Original Article

Reliability of Sofa (Sequential Organ Failure Assessment) Score for Predicting Morbidity and Mortality in Acute Pancreatitis in a Tertiary Care Center

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Abstract

Introduction: Severe pancreatitis can cause high mortality, and scorings are essential in assessing and managing it. We used serial Sequential Organ Failure Assessment (SOFA) scores in assessing patients with acute severe pancreatitis to predict severity, intensive care unit admission, and mortality.

Materials and Methods: Our study was a prospective, single-institutional review of 150 consecutive acute severe pancreatitis patients admitted to Coimbatore Medical College and Hospital from May 2019 to April 2020. Serial SOFA scores were calculated on admission, on days 2, 7, 14, and 21 of these patients.

Results: The serial SOFA scores correlated significantly with mortality. Highest SOFA score of 11 and mean SOFA score of more than 8 correlated to mortality of more than 80%. Analyzing the trends in the SOFA score, the mortality rate was around 50% when the score increased, 30% when it remained unchanged, and less than 25 % when it showed a decreasing trend. Mortality differences were better predicted by the first 48 hours SOFA score than in the subsequent 48 hours value. Prolonged hospital stay was associated with late mortality when compared with groups. When comparing other variables, the majority of pancreatitis was caused by alcohol consumption with high mortality observed in patients requiring organ support systems.

Conclusion: Changes in SOFA scores over time predicted the progression of organ failure, and escalating changes in SOFA score on hospital day 1 were subsequently associated with higher mortality rates. In our study, serial assessment of SOFA scores was found to be a cost-effective and easy method for predicting morbidity and mortality in acute pancreatitis patients.

Keywords: Sequential organ failure assessment, pancreatitis, mortality.

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Introduction

One of the most prevalent gastrointestinal disorders worldwide is acute pancreatitis. It is the most prevalent pancreatic disease in India and necessitates hospitalization. Pancreatitis is becoming more common worldwide[1].

Rapidly developing and exhibiting a wide range of clinical manifestations and severity, acute pancreatitis is an inflammatory condition. Worldwide, the incidence ranges from 4.9 to 73.4 cases per 100,000 people[1]. The symptoms of acute mild pancreatitis go away in about 79% of cases in a week. On the other hand, about 21% of patients experience necrotizing pancreatitis and severe pancreatitis with organ failure. Multiple organ failure and prolonged systemic inflammatory response syndrome are more likely to occur in these patients.

Three to four weeks after the start of the disease process, 30% of these patients experience increased morbidity and death as a result of secondary infections of necrosis[2]. Compared to moderate pancreatitis, the overall mortality rate for severe pancreatitis might reach 15% to 30%. Alcohol use is the primary cause of most cases of acute pancreatitis, but biliary aetiology accounts for the remaining occurrences of pancreatitis[3]. Acute exacerbations of chronic calcific pancreatitis are another reason that is specific to the Tropics.

Many grading systems have been created in recent years to help clinicians determine the degree of sickness in patients who have been admitted with acute pancreatitis. Clinical and biochemical characteristics served as the foundation for these rating schemes. Each of these rating schemes has advantages and disadvantages of its own.

It was determined that the scoring systems accurately measured the dynamic fluctuations in critical disease. APACHE (Acute Physiology and Chronic Health Assessment) II & III, Atlanta, Glasgow-Imrie, Ranson, BISAP (Bedside Index for Severity in Acute Pancreatitis), and SOFA (Sequential Organ Failure Assessment) score[5] are a few of these. The SOFA score was created in 1994 during a consensus meeting with the goal of developing a score that would quantitatively and objectively describe the extent of organ failure or malfunction over time in patient groups or even in individual individuals. The score was created to forecast results and characterize a series of consequences associated with critical illness.

The score was once known as the Sepsis-related OrganFailureAssessment[6], but its early recognition of its use in assessing acute morbidity in a variety of severe illnesses led to a modification in its name. It has been demonstrated that the SOFA scoring system performs better and was simpler to use. The respiratory (ABG / SPO_2), cardiovascular (mean arterial pressure), hepatic (bilirubin level), coagulation (platelet count), renal (serum creatinine), and neurological (Glasgow Coma Scale score) systems were evaluated using six distinct parameters that made up the SOFA score. Each parameter had a score between 0 and 4, with a higher score denoting worsening organ dysfunction. In resource-starved environments, the SOFA scoring system directs the effective use of resources[7]. The aim behind this approach is to determine the patient's fate based on the course of the disease and the use of the resources that are available.

This keeps all forms of care from being thrown on a patient who might not make it. In order to predict morbidity and mortality as well as the reliability of the SOFA score in patients with acute pancreatitis who were admitted to our Coimbatore Medical College and Hospital, this study was conducted.

Though there were studies on prognostic value of SOFA score in acute pancreatitis, there were very few studies measuring the utility of serial SOFA scores in predicting morbidity and mortality.

Sofa Score

Based on the level of malfunction in six organ systems, the Sequential Organ Failure Assessment (SOFA) Score predicts death. Using the worst metrics recorded over the previous 24 hours, the score is determined at admission and then every 24 hours until release.

Aims & Objectives

Aim:

To evaluate the efficacy and reliability of serial SOFA scores for predicting morbidity and mortality

of patients presenting with acute pancreatitis in Coimbatore Medical College and Hospital.

Objectives:

1. To assess the serial SOFA score.
2. To predict their correlations and their outcome in patients with acute pancreatitis.
3. To study the usefulness of SOFA score assessment in predicting mortality in acute pancreatitis patients.
4. To study mortality among mechanically ventilated patients and ICU admitted patients and its correlation with SOFA score.

Materials and Methods

This prospective study, which took place between May 2019 and April 2020, focused on patients who were admitted to Coimbatore Medical College and Hospital in Coimbatore, Tamilnadu (convenience sampling). 150 patients with acute bouts of acute pancreatitis were included in the study. Sample size calculated with 95% confidence interval and 5% margin of error. Acute pancreatitis was diagnosed using radiologic evidence (ultrasonography or computed tomographic scan imaging), clinical presentation, and laboratory test results. SOFA score calculated by 6 parameters as described.

Inclusion criteria:

All patients more than 18 years of age with acute pancreatitis.

Exclusion criteria:

Chronic pancreatitis

Pancreatitis from surgical complications

Traumatic pancreatitis

Pancreatitis due to surgical complications

Known CKD patients, COPD patients

Known liver disease patients

On admission, a detailed clinical history was obtained and a thorough physical examination was conducted. Prognostic stratification and classification was done based on the SOFA score. Information on clinical status, investigations, length of hospitalstay and intensive care unit stay, the kind of feeding, ventilator requirement and need for ionotropic support were gathered. A severity prediction based on the SOFA score was created and patients followed up. During follow-up, SOFA scores were calculated on day 2 and day 7. Day14 or 21 SOFA score added as available. Following discharge, patients with mild illness were monitored on an OPD basis for two weeks and three months. Serious cases were investigated based on their merits. When necessary, laparoscopic or open cholecystectomy was done for patients with biliary pancreatitis. Patients with alcoholic pancreatitis were advised to abstain from alcohol, and in certain situations, a psychiatrist assisted in the de-addiction process.

The characteristics of the patients, the cause of the pancreatitis, the organ support system that was utilized, and the ICU hospitalization were among the demographic data that was documented.

Observation and Results

IBM was used to examine the gathered data. Version 23.0 of the SPSS statistical software. For categorical variables, descriptive statistics such as frequency and percentage analysis were employed, whereas for continuous variables, the mean and standard deviation were employed. The unpaired sample t-test was used to determine whether there was a significant difference between the bivariate samples in the independent groups. The probability value of.05 is regarded as a significant level in the statistical instrument mentioned above.

Table 1: Age distribution

Age Distribution	Frequency	Percentage
21-30	58	38.7
31-40	73	48.7
41-50	17	11.3
51-60	2	1.3
Total	150	100

Mean ± SD = 34 ± 7 years

Table 2: Gender distribution

Gender distribution	Frequency	Percentage
Female	4	2.7
Male	146	97.3
Total	150	100

As seen in general population, there was male predominance in our series too.

Table 3: Etiology distribution

Etiology	Frequency	Percentage
Alcoholic	127	86.7
Biliary	8	5.3
Others	15	10
Total	150	100

The above table shows the Etiology distribution were 86.7% is Alcoholic, 5.3% is Biliary, 10.0%

Table 4: Use of Ventilator support distribution

Ventilator support	Frequency	Percentage
Absent	136	90.7
Present	14	9.3
Total	150	100

The above table shows the Use of Ventilator support distribution were 90.7% is Absent, 9.3%

Table 5: Ionotropic requirement distribution

Ionotropic support	Frequency	Percentage
Absent	123	82
Present	27	18
Total	150	100

The above table shows the Ionotropic requirement distribution were 82.0% is Absent, 18.0%

Table 6: Renal replacement therapy distribution

Renal replacement therapy	Frequency	Percentage
Absent	140	93.3
Present	10	6.7
Total	150	100

Table 7: ICU admission distribution

ICU admission	Frequency	Percent
No	121	80.7
Yes	29	19.3
Total	150	100

Table 8: Outcome distribution

Outcome	Frequency	Percent
Alive	141	94
Dead	9	6
Total	150	100

Table 9: Comparison of Average SOFA with Groups by Unpaired t-test

Group	N	Mean SOFA	SD
Dead	9	15	1
Alive	141	2	2

** Highly Statistical Significance at p-value-0.0005

Table 10: Comparison of SOFA with Groups by Unpaired t-test

Assessment day	Mmean SOFA, Dead	SD	Mean SOFA, Alive	SD	t-value	p-value
Day-1	15.2	1.1	5.1	2.5	11.983	0.0005
Day-2	14.1	1.3	2.1	2.1	16.873	0.0005
Day-7	14.2	1.4	0.7	1.1	33.893	0.0005
Day-14/21	14.2	1.4	0.3	0.6	29.745	0.0005

** Highly Statistical Significance at p < 0.01 level

A comparison of SOFA and groups using the unpaired t-test is displayed in the above table. The difference between SOFA at admission and Groups was extremely statistically significant, as evidenced by the t-value of 11.983 and p-value of 0.0005<0.01 in the comparison. The difference between SOFA at Day 2 and Groups was highly statistically significant, as evidenced by the t-value of 16.873 and p-value of 0.0005<0.01 in the comparison. The difference between SOFA at Day 7 and Groups was highly statistically significant, as evidenced by the t-value of 33.893 and p-value of 0.0005<0.01 in the comparison. 't' value=33.893, p=0.0005<0.01 in a comparison of SOFA at Day 7 with Groups indicates a very statistically significant difference between

SOFA at Day 7 and Groups. In a comparison of SOFA at Day 14/21 with Groups were 't' value=29.745, p=0.0005<0.01 which shows a highly statistically significant difference between SOFA at Day 14/21 and Groups respectively.

Discussion

Due to changes in guidelines and advancements in diagnostic and therapeutic approaches, particularly for patients with severe disease, the outcomes of patients with acute pancreatitis have improved over the past 20 years. Nonetheless, a 30% fatality rate is still linked to severe acute pancreatitis[8,9]. Timing determines the cause of death in individuals with acute pancreatitis: sepsis and its consequences cause late mortality, while SIRS leading to MODS typically causes early death[10]. Significant resources are needed for imaging, endoscopy, surgery, and intensive care unit treatment for patients with severe acute pancreatitis. The Coimbatore Medical College and Hospital served as the study's site. According to this study, men were more likely than women to have acute pancreatitis.

Our study's median age group was 35 years old, suggesting that younger people were more impacted. In our study with alcoholic preponderance, gallstones and alcohol were responsible for 93.2% of the cases of acute pancreatitis, which is comparable to Western developed nations. Etiology, however, had little effect on outcome[11]. This could suggest that the course and outcome of acute pancreatitis are unaffected by the pathogenic process. Patients with severe acute pancreatitis were included in this investigation. Our study's overall mortality rate was 11%, with the intensive care unit accounting for the majority of deaths (19%). Nine (6%) of these patients passed away in less than two weeks.

This could suggest that improvements in medical management have led to more successful treatment of early problems, which has decreased the rate of early mortality. Still, almost half of the patients experienced late mortality. More work should therefore be done to enhance the techniques for forecasting late death in patients suffering from acute pancreatitis. Physicians must have the ability to incorporate data into clinical decision-making because the grading systems are not always 100% accurate. Instead of dehumanizing the decision-making process, these scoring human systems let doctors stop depending on subjective, emotionally charged, and inaccurately calculated estimates. Like any other study, ours has certain limitations. Due to the small size of the research population, more extensive multicentric investigations involving a greater number of patients are required. Additionally, different scoring methods should be evaluated. In contrast to other scoring systems like APACHE, MODS, Glasgow, etc., the SOFA scores were determined at the time of admission and 48 hours later, on the 7th and 21st days. Ideally, they should have been tested every 24 hours to track the disease's progression.

Conclusion

In a concise, our study demonstrated a strong association between the use of SOFA score and mortality. Our study also demonstrated morbidity in association with prolonged hospital stay and use of organ support systems in severe acute pancreatitis patients. Our study divulged acute pancreatitis to be more common in middle-aged young men with alcohol predominance. The overall mortality rate was 11% in our study, with death occurring in the early week of admission. Thus, serial SOFA scores were shown to be reliable for guiding clinical decisions and 1 week is a reasonable time for SOFA score reassessment to predict late mortality in acute pancreatitis.

Although other scoring systems were available for predicting mortality in acute severe pancreatitis, the SOFA score was found to be cost-effective and an easier tool to apply with bedside clinical and easily available laboratory methods.

This study demonstrates that in patients with acute pancreatitis and SOFA score greater than 8 indicators of organ failure correlated with the development of systemic complications and mortality. Independent of the initial score, an increase in SOFA score during the first 48 hours predicted a mortality rate of at least 50%.

The SOFA score can be used as an important tool in defining both the clinical condition of the individual patient and the response to therapies in the context of clinical trials. This study conducted in Coimbatore Medical College and Hospitals showed the serial assessment of SOFA score is very useful in predicting morbidity and mortality in acute pancreatitis patients, since there is a significant correlation between the rise in the SOFA score and mortality in all stages of the disease.

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