Severe acute pancreatitis in the elderly: Etiology and clinical characteristics

Ming-Jun Xin, Hong Chen, Bin Luo, Jia-Bang Sun

Ming-Jun Xin, Hong Chen, Bin Luo, Jia-Bang Sun, Department of General Surgery, Xuanwu Hospital, Capital Medical University, Beijing 100053, China

Author contributions: Sun JB and Xin MJ designed the research; Xin MJ and Chen H performed the research; Xin MJ and Luo B analyzed data and wrote the paper.

Correspondence to: Jia-Bang Sun, Department of General Surgery, Xuanwu Hospital, 45 Changchun Jie, Beijing 100053, China.

Telephone: +86-10-83198835 Fax: +86-10-83154745

Received: December 12, 2007 Revised: January 21, 2008

Abstract

AIM: To investigate the etiology and clinical characteristics of severe acute pancreatitis (SAP) in elderly patients (≥ 60 years of age).

METHODS: We reviewed retrospectively all the SAP cases treated in Xuanwu Hospital in Beijing between 2000 and 2007.

RESULTS: In 169 patients with SAP, 94 were elderly and 16 died. Biliary and idiopathic etiologies were the first two causes that accounted for over 90% of SAP in the elderly. Biliary, hyperlipemic and alcoholic etiologies were the first three causes in the young. The proportion of co-morbidity of cholelithiasis, biliary infection, hypertension and coronary heart disease in the aged was significantly higher than that in their young partners. The scores of APACHE II and Ranson were also significantly higher in the elderly except the CT score. Organ failures were more common in the elderly, but the local pancreatic complications were not different between the two groups. Mortality of the aged was correlated with the severity of SAP, multiple co-morbidity and incidence of multiple organ dysfunction syndrome (MODS). MODS was the main cause of death.

CONCLUSION: The etiology of SAP in the elderly is quite different from that in the young. Biliary and unknown factors are main causes in the aged. The elderly are subject to major organ failures but there is no difference in the occurrence of local pancreatic complications between the elderly and the young. It is crucial to monitor and improve the functions of major organs so as to prevent MODS in the aged with SAP.

Key words: Severe acute pancreatitis; Elderly; Etiology; Mortality; Complication

Peer reviewer: Chris E Forsmark, Professor, Division of Gastroenterology, Hepatology, and Nutrition, University of Florida, Box 100214, Room HD-602 1600 SW Archer Road Gainesville, FL, 32610-0214, United States

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diagnostic criteria of SAP were the APACHE II score of more than 8 within 72 h after admission.[5] Clinical severity evaluations were carried out by APACHE II and Ranson’s scoring systems within 48 h after admission[6,7]. A serial abdominal contrast-enhanced CT (CECT) was performed in each patient and the findings were graded according to the Balthazar classification[8,9].

On admission, all patients were treated medically according to generally accepted principles consisting of withholding oral intake, inserting a nasogastric tube for drainage, providing pain relief, restoring fluid and electrolytes intravenously, and administration of prophylactic antibiotics. A proton pump inhibitor and somatostatin were given to prevent stress ulcers and to inhibit pancreatic excretion. The Dachengqi decoction (a Chinese herbal medicine in fluid form) was given through the nasogastric tube twice a day to improve gastrointestinal function.

Patients with gallstones were evaluated by sonography routinely. Endoscopic retrograde cholangiopancreatography (ERCP) was performed in cases of biliary etiology, as proven by ultrasonography, or magnetic resonance cholangiopancreatography and elevated bilirubin, alkaline phosphatase and aspartate aminotransferase. A papillotomy was done if stones and sludge were present in the common bile duct and some were followed by an endoscopic nasobiliary drainage. Surgical intervention (necrosectomy with drainage and continuous postoperative lavage) was performed if infected pancreatic necrosis was clinically suspected or confirmed by positive bacteriologic results of CT-guided fine-needle aspirations.

Patients consuming large amounts of alcohol were considered as having alcoholic pancreatitis. Serum triglyceride level more than 11.3 mmol/L (1000 mg/dL), and exclusion of other etiologies were accepted as the hyperlipidemic etiology[10]. Patients were classified as having an idiopathic etiology if the history and laboratory findings ruled out any known etiologic factors, and ultrasonography revealed a normal biliary tract.

Co-morbidity was defined as a pre-existing disease or a condition in addition to the acute pancreatitis. Co-morbidity was diagnosed if the condition was an active problem and/or need routine treatment prior to the onset of acute pancreatitis. The assessment of organ function and diagnosis of multiple organ dysfunction syndrome (MODS) was performed on the basis of the Marshall multiple organ dysfunction score[10].

Statistical analysis
Statistical evaluation was performed with SPSS 11.0 for Windows. The significant differences of clinical characteristics of the aged and young SAP patients were tested with the $\chi^2$ test. Clinical severity scoring of SAP, such as Ranson, APACHE II and CT scorings, was described with mean $\pm$ SD. The differences between the two groups were tested through independent samples $t$ test. $P < 0.05$ was considered statistically significant.

RESULTS
General clinical characteristics
Patient general characteristics are summarized in Table 1.

There were 169 patients with SAP in this study, including 94 aged ($\geq 60$ years old) and 75 young ($< 60$ years old). The mean age of the aged was 70.9 years (range 60-87) and the young was 44.2 years (range 17-59). Of the 94 elderly patients, 44 (46.8%) were men, and 50 (53.2%) women. In patients younger than 60 years old, 49 (65.3%) were men, and 26 (34.7%) women. Medium stay in ICU was 8 d (2-56 d) in the aged and 8 d (2-90 d) in the young patients. Medium hospital stay was 21 d (13-64 d) in the aged and 19 d (12-90 d) in the young. The mortality rate of SAP was 17.0% (16 cases) in the aged and 5.3% (4 cases) in the young.

Etiology
The two major etiological factors responsible for acute pancreatitis were biliary and alcohol, although the proportions of pancreatitis attributed to these two factors varied considerably in different countries and regions. In our 169 SAP patients, biliary pancreatitis was the first common etiology in both the aged and the young groups (Table 2), but it was more common in the elderly (64.9% vs 37.3%, $P = 0.0006$). Interestingly, the idiopathic pancreatitis was the second most common etiology in the aged patients, significantly more common than in its younger counterparts (26.6% vs 12.0%, $P = 0.0210$). In patients younger than 60 years of age, the second and third causes were hyperlipemia (29.3%) and alcohol (20.0%) respectively. However, in the elderly, these two etiologies were less common (3.2% and 2.1% respectively). Two cases of pancreatitis underwent abdominal surgery in the elderly and one in the young. The operations were esophageal cancer resection, cholecystectomy and gastrectomy, respectively. One elderly woman experienced drug-induced SAP while taking Methotrexate.

Table 1 General clinical characteristics of patients with severe acute pancreatitis

|                     | Elderly ($\geq 60$ yr) | Young ($< 60$ yr) | $P$ value |
|---------------------|------------------------|-------------------|-----------|
| Mean age (yr, range)| 70.9 (60-87)           | 44.2 (17-59)      | -         |
| Male                | 44 (46.8%)             | 49 (65.3%)        | 0.0197    |
| Female              | 50 (53.2%)             | 26 (34.7%)        | 0.0197    |
| Medium ICU stay in days (range)| 8 (2-56) | 8 (2-90) | -         |
| Medium hospital stay in days (range)| 21 (13-64) | 19 (12-90) | -         |
| Hospital deaths     | 16 (17.0%)             | 4 (5.3%)          | 0.0291    |

Table 2 Etiology of severe acute pancreatitis ($n$ %)

|                  | Elderly ($\geq 60$ yr) | Young ($< 60$ yr) | $P$ value |
|------------------|------------------------|-------------------|-----------|
| Biliary          | 61 (64.9)              | 28 (37.3)         | 0.0006    |
| Alcohol          | 2 (2.1)                | 15 (20.0)         | 0.0001    |
| Hyperlipemia     | 3 (3.2)                | 22 (29.3)         | <0.0001   |
| Abdominal surgery| 2 (2.1)                | 1 (1.3)           | 1         |
| Drug-induced     | 1 (1.1)                | 0 (0.0)           | 1         |
| Idiopathic       | 25 (26.6)              | 9 (12.0)          | 0.021     |
| Total            | 94                     | 75                | -         |
Co-morbidity

Co-morbidity was defined as a pre-existing disease or condition in addition to the current onset of pancreatitis (Table 3). The morbidity of choledolithiasis, biliary infection, hypertension and coronary heart disease in the aged was significantly more common than in the young. Previous stroke was diagnosed in five aged patients but none in the young (5.3% vs 0%, \( P = 0.0667 \)). Diabetes mellitus, previous myocardial infarction, liver cirrhosis, malignancies and autoimmune diseases might be seen in both groups.

Clinical scoring of SAP

In our study, three clinical scores, APACHE II, Ranson’s and CT score, were collected (Table 4). The scores of APACHE II and Ranson were significantly higher in the aged than in the young (3.4 ± 1.7 vs 2.8 ± 1.6, \( P = 0.0069 \)). Surprisingly, the CT score was higher in the younger patients (4.8 ± 1.8 vs 4.0 ± 1.9, \( P = 0.0020 \)).

Organ failures and complications of SAP

Organ failures and complications were two major characteristics of SAP distinguished from mild pancreatitis. As shown in Table 5, the most frequent complications of SAP in the aged are acute lung injury (ALI) and/or acute respiratory distress syndrome (ARDS) (30.9%), followed by MODS (26.6%), electrolyte disturbances (21.3%), renal failure (18.1%), pancreatic encephalopathy (17.1%) and cardiovascular insufficiency (17.0%). Except for metabolic disorders and cardiovascular insufficiency, the incidences of ALI/ARDS, MODS, renal failure and pancreatic encephalopathy in the elderly were significantly higher than those in the young. The other complications, such as GI bleeding, paralytic ileus, pancreatic pseudocyst, pulmonary infection, fungous infection, abdominal compartment syndrome (ACS) and disseminated intravascular coagulation (DIC), occurred less frequently (< 15%) in both the elderly and the young.

Mortality of SAP in the elderly

The mortality of SAP in the aged was significantly higher than that of the young in our data (17.0% vs 5.3%, \( P = 0.0291 \), Table 1). We further compared the clinical characteristics of the dead and the surviving patients of the elderly (Table 6). We found no difference in either gender or etiologies between the two subgroups. Only the severe scores, multiple co-morbidities and MODS were significantly higher in the subgroup of the dead patients and almost all of this subgroup died of MODS.

DISCUSSION

In most studies, the two major etiological factors, biliary disease and alcohol abuse together account for more than 80% of AP patients\(^{[11,12]}\). Studies in the United Kingdom reveal that 40%-57% of patients with AP have small gallstones\(^{[13,14]}\).

In our study, biliary pancreatitis was the most common...
cause for SAP in both aged and young patients. However, biliary etiology in the elderly is as high as 64.9%, we thought it was because very few patients were addicted to alcohol and the incidence of cholelithiasis increased in this subgroup. Meanwhile, unknown etiology, or idiopathic pancreatitis accounted for 26.6% of the elderly and ranked second, quite different from the etiologies in the young patients. This is similar with other reports in which 30%-40% of elderly patients with acute pancreatitis have an unclear etiology. Interestingly, the second more common etiology was not alcohol abuse but hyperlipemia in the young patients in our study. Although alcoholism was associated with over 80% of patients in studies from New York and around 70% in Scandinavian countries, in the Beijing area, it seems not a major concern.

Many drugs are associated with the development of acute pancreatitis. These include didanosine, furosemide, corticosteroids, azathioprine and sodium valproate. However, there is no clinical feature that can differentiate drug-induced pancreatitis from other factors causing pancreaticis. Drug-induced pancreatitis is usually diagnosed using the following criteria: pancreatitis developed during treatment, resolved following the discontinuation of the drug, and re-developed following re-challenge of the offending drug. Because no causal factor for pancreatitis was found after the initial work-up, acute pancreatitis induced by Methotrexate was suspected in a 63 years old woman who took it for a week and her symptom was relieved after cessation of the drug.

Even though the mortality of SAP is around 22%-30%, few data showed the mortality of SAP in the elderly. A Japanese survey done from 1991 to 1995 showed that the mortality of SAP is greater than 20% in patients over 50 years of age. Andersson reported that the hospital mortality of AP in a university hospital in Sweden decreased slightly, from 4.7% (1975-1985) to 3.7% (1986-1996), and that the average age of the dead patients markedly increased from 59.2 to 73.6 years. This suggested that the older the patients, the higher mortality they have. Fan has concluded that mortality from AP was related to coexisting diseases in the elderly, not to the severity of chronic disease. In our study, it was diagnosed according to clinical symptoms and electroencephalogram or MRI.

The most frequent complication of SAP is ALI/ARDS (29 cases, 30.9%), followed by MODS (25, 26.6%), electrolyte disturbances (21.3%), renal failure (17, 18.1%), pancreatic encephalopathy (16, 17.0%) and shock (16, 17.0%). Currently, there are no specific examinations or unified diagnostic standards for pancreatic encephalopathy. It results from the combined actions of multiple factors based on cerebral demyelination due to pancreatin. In our study, it was diagnosed according to clinical symptoms and electroencephalogram or MRI.

In our study, the incidence of paralytic ileus was less than 10%. It may be associated with the gastrointestinal functions. SAP patients admitted to our intensive care unit were given purgatives, such as magnesium sulfate, Mannitol, lactulose and Dachengqi decoction (Chinese herbal medicine). These drugs could promote gastrointestinal motility, ameliorate intestinal permeability and decrease bacterial translocation. They can also improve bile discharge and decrease effusion in the abdominal cavity. Rhubarb is the main constituent of Dachengqi decoction. Rhubarb can exert protective effects on SAP by inhibiting the inflammation of pancreas in rats, improving pancreatic microcirculation and altering exocrine secretion. Wu also reported the benefit from Chinese herbal medicine in treatment of SAP and recommended the regimen for clinical use.

In conclusion, SAP in the aged had obviously different features from the young. Both of biliary and unknown etiological factors result in over 90% of SAP in elderly. The co-morbidities of cholelithiasis, biliary...
infection, hypertension and coronary heart disease are more common than in the young. APACHE II scores and Ranson’s criteria are markedly higher in the elderly and CT scores much higher in the elderly who died in the hospital. Therefore, the mortality of the aged patients is correlated with the severity of SAP, and co-morbidity and incidence of MODS are not relevant to patients’ gender or etiologies. Importance should be attached to monitoring and improving the functions of major organs so as to prevent MODS in the aged with SAP.

**COMMENTS**

**Background**

The overall mortality of severe acute pancreatitis (SAP) has decreased in recent years to around 15%-20%. Few studies compared the clinical characteristics between the elderly (≥ 60 years old) and the young patients with SAP.

**Research frontiers**

Some researches have shown that the presence of complications such as infected pancreatic necrosis, in the aged (≥ 75 years old) can increase the mortality of AP to 50%, probably due to a high prevalence of cardiopulmonary diseases and bilary stones.

**Innovations and breakthroughs**

The authors retrospectively reviewed the SAP cases that were treated in a hospital in Beijing between 2000 and 2007 to investigate the etiology, clinical characteristics and outcomes of SAP in the elderly patients.

**Applications**

The authors suggest that importance should be attached to monitoring and improving the functions of major organs so as to prevent MODS in the aged with SAP.

**Peer review**

This article reviews the experience with elderly patients in China with SAP. This is an interesting and well-written paper.

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S-Editor: Zhong XY  L-Editor: Ma JY  E-Editor: Liu Y