Original Article

Etiology, Severity and Treatment Outcomes of Acute Pancreatitis in Maharaj Nakorn Chiang Mai Hospital: A Retrospective Study

Tuanjai Mahatumarat MD[1], Kanokwan Pinyopornpanish MD[1],
Nithi Thinrungroj MD[1], Apinya Leerapun MD[1],
Taned Chitapanarux MD[1], Satawat Thongsawat MD[1], Phuripong Kijdamrongthum MD[1]

[1] Division of Gastroenterology, Department of Internal Medicine, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand

Background: Severity of acute pancreatitis varies from mild to severe. BISAP score is used for prediction of severity and mortality in acute pancreatitis and is a tool for triage patients for appropriate care.

Objective: To determine etiology, severity and treatment outcomes of acute pancreatitis in Maharaj Nakorn Chiang Mai Hospital. Usage of the BISAP score to predict outcomes of treatment was also evaluated.

Materials and Methods: Data pertinent to 115 patients with acute pancreatitis were retrospectively reviewed to define the incidence of severe acute pancreatitis, etiology of pancreatitis and treatment outcomes. Data regarding local complications, organ failure, length of hospital stay and death were also analyzed to evaluate the capability of the BISAP score for prediction of outcomes.

Results: The major causes of acute pancreatitis were gallstones (43.5%) and alcohol use (36.5%). Twenty-one patients (18%)were classified as having severe acute pancreatitis. Overall mortality was 4.3% and rising to 24% in severe acute pancreatitis. The relationship between the development of severe acute pancreatitis with a BISAP score ≥3 (p<0.001) and mortality (p<0.001) was statistically significant. It was also associated with increased organ failure but not local complications.

Conclusion: Etiologies, severity and outcomes of acute pancreatitis in this study were similar to previous studies. A BISAP score ≥3 was valuable in the prediction of severe acute pancreatitis and mortality.

Keywords: Acute pancreatitis, BISAP score, Etiology, Outcome, Severity

J Med Assoc Thai 2018; 101 [Suppl. 4]: S53-S58
Full text. e-Journal: http://www.jmatonline.com

Acute pancreatitis [AP] is an acute inflammation of the pancreas which can have a detrimental effect on other organs, causing abnormalities in both adjacent and distant areas. The common etiologies are gallstones (30% to 40%), alcohol (30% to 40%), idiopathic AP (10% to 20%) and other causes, such as certain drugs, hypercalcemia, hypertriglyceridemia and surgical procedures (i.e. endoscopic retrograde cholangiopancreatography and fine needle aspiration of the pancreas)[1,2]. AP can be diagnosed from the presence of 2 out of 3 of the following criteria; 1) sudden upper abdominal pain radiating into the back; 2) elevation of serum amylase and lipase greater than 3 times the upper limit of normal levels; 3) abdominal radiologic imaging consistent with acute pancreatitis[3]. Severity is classified as mild, moderately severe or severe. Mild AP, the most common form, has no associated organ failure, local or systemic

Correspondence to:
Kijdamrongthum P, Division of Gastroenterology, Department of Internal Medicine, Faculty of Medicine, Chiang Mai University, 110 Intawaroros Road, Chiang Mai 50200, Thailand.
Phone: +66-53-936446
E-mail: drkeng098@hotmail.com

How to cite this article: Mahatumarat T, Pinyopornpanish K, Thinrungroj N, Leerapun A, Chitapanarux T, Thongsawat S, Kijdamrongthum P. Etiology, severity and treatment outcomes of acute pancreatitis in Maharaj Nakorn Chiang Mai Hospital: a retrospective study. J Med Assoc Thai 2018;101;Suppl.4:S53-S58.

complications and usually resolves in the first week. Moderately severe AP is defined by the presence of transient organ failure, local complications or exacerbation of co-morbid disease. Severe AP is defined by persistent organ failure, that is, organ failure persists for more than 48 hours[4].

A previous recent report of the outcomes of AP in Thailand showed an overall mortality rate of 6% and in cases of severe AP, mortality was up to 42%[5]. Therefore, assessment of the severity of AP is very important in the initial management of patients in order to triage and make a decision regarding closeness of monitoring and the need for intensive care or referral to the hospitals that have more expertise and resources for management of AP. Unfortunately by definition, severe AP requires the occurrence of persistent organ failure and recognition is usually late. Several scoring systems for prediction of the severity of AP are proposed to use for early detection in the patients that have a high risk of the severe form of this disease. The Acute Physiology and Chronic Health Evaluation II [APACHE-II score][6] and Bedside Index for severity in acute pancreatitis [BISAP score][7] have been validated for use in the assessment and prediction of severity[8,9] but the BISAP score was found to be easier to use because fewer parameters are needed to calculate the score and all parameters are able to be obtained in general hospitals.

The present study aimed to determine the etiology, incidence of severe AP and treatment outcomes of AP in Maharaj Nakorn Chiang Mai Hospital and analyze the effective usage of the BISAP score in the prediction of outcomes of treatment that will enable the provision of optimal care for patients with AP.

Materials and Methods

This study was a retrospective descriptive study. Medical records of 115 patients, admitted to Maharaj Nakorn Chiang Mai Hospital with AP from January 2011 to December 2013 were reviewed to define the incidence of severe AP, etiology of AP and treatment outcomes.

Patients

We included patients who were more than 18 years of age and had 2 out of the 3 criteria for the diagnosis of AP according to American College of Gastroenterology guidelines for the management of AP[3]. Patients who had AP as a complication of other diseases or had received treatment of AP from other hospital for more than 24 hours were excluded.

Identification of etiology of AP

The presence of gallstones was identified as an etiology of AP in patients, the gallstone being found by transabdominal ultrasound [US] or abdominal computerized tomography [CT]. Hypertriglyceridemia was considered as an etiology in cases where the serum triglyceride levels were greater than 1,000 mg/dL[3]. In patients who did not have gallstones or hypertriglyceridemia but had a history of habitual alcohol consumption were classified as acute alcoholic pancreatitis. Hypercalcemia was considered as an etiology in cases where elevated serum calcium was found but there was absence of gallstones, alcohol use or hypertriglyceride levels. In the present study other causes were classified as idiopathic.

Definitions of severity of AP and local complications

The severity of AP and local complications were classified according to the 2012 revision of the Atlanta classification[4].

Outcome measurement

Treatment outcomes such as mortality rate, organ failure and length of hospital stay were recorded. Three organ systems (respiratory, cardiovascular and renal) were assessed to define organ failure. The modified Marshall scoring systemwas used and organ failure was identified as having a score of 2 or more for one of these 3 organ systems[10]. BISAP score was evaluated, using clinical parameters (blood urea nitrogen >25 mg/dL, impaired mental status, systemic inflammatory response syndrome [SIRS], age >60 years, and pleural effusions)[7]. These parameters were also analyzed for any correlation against the treatment outcomes.

Statistical analysis

Comparison of categorical data was carried out using Chi-square test and a student t-test or non-parametric test was used for analysis of continuous data. SPSS version 16.0 was used to carry out the statistical tests. A p-value <0.05 was used to define statistical significance.

This study was approved by the Research Ethics Committee of the Faculty of Medicine, Chiang Mai University (Cerificate of Approval number 422/2013).

Results

Between January 2011 to December 2013, 115 patients were admitted to Maharaj Nakorn Chiang Mai

Hospital with a diagnosis of AP. Characteristics of the patients are shown in Table 1. Sixty-five percent of patients were male and the mean age was 49. Major causes of AP were gallstones (43.5%) and alcohol (36.5%) (Table 2). Most of the patients (81.7%) did not have previous history of AP.

The incidence of local complications and organ failure are shown in Table 3. Of the 115 patients, 21 (18.2%) were classified as severe acute pancreatitis and 10 out of the 21 (47.6%) had pancreatic necrosis, 9 patients had persistent organ failure and 2 patients had both pancreatic necrosis and persistent organ failure. Overall mortality of AP patients in this study was 4.3%, and rising to 24% in severe AP. In those who had BISAP score <3, the mortality rate was only 1% but this statistically increased to 33.3% in patients who had a BISAP score ≥3. This showed statistical significance of a BISAP score ≥3 with the increasing mortality rate of AP (p<0.001).

The development of severe AP (p<0.001) and mortality (p<0.001) with BISAP score ≥3 was also statistically significant (Table 4). Moreover a BISAP score ≥3 was related to a longer hospital stay but was not related to the rate of local complications of AP. Also, a BISAP score ≥3 was associated with increased organ failure, severe AP and death, but was not associated with local complications (Figure 1). However, when considering the data concerning the patients who had a BISAP score of 4 or 5 the results showed increasing organ failure (reaching 100%), but all of them (n = 3) did not develop persistent organ failure and ultimately survived.

In the present study, a BISAP score ≥3 had

Table 1. Characteristics of 115 patients with acute pancreatitis

Age (years), mean ± SD	49±1.6
Gender, n (%)	
Male	75 (65.2)
Female	40 (34.8)
Body weight (kg), mean (range)	63.4 (30 to 115)
Comorbid diseases, n (%)	
Hypertension	30 (26.1)
Dyslipidemia	21 (18.3)
Diabetes mellitus	18 (15.7)
HIV infection	6 (5.2)
Cirrhosis	4 (3.5)
Coronary artery disease	4 (3.5)
Renal failure	3 (2.6)
Cerebrovascular disease	3 (2.6)
Asthma	3 (2.6)
Gallstone	3 (2.6)
Hypothyroidism	1 (0.9)
Thalassemia	1 (0.9)
Chronic obstructive pulmonary disease	1 (0.9)
Valvular heart disease	1 (0.9)
Systemic lupus erythematosus	1 (0.9)
Ampulla carcinoma	1 (0.9)
Previous acute pancreatitis, n (%)	
No	94 (81.7)
1 time	11 (9.6)
2 times	2 (1.7)
≥3 times	8 (7)

Table 2. Etiologies and diagnosis of acute pancreatitis

Etiology, n (%)	
Gallstones	50 (43.5)
Alcohol	42 (36.5)
Idiopathic	19 (16.5)
Hypertriglyceridemia	3 (2.6)
Hypercalcemia	1 (0.9)
Amylase (U/L), mean (range)	1,382 (27 to 8,946)*
Lipase (U/L), mean (range)	1,515 (13 to 8,694)**
Initial BUN (mg/dL), mean±SD	14.9±13
Initial creatinine (mg/dL), mean±SD	1.4±2
Radiologic examination; n (%)	
Computed tomography	69 (60)
Ultrasonography	22 (19)

* Data from 111 patients, ** Data from 48 patients

Table 3. Local complications, organ failure, severe acute pancreatitis and treatment outcomes

Incidence/outcomes	n (%)
Local complication	
None	61 (53)
>2 fluid collections	18 (15.6)
Pancreatic necrosis	6 (5.2)
Both	6 (5.2)
Organ failure	
None	95 (82.6)
Transient organ failure	9 (7.8)
Persistent organ failure	11 (9.5)
Severe acute pancreatitis	21 (18.2)
Pancreatic necrosis	10 (8.7)
Persistent organ failure	9 (7.8)
Both	2 (1.7)
Death	5 (4.3)
Hospital length of stay, median (range)	6 (1 to 72)

Table 4. Severity and treatment outcomes according to BISAP score

Results	BISAP <3 (n = 103)	BISAP ≥3 (n = 12)	*p*-value
Local complications			0.378
>2 fluid collection	17 (16.5)	1 (8.3)	
Pancreatic necrosis	4 (3.9)	2 (16.7)	
Both	5 (4.8)	1 (8.3)	
Organ failure			<0.001
Transient organ failure	4 (3.9)	5 (41.7)	
Persistent organ failure	5 (4.8)	6 (50)	
Severe acute pancreatitis	13 (12.6)	8 (66.7)	<0.001
Death	1 (1)	4 (33.3)	<0.001
Hospital length of stay			0.003
<7 days	60 (58.2)	4 (33.3)	
7 to 29 days	42 (40.8)	6 (50)	
≥30 days	1 (1)	2 (16.7)	

Data are expressed as n (%)

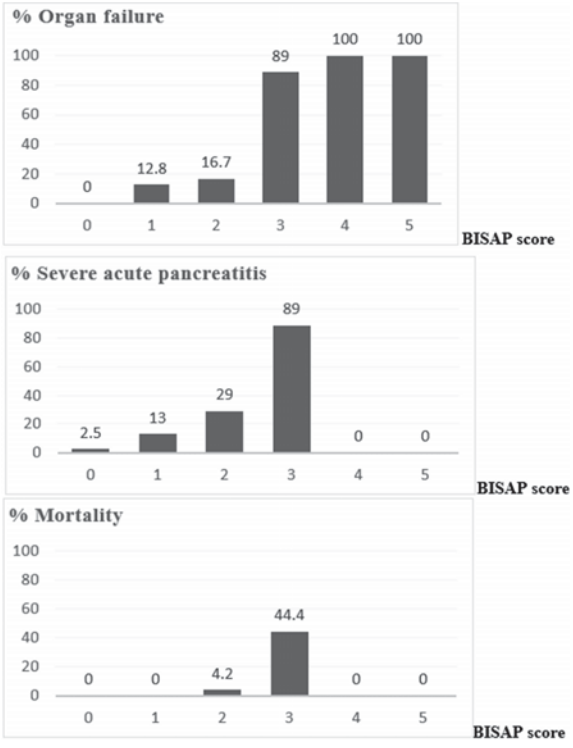

Figure 1. Relationship of BISAP score with organ failure, severe acute pancreatitis and mortality.

sensitivity and specificity for the prediction of severity, pancreatic necrosis and mortality of AP patients as shown in Table 5. The sensitivity and specificity to predict severe AP were 38% and 96% respectively and

Table 5. Performance of BISAP score ≥3 for the prediction of severity, organ failure and mortality of acute pancreatitis

	Sensitivity (%)	Specificity (%)
Pancreatic necrosis	25	94
Transient organ failure	56	93
Persistent organ failure	55	94
Severe acute pancreatitis	38	96
Death	80	93

for prediction of death were 80% and 93%, respectively.

Discussion

Patients who were diagnosed with AP at Maharaj Nakorn Chiang Mai Hospital in the presented study had etiologies mostly from gallstones and alcohol. These findings were similar to other reports from Thailand and western countries[1,2]. Severe AP occurred in 18% of patients and led to a high mortality rate (24%) compared with 4.3% overall. This was consistent with a previous study in Thailand that showed mortality rates of 1% and 42% in cases of mild and severe AP, respectively with an overall mortality of 6%[5].

BISAP score ≥3 was associated with increased organ failure, severe AP, death and showed statistical significance with the development of severe AP, longer hospital stay and mortality. These results were consistent with previous studies that reported on the

benefit of using the BISAP score to predict the risk of organ failure and death after a diagnosis of AP[7, 9,11]. In this study, we found 3 patients that had a BISAP score up to 4 or 5 that predicted very high risk of mortality[7,9] but all of them survived and there was no occurrence of persistent organ failure. This result was an example of fact that a high BISAP score can predict the outcome of the development of organ failure but if it was transient organ failure, it might not be severe AP, therefore having a better prognosis than we expected[4]. However, because of very few patients that had a BISAP score of 4 or 5, it was difficult to ignore the predictive capability of a high BISAP score with the high risk of mortality.

When we considered the sensitivity and specificity of a BISAP score, we found it was a good assessment tool to predict mortality due toAP (sensitivity 80% and specificity 93%) but it had a low sensitivity in the prediction of the occurrence of severe AP and persistent organ failure, 38% and 55%, respectively. In clinical practice we would prefer to triage patients who have a high risk of severe AP, in the emergency room for admission to the intensive care unit or referral to higher expertise centers. Patients who have a BISAP score ≥3 need aggressive treatment because from the results of this study, 67% of them developed severe AP and 33% of them died. However, a BISAP score <3 might not be a cut-off point to exclude the patients who have a high risk of severe AP. Interestingly, findings from this study showed that some patients who had BISAP score 2, 29% of them to be exact, developed severe AP and 4.2% died. We found a zero death rate in patients who had a BISAP score <2 and this might be an indication that the threshold of BISAP score for the prediction of severity in AP could be reduced. Using a BISAP score that composes of BUN >25 mg/dL, impaired mental status (Glasgow coma score <15), SIRS, age >60 years, and pleural effusion to triage patients who have a high risk of AP with a score ≥3 might be impossible in some patients who are young and come to hospital early because they cannot get the point from age >60 years and may not have a high BUN and show pleural effusion and impaired mental status from their early presentation. Therefore, the use of the BISAP score should be approached carefully as the dynamic processes involved in AP can change parameters for the calculation of the BISAP score later after admission and can lead to worse outcomes. Several intrinsic patient characteristics, such as SIRS, obesity, signs of hypovolemia and comorbidities, are alarm features for clinicians who need to be aware of the poor outcomes of acute pancreatitis rather than only rely on the scoring systems[3].

Conclusion

In this study the causes, incidence of severe AP and mortality rate were found to be similar to other studies. A BISAP score ≥3 was valuable in the prediction of severe AP and mortality. However, a BISAP score <3 was not an effective criterion in the separation of patients who needed less intensive treatment.

What is already known on this topic?

AP is a sudden inflammation of the pancreas that varies in severity but in those who have severe AP, the risk of mortality is high. The BISAP score is a practical tool in the evaluation of patients enabling early recognition of the patients who may be at a high risk of severe AP and mortality.

What this study adds?

In patients who were diagnosed with AP in Maharaj Nakorn Chiang Mai Hospital, the incidence of severe AP and mortality rate were similar to other studies carried out in Thailand and other countries. A higher mortality was found in those who had severe AP. A BISAP score ≥3 was valuable in the prediction of severe AP and mortality. However, a BISAP score <3 was not a good criterion in identifying the patients who needed less intensive treatment.

Potential conflicts of interest

None.

References

1. Lankisch PG, Apte M, Banks PA. Acute pancreatitis. Lancet 2015; 386: 85-96.
2. Pongprasobchai S, Thamcharoen R, Manatsathit S. Changing of the etiology of acute pancreatitis after using a systematic search. J Med Assoc Thai 2009; 92 (Suppl 2): S38-42.
3. Tenner S, Baillie J, DeWitt J, Vege SS. American College of Gastroenterology guideline: management of acute pancreatitis. Am J Gastroenterol 2013; 108: 1400-15.
4. Banks PA, Bollen TL, Dervenis C, Gooszen HG, Johnson CD, Sarr MG, et al. Classification of acute pancreatitis—2012: revision of the Atlanta classification and definitions by international consensus. Gut 2013; 62: 102-11.
5. 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.
6. Larvin M, McMahon MJ. APACHE-II score for assessment and monitoring of acute pancreatitis. Lancet 1989; 2: 201-5.
7. Wu BU, Johannes RS, Sun X, Tabak Y, Conwell DL, Banks PA. The early prediction of mortality in acute pancreatitis: a large population-based study. Gut 2008; 57: 1698-703.
8. Chen L, Lu G, Zhou Q, Zhan Q. Evaluation of the BISAP score in predicting severity and prognoses of acute pancreatitis in Chinese patients. Int Surg 2013; 98: 6-12.
9. Cho YS, Kim HK, Jang EC, Yeom JO, Kim SY, Yu JY, et al. Usefulness of the Bedside Index for severity in acute pancreatitis in the early prediction of severity and mortality in acute pancreatitis. Pancreas 2013; 42: 483-7.
10. Marshall JC, Cook DJ, Christou NV, Bernard GR, Sprung CL, Sibbald WJ. Multiple organ dysfunction score: a reliable descriptor of a complex clinical outcome. Crit Care Med 1995; 23: 1638-52.
11. Papachristou GI, Muddana V, Yadav D, O'Connell M, Sanders MK, Slivka A, et al. Comparison of BISAP, Ranson's, APACHE-II, and CTSI scores in predicting organ failure, complications, and mortality in acute pancreatitis. Am J Gastroenterol 2010; 105: 435-41.