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Evaluating Outcome in Perforated Peptic Ulcer by Boey and POMPP Score

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A B S T R A C T

Introduction: Perforated peptic ulcer (PPU) is able to increase the risk of mortality and morbidity. This study used Boey and practical scoring system of mortality in patients with perforated peptic ulcer (POMPP) scoring systems to assess risk mortality of the patients. Every parameter has a value to add up 1 point in Boey and POMPP score.

Methods: This observational study used medical records of PPU patients who came to Dr. Soetomo General Hospital in emergency state and being operated and treated at surgical inpatient care facility in 2016. The data were analyzed retrospectively. The sampling technique in this study was done by total sampling.

Results: Most of PPU patients had the average age of 59.56 years old and 71.79% of the patients were male. Both analyzing results of Boey and POMPP scoring systems were not statistically significant to predict mortality risk of the patients. Even so, the results of Boey scoring system tended to have a positive correlation with mortality risk (0%, 37.50%, 52.94%, and 100%) with 17 patients (43.59%) had mortality.

Conclusion: While Boey and POMPP score are most commonly used to predict outcome for PPU patients in Dr. Soetomo General Hospital, considerable variations in risk of mortality were shown. Therefore, both Boey and POMPP score had its own advantages and disadvantages. Further prospective research is needed to test the validity of Boey and POMPP scoring systems, thus the scoring systems can be used in daily hospital practice in patients with PPU.

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Introduction

One of severe complications in peptic ulcer is perforated peptic ulcer (PPU). PPU is able to increase the risk of mortality and morbidity.[1] There are two kinds of peptic ulcer: gastric ulcer and duodenal ulcer. Gastric ulcer happens on gastric lining in which the symptom is usually an abdominal pain after eating.[2] Meanwhile, duodenal ulcer happens on small intestine lining, especially duodenum, which usually is followed by a sudden sharp of abdominal pain in the particular part of stomach as the symptom.[2]

In 2015, a study conducted at a hospital in India showed that 13% of mortality was caused by PPU.[3] According to Thorsen, *et al*. in 2013, 37% of PPU happened to be correlated with mortality rate. They also discovered that in similar previous studies, mortality rate of PPU reached more than 27% followed by 20-50% of the patients with complication.[4]

Therefore, a suitable method is needed to predict the prognosis of PPU patients. Scoring is one of the methods which is considered to be effective because of its simple interpretation. The escalation of total score in scoring is usually followed by a higher risk of mortality. This study used Boey and practical scoring system of mortality in patients with perforated peptic ulcer (POMPP) scoring systems to assess risk of mortality of the patients. Boey scoring system has been used since 1987 with varieties of prediction value and accuracy.[5, 6] The parameters of Boey scoring system include preoperative shock, >24 hours of perforation, and comorbidity of diseases. Every parameter has a value to add up 1 point in the scoring. As a result, the lowest score is 0 and the highest score is 3 in Boey scoring system.[5] The mortality risk of each score is 1.9%, 7.1%, 31.7%, 40%, respectively.[3] Meanwhile, the parameters of POMPP scoring system are patients aged >65, blood urea nitrogen (BUN) level >45 mg/dL, and serum albumin level ≤1,5 g/dL. The same interpretation is used as in Boey scoring system with mortality risk of each score is 0%, 7.1%, 34.4%, 89.9%, respectively.[6]

Methods

This observational study used medical records of PPU patients who came to Dr. Soetomo General Hospital in emergency state and being operated and treated at surgical inpatient care facility in 2016. The data were analyzed retrospectively with certain inclusion and exclusion. The inclusion criteria of this study include all medical records with PPU, whether it is derived from gastric ulcer or duodenal ulcer, as final diagnosis followed by complete anamnesis, preoperative laboratory test results, and every outcome required for Boey and POMPP scoring systems. Meanwhile, the exclusion criteria were all medical records with final diagnosis other than PPU followed by incomplete data of patients.

For the descriptive results, data of the patients taken were patient's characteristics (age and gender), clinical conditions (symptoms, herbs or NSAID, and location of PPU), laboratory test results (BUN level, serum creatinine level, serum albumin level), and outcomes (complication and mortality). The normal range of BUN level was 5-20 mg/dL. The normal range of serum creatinine level was 0.6-1.2 mg/dL in men and 0.5-1.1 mg/dL in women. Then, serum albumin level which showed <3.5 g/dL was grouped as hypoalbuminemia.

For the analytic results, the patients were grouped according to its total score based on Boey and POMPP scoring systems (total score in 0, 1, 2, and 3). The score was obtained by adding up 1 point to every fulfilled parameter. Every parameter was required from the patient's preoperative condition. The parameters of Boey scoring system include preoperative shock, >24 hours of perforation, and comorbidity of diseases. Preoperative shock was defined when the condition of systolic blood pressure reached lower than 90 mmHg. Duration of perforation >24 hours were the time interval between the patient's onset of abdominal pain until arrival at the hospital. The comorbidity of diseases include cardiovascular diseases, renal failure diabetes mellitus, liver failure, and immunocompromised diseases. Meanwhile, the parameters of POMPP scoring system are patients aged >65, BUN level >45 mg/dL, and serum albumin level ≤1,5 g/dL.

All of the data were compiled and analyzed using Microsoft Excel 2013 and SPSS Statistics 17.0. Chi square test was used as statistical hypothesis test in this study with 0.05 as the value of significance level.

Results

This study obtained 39 medical records with no exclusion criteria found. The average age of PPU patients in this study was 59.56 ± 10.08 years with 58 years old as the median. The age range of the most patients was 56-65 years old with total of 16 patients (41.02%). Out of 39 patients, 28 patients were male (71.79%) and 11 patients were female (28.21%).

From the clinical conditions, most patients had symptoms such as pain in all parts of abdomen which started from heartburn followed by sharp abdominal pain sensation (48.72%), fever (56.41%), and nausea (48.72%). From the risk factors, patients who had herbs consumption habit reached 48.72% and 25.64% of patients had NSAID habit. The location of PPU in most patients was on gastric lining with 37 patients (94.87%), especially on prepyloric (54.06%). The other 2 patients had their PPU located on duodenal lining (5.13%). From the laboratory test results, most of the patients came with elevated BUN and serum creatinine level, with 34 (87.18%) and 28 (71.80%) patients respectively. Patients who were grouped as hypoalbuminemia reached 37 patients (98.7%) in this study.

Table 1. Location of PPU.

Location of PPU (gastric lining)	N	%
Antrum	5	13.51%
Corpus	2	5.41%
Prepyloric	20	54.06%
Pyloric	5	13.51%
N/A	5	13.51%
Total	37	100%

Table 2. Laboratory test results.

Variable	Level	N	%	Mean
BUN				45.06
	Low	0	0%	
	Normal	5	12.82%	
	High	34	87.18%	
Serum Creatinin				2.18
Male	Low	0	0%	
	Normal	6	15.38%	
	High	24	61.54%	
Female	Low	0	0%	
	Normal	5	12.82%	
	High	4	10.26%	
Albumin Serum				2.94
	Hypoalbuminemia	37	94.87%	
	Normal	2	5.13%	
Total		39	100%	

Table 3. Complications.

Complication	N	%
Anemia	20	51.28%
Hypoalbuminemia	25	64.10%
Renal complication	11	28.21%
Respiratory complication	2	5.13%
Acid-base dysregulation	7	17.95%
Septic shock	3	7.69%
Sepsis	32	82.05%
Others	8	20.51%

Table 4. Boey score.

Boey score	Mortality (%)	No Mortality (%)	N	*Chi Square*
0	0 (0%)	4 (100%)	4	p > 0.05
1	6 (37.50%)	10 (62.50%)	16	
2	9 (52.94%)	8 (47.06%)	17	
3	2 (100%)	0 (0%)	2	
Total	22	17	39	

Table 5. POMPP score.

POMPP score	Mortality (%)	No Mortality (%)	N	*Chi Square*
0	8 (40%)	12 (60%)	20	p > 0.05
1	7 (50%)	7 (50%)	14	
2	2 (40%)	3 (60%)	5	
3	0 (0%)	0 (0%)	0	
Total	22	17	39	

Both analyzing results of Boey and POMPP scoring systems were not statistically significant (p > 0.05) to predict mortality risk of the patients. Even so, the results of Boey scoring system tended to have a positive correlation with mortality risk (0%, 37.50%, 52.94%, and 100%) with 17 patients (43.59%) had no mortality. All of the patients got complications and sepsis had the most patients with 32 patients (82.05%). Sepsis also caused the most deaths in this study with 9 patients (52.94%).

Discussion

In this study, the patients were dominated by elderly. This is because the elderly tended to have gastric atrophy and gastropathy which caused an apparent damage on

gastric lining.[7] Male patients were dominating in this study because their habits might increase the risk of getting PPU, such as smoking, alcohol consumption, and NSAID as painkiller intake.[8]

The main symptom of the patients was pain in all parts of abdomen which started from heartburn followed by sharp abdominal pain sensation. The pain disseminated to all regions of abdomen because of peritonitis. While the sharp sensation was a symptom resulted from the contents of the gastrvic, which was quite acidic, it came out into abdomen cavity.[9] The main symptom was mostly followed by fever and nausea. Fever was a sign of inflammation and infection happened in the body. It also had a systemic effect on organ system dysfunctions, gastrointestinal tract was one of them.[10] Nausea was one of the signs of dyspepsia.[11]

A study conducted by Diaz and Rodriguez in 2000 discovered that the consumption of traditional NSAID called as herbs in Indonesia tended to increase the risk of bleeding as complication and 3-5 times faster to experience PPU.[12] NSAID intake gave a side effect through inhibiton of prostaglandin synthesis which caused mucous layer on gastric lining to decrease.[13]

Most patients had PPU located on their gastric lining, especially on prepyloric, because there was a hypersecretion of gastric acid on prepyloric part of the stomach. This might cause a retention which resulted in gastric ulcer to develop faster on this part.[14]

Most of the patients in this study came in clinically good condition with >24 hours of perforation. This happened probably because the contents of the gastric which came out into abdomen cavity was correlated with duration of abdominal pain felt by the patients. A long duration of abdominal pain was one of the risk factors of getting complication in PPU and also tended to increase the mortality risk.[15, 16]

Cardiovascular diseases and diabetes mellitus were the ones that followed most patients in this study. Age and gender were the risk factors of getting cardiovascular diseases. This study found a dysfunction of endothelium, atherosclerosis, hypertension, and glucose intolerance resulted from proinflammatory and prothrombotic mechanisms in patients with metabolic syndrome. This explained the correlation between hypertension and diabetes mellitus.[11]

BUN level regulated catabolism of protein, steroid intake, bleeding of upper gastrointestinal tract, and renal function. The elevation of BUN level increased the probability of bleeding and renal dysfunction to happen.[6] Meanwhile, the mortality risk was getting higher when BUN level reached >40 mg/dL.[17] The elevation of serum creatinine level might be an indicator of chronic renal failure, delayed renal failure, dehydration, shock, or septic shock, which escalated the mortality risk and complication in PPU patients.[18] Hypoalbuminemia also made the mortality risk and complication higher.[19]

Sepsis was a complication that PPU patients had the most. There were several methods to identify sepsis or septic shock in patient such as SOFA, qSOFA, and SIRS criteria.[20] Those methods are not used in this study because it was already stated in the medical records. Sepsis as a complication might be strongly correlated with PPU.[9]

Sepsis and septic shock were the cause of the most deaths in this study. Death by septic shock happened because of the failure to take care of the shock immediately, while sepsis was followed by multiple organ dysfunction syndrome (MODS).[20] The contents of the gastric that came out into abdomen cavity could induce SIRS and sepsis to happen, which will escalate MODS and mortality risk in patients.[9, 11]

Both analyzing results of Boey and POMPP scoring systems in this study were not statistically significant ($p > 0.05$) to predict mortality risk of the patients. In 2013, Thorsen, *et al*. stated that Boey scoring system was more suitable to be used in younger patients rather than in elderly.[4] Then, >24 hours of perforation could be biased through anamnesis of the patient which influenced the score. Anamnesis is subjective, resulting a confusion in the patients to interpret their non specific symptoms.[9] Results of several studies stated that the average age of the patients of Boey scoring system respectively were 50.56 ± 19.6 years, 52 years old, 40.5 years old, and 48.23 ± 11.83 years.[6, 16, 21, 22] Meanwhile, based on the age distribution in this study, most patients were aged 56-65 years old with an average age of 59.56 ± 10.08 years. Another possibility is the bias regarding the duration of the perforation and comorbid disease information at the time of history, which affects the total Boey score obtained.

There was no patient found with serum albumin level ≤1.5 g/dL in this study. Therefore, the other POMPP parameters might not be suitable for this study. POMPP scoring system was not assessing the clinical conditions of the patient arrived at the hospital for the first time, because the patients came to the hospital in various conditions. This scoring system also required laboratory tests which had preanalytic, analytic, and postanalytic errors. In a previous study, it was found that 70% of errors happened because of the preanalytic errors.[23]

Conclusion

Boey scoring system is subjective, simple, and easily interpreted through anamnesis and vital sign examination, even though the risk of bias is still there. Meanwhile, POMPP is objective but the clinical conditions of the patient arrived at the hospital for the first time is not assessed, and the scoring could only be done with laboratory test which has its own risk of errors. Therefore, both Boey score and POMPP score have its own advantages and disadvantages. Further prospective research is needed to test the validity of Boey and POMPP scoring systems, thus the scoring systems can be used in daily hospital practice in patients with PPU.

CONFLICT OF INTEREST

The author stated there is no conflict of interest in this study.

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