	80.2
	Moderate	130	18.4
	Severe	59	8.3
		Mean±SD	**Min-Max**
Duration of hospital stay		6.4±5.7	1.0-45.0
Intensive care stay		8.0±9.0	1.0-45.0

DOI: 10.5455/medscience.2023.11.223

Table 3. Mortality rates in acute pancreatitis according to etiology

Patients	Total (n)				p
	Non-survivor %		Survivor %		
Overall mortality	32	4.5	677	95.5	
Age, Mean±SD	63.7±18.0		62.4±18.7		0.714*
Male	17	5.9	273	94.1	0.150**
Female	15	3.6	404	96.4	
Etiologies					
Idiopatic	10	6.0	157	94.0	0.02
Biliary	7	2.2	309	97.8	
Medicine	3	10.0	27	90.0	
Malignancy	4	10.5	34	89.5	
Alcohol	4	7.3	51	92.7	
Hyperlipidemia	2	10.0	18	90.0	
Pancreatic divisum	0	.0	1	100.0	
Post-ERCP pancreatitis	2	2.4	80	97.6	

Table 4. Mortality rates according to disease severity in patients with acute pancreatitis

		Survivor		Non-survivor		p*
		(n)	%	(n)	%	
Atlanta classification	**Mild**	4	0.7	516	99.2	<0.001
	Moderate	8	6.1	122	93.8	
	Severe	20	33.8	39	66.1	
SIRS score	**0**	4	0.9	435	99.1	<0.001
	1	4	3.3	116	96.7	
	2	6	6.9	82	93.2	
	3	6	18.7	26	81.2	
	4	12	75.0	16	57.1	

Discussion

AP is a common disease that can progress from mild pancreatic inflammation to life-threatening multiple organ failure and death, increasing with high mortality and morbidity. Promptly assessing severity and prognostic factors in AP patients is essential. The Ranson Score, BISAP, and APACHE-II are commonly used for early recognition of AP severity (1). In a previous study, the prevalence of AP was similar in both genders, and biliary pancreatitis was the most common etiology of AP. In addition, biliary AP was found to be higher in women, alcohol, chronic pancreatitis, hypercalcemic AP, hypertriglyceridemic AP, malignancy-related AP, and type 1 autoimmune pancreatitis rates were higher in men (2). Similarly, in our study in which 709 patients were evaluated retrospectively, the most common etiological causes were biliary pancreatitis (45.6%), idiopathic (26.3%), post-ERCP (7.8%) alcohol (7.8%), malignancy (5.4%) respectively. In our study, the prevalence of patients with biliary etiology was 44.4%, whereas those with non-biliary etiology constituted 55.4%. Notably, biliary causes emerged as the predominant etiological factor for AP, aligning with existing medical literature. Gallstones, with a prevalence ranging from 40-50% [3], were identified as the primary cause of AP. While gallbladder stones and alcohol use stand as the two most commonly recognized causes of AP, it is critical to acknowledge the presence of idiopathic cases, comprising approximately 8-44% of all cases.

In our study, idiopathic pancreatitis cases are the most common cause of non-biliary pancreatitis after biliary pancreatitis, and these patients constitute 23.6% of all cases. In the literature, it is stated that genetic pathologies are the underlying cause in most idiopathic cases, and a meta-analysis reported that there is a decrease in the frequency of recurrent attacks with cholecystectomy performed after an AP attack [6]. In light of this information, it is thought that the cause of idiopathic cases may be undiagnosed genetic diseases or microlithiasis. Previous studies showed that the rates of post-ERCP pancreatitis were between 1.8% and 7.2% [7]. In our investigation, the rate of post-ERCP pancreatitis was higher. This was thought to be because our hospital is the largest liver transplant center in the region, and ERCPs are performed in higher volüme than in other clinics. In our study, the prevalence of pancreas divisum was 0.1%, the prevalence of AP due to malignancy was 5.4%, and 1 (0.1%) patient was diagnosed with pancreas divisum in our study. Pancreas divisum has been reported in 3-7% of cases of AP [8]. The apparent scarcity of pancreas divisum cases in our study may be ascribed to the inherent complexities associated with its diagnosis through non-invasive imaging methods, a challenge in existing medical literature.

In a nationwide investigation involving 17,901 cases of AP, the observed mortality rate was 2.6%. Stratifying by severity, non-severe cases exhibited a mortality rate of 1.1%, while severe cases demonstrated a higher rate of 7.0% [9]. Our study parallels these findings, revealing an overall mortality rate of 4.5%. Significantly, severe pancreatitis in our cohort presented with a markedly elevated mortality rate of 33.8%, underscoring the gravity associated with severe manifestations of AP.

In line with a retrospective study [10], our analysis categorized patients into mild (80.2%), moderate (18.4%), and severe (8.3%) AP, with corresponding mortality rates of 0.7%, 6.1%, and 33.8%, respectively. This reaffirms the importance of severity stratification in predicting outcomes.

Our clinical investigation into SIRS dynamics revealed distinct mortality rates. Individuals persistently exhibiting SIRS from onset experienced a mortality rate of 25%, those initially resolving SIRS had an 8% mortality rate, and cases without SIRS from the outset showed a 0% mortality rate. These findings align with the broader literature, emphasizing the prognostic significance of early SIRS indicators in AP. Another study highlighted the heightened severity of AP in the presence of three out of four SIRS indicators, emphasizing the close association with increased comorbidity, sustained SIRS, and organ failure [11-13]. Notably, our research identified varying mortality rates corresponding to SIRS scores: 1.7% for a score of 0, 1% for a

DOI: 10.5455/medscience.2023.11.223

score of 1, 28% for a score of 2, 66.7% for a score of 3, and 75% for a score of 4. This underscores the pivotal role of SIRS in predicting mortality, with a statistically significant difference among different SIRS scores ($p<0.001$).

There were some limitations regarding our research. The most important of these limitations is related to the fact that the study was conducted retrospectively and in a single center. Patients' information was accessed through the hospital's electronic database and files in the hospital archive. Ensuring the fidelity of patient information inscribed by healthcare providers in the presently accessible patient files remains a challenge, casting a shadow on the accuracy of our study. The precision of clinical severity determination and etiological identification is essential in diagnosing, treating, and monitoring AP.

In light of AP's potentially fatal nature and the absence of a specific treatment, meticulous reliance on clinical and laboratory findings, radiological imaging, and other investigative modalities becomes imperative for swiftly diagnosing patients arriving at hospitals with a preliminary AP diagnosis.

Conclusion

Given the diverse and variable clinical features characterizing AP, the early determination of clinical severity emerges as a crucial determinant in enabling a pragmatic treatment approach. This proactive approach not only aids in immediate intervention but also serves to mitigate the potential development of complications associated with AP.

These considerations underscore the need for stringent data validation measures and standardized diagnostic protocols in AP research, emphasizing the quest for accuracy.

Conflict of Interests
The authors declare that there is no conflict of interest in the study.

Financial Disclosure
The authors declare that they have received no financial support for the study.

Ethical Approval
This study was approved by the Inonu University Faculty of Medicine Ethics Comittee, dated 29.03.2022 and numbered 2022/3049.

References

1. Silva-Vaz P, Abrantes AM, Morgado-Nunes, et al. Evaluation of prognostic factors of severity in acute biliary pancreatitis. Int J Mol Sci. 2020;21:4300.
2. Lankisch PG, Lowenfels AB, Maisonneuve P. What is the risk of alcoholic pancreatitis in heavy drinkers?. Pancreas. 2002;25:411-2.
3. Krishna SG, Hinton A, Oza V, et al. Morbid obesity is associated with adverse clinical outcomes in acute pancreatitis: a propensity-matched study Am J Gastroenterol. 2015;110:1608-19.
4. Hajibandeh S, Jurdon R, Heaton E, et al. The risk of recurrent pancreatitis is the first episode of acute pancreatitis concerning etiology and severity of disease: A systematic review, meta-analysis, lysis, and meta-regression analysis. J Gastroenterol Hepatol. 2023;3810:1718-33.
5. Kochar B, Akshintala VS, Afghani E, et al. Incidence, severity, and mortality of post-ERCP pancreatitis: a systematic review using randomized, controlled trials. Gastrointest Endosc. 2015;81:143-9.
6. Cahyadi O, Tehami N, de-Madaria E, Siau K. Post-ERCP pancreatitis: prevention, diagnosis and management. Medicina (Kaunas). 2022;58:1261.
7. Ng WK, Tarabain O. Pancreas divisum: a cause of idiopathic acute pancreatitis. CMAJ. 2009;180:949-51.
8. Hamada T, Yasunaga H, Nakai Y, et al. Japanese severity score for acute pancreatitis well predicts in-hospital mortality: a nationwide survey of 17,901 cases. J Gastroenterol. 2013;48:1384-91.
9. Pongprasobchai S, Vibhatavata P, Apisarnthanarak P. Severity, treatment, and outcome of acute pancreatitis in Thailand: the first comprehensive review using revised Atlanta classification. Gastroenterol Res Pract. 2017;2017:3525349.
10. Mofidi R, Duff MD, Wigmore SJ, et al. Association between early systemic inflammatory response, the severity of multiorgan dysfunction and death in acute pancreatitis. Br J Surg. 2006;93:738-44.
11. Singh VK, Wu BU, Bollen TL, et al. A prospective evaluation of the bedside index for severity in acute pancreatitis score in assessing mortality and intermediate markers of severity in acute pancreatitis. Am J Gastroenterol. 2009;104:966-71.
12. Singh VK, Bollen TL, Wu BU, et al. An assessment of the severity of interstitial pancreatitis. Clin Gastroenterol Hepatol. 2011;9:1098-103.
13. Singh H, Gougol A, Mounzer R, et al.Which patients with mild acute pancreatitis require prolonged hospitalization?. Clin Transl Gastroenterol. 2017;8:e129.