Update on the effect of age on acute pancreatitis morbidity: a retrospective, single-center study

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Abstract

Introduction: Acute pancreatitis (AP) is one of the urgent diseases of gastroenterology. Due to the growth of the elderly population, the frequency of the disease in the elderly population is also increasing.

Aim: To evaluate the contributing factors of mortality in geriatric patients (age ≥ 65 years) and non-geriatric (age < 65 years) patients.

Material and methods: We retrospectively analyzed data of consecutive patients with AP, in the Adana Numune Education and Research Hospital between March 2013 and September 2015.

Results: Of the 602 patients studied, 405 were female and 197 were male and their mean age was 55.2 ±19.5 years. The most common etiological factors were biliary stone, hyperlipidemia and alcohol, respectively. Two hundred and four patients were in the geriatric group and 394 patients were in the non-geriatric group. 84.4% of patients had mild AP, and 15.6% of patients had moderate to severe AP according to the revised Atlanta classification. 91.7% of non-geriatric patients had mild AP while 70.7% of geriatric patients had mild AP ($p < 0.001$). 29.4% of geriatric patients had moderate-to-severe AP while 8.4% of non-geriatric patients had moderate-severe AP. Duration of hospital stay was 6.2 ±3 days and 5.3 ±2.3 days in geriatric and non-geriatric groups respectively ($p < 0.001$). Mortality was higher in the geriatric group than the non-geriatric group (9.6% vs. 0.5%, respectively) ($p < 0.001$).

Conclusions: Acute pancreatitis in the geriatric population shows a more severe course than the non-geriatric population. Geriatric patients have longer duration of hospital stay and higher mortality than non-geriatric patients.

Introduction

Acute pancreatitis (AP) is an inflammatory disease of the pancreas with various clinical courses. Acute pancreatitis prevalence is increasing in the world [1]. Eighty percent of patients have mild acute pancreatitis, which is self-limiting and heals completely without serious complications in a couple of days, while 20% of patients have severe pancreatitis [1]. Although mortality in AP is decreasing and it is 2% at present, it is higher in elderly patients [1, 2].

It is important for clinicians to evaluate the severity of AP, to determine the need for intensive care unit admission, prognosis and management [3–5]. As the elderly population increasing, it is important to determine the prognosis of AP in the geriatric population. There are many scoring systems and laboratory parameters to determine the prognosis [3–6]. Ranson Criteria, Modified Glasgow Score, Acute Physiology and Chronic Health Evaluation II (APACHE II) are widely used scores. There are some limitations of these scoring systems. The recently revised Atlanta classification is used widely. Patients with AP are classified into mild, moderate and severe AP according to the revised Atlanta classification [7].

Although it is thought that elderly patients with AP had a worse clinical course, there are only a few studies comparing disease course according to age. There are conflicting results on the effect of AP on mortality in the geriatric population. While some studies reported that mortality is unchanged in geriatric patients, some

other studies reported higher mortality rates in geriatric patients [8, 9].

Aim

Thus, we aimed to evaluate mortality and influencing factors in geriatric and non-geriatric patients with AP.

Material and methods

We retrospectively analyzed data of patients with acute pancreatitis, in the Adana Numune Education and Research Hospital between March 2013 and September 2015. Acute pancreatitis diagnosis was established by two of the following three features: 1) characteristic abdominal pain; 2) increased amylase and lipase levels (> 3 times the upper limit of normal); 3) imaging consistent with AP [1]. Patients' age, gender, etiology of AP, laboratory parameters, Ranson score, revised Atlanta classification, duration of hospital stay and mortality rates were recorded. The revised Atlanta classification (mild: no organ failure and no local or systemic complications; moderately severe: transient organ failure (< 48 h) and/or local or systemic complications without persistent organ failure (> 48 h); severe: persistent organ failure (> 48 h): single organ failure or multiple organ failures) was used to diagnose the severity of AP [6].

Patients were grouped into two groups: the geriatric (≥ 65 years) and non-geriatric group (< 65 years). We compared both groups according to gender, etiology of AP, laboratory parameters, Ranson criteria, revised Atlanta classification, duration of hospital stay and mortality rates.

All patients underwent abdominal imaging (ultrasonography and/or computed tomography according to the severity). The etiology was defined as biliary if gallstones or sludge was found. Alcoholic AP was considered if the patient had consumed more than 40 g of ethanol per day (20 g in female) for at least 5 years or if the patient had consumed an excessive amount of alcohol shortly before the onset of the disease (more than five standard drinks/60 g) [8]. A serum triglyceride level more than 1000 mg/dl and exclusion of other etiologies were accepted as a hyperlipidemic etiology [8]. We excluded patients who had chronic pancreatitis with acute relapse.

Statistical analysis

The statistical significance level was set at 0.05. All analyses were performed using MedCalc Statistical Software version 12.7.7 (MedCalc Software bvba, Ostend, Belgium; http://www.medcalc.org; 2013). Descriptive statistics were used to define continuous variables and mean, median, standard deviation, minimum, and maximum values were calculated. Comparison of two independent and normally distributed continuous variables was made with Student's *t* test, and the comparison of two independent variables which do not fit the normal distribution was performed by the Mann-Whitney *U* test. Relationships of categorical variables were analyzed by the χ^2 test or Fisher's exact test.

Results

One thousand ninety-seven (32.75%) male and 405 (67.3%) female patients were included in the study. The median age was 55.2 ±19.5 years old. Two hundred and eight (34.6%) patients were in the geriatric group and 394 (65.4%) patients were in the non-geriatric group. Mean ages were 76.9 ±7.7 years in the geriatric group and 43.8 ±13 years in the non-geriatric group. The most frequently observed etiologic factors were biliary stone disease, hypertriglyceridemia, and alcohol (81.6%). Patients' demographic, etiologic factors, laboratory parameters, scoring system results, duration of hospital stay and mortality rates are shown in Table I.

In the geriatric group 147 (70.7%) patients had mild AP, 43 (20.7%) patients had moderate AP and 18 (8.7%) patients had severe AP according to the revised Atlanta classification. In the non-geriatric group 361 (91.7%) patients had mild AP, 29 (7.4%) patients had moderate AP and 4 (1%) patients had severe AP according to the revised Atlanta criteria. There was a statistically significant difference between geriatric and non-geriatric groups using the revised Atlanta classification ($p < 0.001$) (Table I). The Ranson score was 2.1 ±1.2 in the geriatric group and 1.1 ±1.1 in the non-geriatric group and there was a statistically significant difference between groups ($p < 0.001$). Duration of hospital stay was 6.2 ±3 days and 5.3 ±2.3 days in geriatric and non-geriatric groups, respectively. The geriatric group had a statistically significantly longer duration of hospital stay ($p < 0.001$). Mortality rates were 9.6% in the geriatric group and 0.5% in the non-geriatric group and there was statistically significant difference ($p < 0.001$) (Table I). In the non-geriatric group 1 (3.4%) patient died in the moderate AP group, and 1 (25%) patient died in the severe AP group. In the geriatric, moderate AP group 6 (13%) patients died, in the severe AP group 14 (77%) patients died. The patients who died in the geriatric, moderate AP group had the following co-morbid diseases: heart failure (3 patient), chronic obstructive pulmonary disease (2 patient), atherosclerotic heart disease (1 patient). The patient who died in the non-geriatric, moderate AP group had cirrhosis.

In the geriatric group creatinine values were significantly higher than the non-geriatric group. Albumin and

Table I. Characteristics of patients with acute pancreatitis

Parameter	All patients (n = 602)	Non-geriatric (< 65 years) (n = 394)	Geriatric (≥ 65 years) (n = 208)	P-value
Age [years]	55.2 ±19.5	43.8 ±13	76.9 ±7.7	< 0.001[2]
Gender:				
Female	405 (67.3%)	244 (61.9%)	161 (77.4%)	< 0.001[1]
Male	197 (32.7%)	150 (38.1%)	47 (22.6%)	
Etiology:				
Biliary	428 (71.1%)	253 (64.2%)	175 (84.1%)	
Hypertriglyceridemia	36 (6%)	34 (8.6%)	2 (1%)	
Alcohol	27 (4.5%)	25 (6.4%)	2 (1%)	< 0.001[3]
Drugs	14 (2.3%)	8 (2%)	6 (2.9%)	
Cancer	1 (0.02)	1 (0.03%)	–	
Idiopathic	96 (15.9)	73 (18.5%)	23 (11.1%)	
Ranson score	1.43 ±1.219	1.1 ±1.1	2.1 ±1.2	< 0.001[2]
Revised Atlanta Classification:				
Mild	508 (84.4%)	361 (91.7%)	147 (70.7%)	
Moderate	72 (12%)	29 (7.4%)	43 (20.7%)	< 0.001[1]
Severe	22 (3.6%)	4 (1%)	18 (8.7%)	
WBC	12398.6 ±4695	12059.5 ±4218.5	13042.5 ±5440.2	0.055[2]
Hb	13 ±1.8	13.2 ±1.8	12.5 ±1.7	< 0.001[4]
Glucose	152 ±63.8	150.2 ±67.5	155.3 ±56.2	0.004[2]
Albumin	4.6 ±14.1	4.9 ±17.3	4.0 ±4.3	< 0.001[2]
AST	193.1 ±232.9	190.6 ±233.8	197.8 ±231.5	0.045[2]
ALT	167.3 ±198.1	185.3 ±223.3	133.2 ±132.4	0.352[2]
ALP	156.5 ±119.9	150.5 ±97.8	167.7 ±152.1	0.972[2]
GGT	270.2 ±277.3	286.4 ±287.7	240.3 ±255.1	0.124[2]
LDH	393.2 ±254.7	387.8 ±264.6	403.2 ±235.4	0.206[2]
Bilirubin	2.2 ±12.6	2.3 ±15.4	2.0 ±3.7	0.023[2]
Creatinine	0.9 ±0.8	0.8 ±0.9	1 ±0.5	< 0.001[2]
CRP	2.5 ±4.4	2.2 ±4.2	2.9 ±4.8	0.650[2]
Duration of hospital stay [days]	5.6 ±2.6	5.3 ±2.3	6.2 ±3	< 0.001[2]
Outcome:				
Discharge	580 (96.3%)	392 (99.5%)	188 (90.4%)	< 0.001
Exitus	22 (3.7%)	2 (0.5%)	20 (9.6%)	

WBC – white blood cells, Hb – hemoglobin, AST – aspartate aminotransferase, ALT – alanine aminotransferase, ALP – alkaline phosphates, GGT – γ-glutamyl transferase, LDH – lactate dehydrogenase, CRP – C-reactive protein, [1]χ^2, [2]Mann-Whitney U test, [3]Fisher's exact test, [4]Student's t test.

hemoglobin values were lower in the geriatric group than the non-geriatric group ($p < 0.001$) (Table I).

White blood cell counts, alanine aminotransferase, γ-glutamyl transpeptidase, alkaline phosphatase, lactate dehydrogenase and CRP values were not different between groups (Table I). Glucose, aspartate aminotransferase and bilirubin levels were significantly different between groups.

Discussion

The elderly population in the world is increasing and therefore the incidence of diseases in the elderly population is also increasing [10]. In most studies the mean age of the first AP attack is 60 years and in most western countries the incidence of AP has increased because of the increased elderly population [11]. With increasing age, the incidence and mortality of AP are also increasing, and there have been studies showing a correlation between age and mortality as an independent parameter [1, 12]. However, there are controversial results regarding the effect of age on disease severity and prognosis. Gardner *et al.* reported higher organ failure and three times higher mortality rates in geriatric patients in a study concerning 56 geriatric patients (≥ 70 years old) and 56 non-geriatric controls (< 70 years old) [13]. Uomo *et al.* reported that age and accompanying comorbidities had a limited effect on disease course and outcomes in a study involving 340 non-geriatric patients (< 70 years old) and 99 geriatric patients (≥ 70 years old) (total 439 patients) with AP [14]. There are also studies reporting no effect of age on disease course in patients with AP. Kim *et al.* reported no significant influence of age on the clinical outcome of AP in a study involving 85 elderly (≥ 65 years old) and 142 non-elderly (< 65 years old) patients with AP [8]. Similarly, Fan *et al.* reported no effect of age on mortality in patients with AP but assumed that concomitant medical and surgical problems might contribute to higher mortality rates in elderly patients [15]. In our study, we found mortality rates of 9.6% in geriatric patients and 0.5% in non-geriatric patients and there was a statistically significant difference ($p < 0.001$). Also in our study group, only 1% of non-geriatric patients had severe pancreatitis in accordance with studies indicating the importance of age on disease severity.

There are many scoring systems, imaging methods and laboratory parameters to determine the prognosis of AP. In clinical practice, it is important to predict the disease severity and need for intensive care unit admission, the duration of hospital stay and prognosis.

In severe pancreatitis on admission, the duration of hospital stay, need for ICU admission, and mortality would be higher than mild-moderate pancreatitis. Although it can be predicted that elderly patients might be hospitalized longer than non-elderly patients, Kim *et al.* reported longer duration of hospital stay in the non-elderly group than the elderly group in a study consisting of 227 patients with AP (11.9 ±10.1 days vs. 10.3 ±9.6 days in non-elderly and elderly patients, respectively) [8].

Xin *et al.* reported 21 days of hospital stay in geriatric patients and 19 days in non-geriatric patients, without a statistically significant difference [16]. In our study, we found 5.3 ±2.3 days in the non-geriatric group and 6.2 ±3 days in the geriatric group, with a statistically significant difference ($p < 0.001$).

The Atlanta classification and Ranson score are widely used to evaluate the severity of AP, and the Atlanta classification was revised in 2012 [7]. Losurdo *et al.* reported higher Ranson scores in geriatric patients than non-geriatric patients (2.52 ±1.57 vs. 0.75 ±0.73 in geriatric and non-geriatric patients, respectively) in a study including 42 geriatric patients and 48 non-geriatric patients ($p < 0.0001$) [17]. Xin *et al.* also reported higher Ranson scores in geriatric patients than non-geriatric patients (3.4 ±1.7 vs. 2.8 ±1.6 in geriatric and non-geriatric patients, respectively) ($p < 0.0069$) [16]. In our study, we found the Ranson scores to be 2.1 ±1.2 in the geriatric group and 1.1 ±1.1 in the non-geriatric group, with a statistically significant difference. Losurdo *et al.* reported mild pancreatitis in 39% of patients and moderate-severe AP in 61% of patients according to the revised Atlanta classification [17]. In our study, 84.4% of patients had mild AP (91.7% of patients in the non-geriatric group and 70.7% of patients in the geriatric group, $p < 0.001$). 8.4% of patients had moderate-severe AP patients in the non-geriatric group and 29.4% of patients in the geriatric group had moderate-severe AP ($p < 0.001$).

There are limitations of the study. It is a retrospective study and all the patients' clinical monitoring processes were obtained from records. Since cases where sufficient records could not be obtained were not included in the study, the number of patients could not be as many as requested. The inadequate number of cases may have caused false positives in statistical values.

Conclusions

Geriatric patients had a more severe course in AP than the non-geriatric population. The geriatric population had a longer duration of hospital stay and a higher mortality rate than the non-geriatric population. When the elderly population increases and these results are evaluated together, we expect more serious acute pancreatitis in the near future.

Conflict of interest

The authors declare no conflict of interest.

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