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Dr. Rajeshwaraiah V
Associate Professor, Department of
General Surgery, Dr. Patnam
Mahender Reddy Institute of
Medical Sciences, Chevella.
Hyderabad, Telangana, India

Dr. B Srinivasa Rao
Associate Professor, Department of
General Surgery, Dhanalakshmi
Srinivasan Medical College &
Hospital, Perambalur, Tamil
Nadu, India

Simplified acute physiological scoring ii ability to accurately predict mortality and morbidity in perforation peritonitis

Dr. Rajeshwaraiah V and Dr. B Srinivasa Rao

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Abstract

Background and objective: The purpose of this study was to assess the efficacy of SAPS II scoring in predicting mortality and morbidity in patients with perforated peritonitis. To supply patients with perforation peritonitis with an objective prognostic method. For the purpose of providing a risk classification system for patients with perforation peritonitis.

Method: The participants in a prospective observational study included 125 adults over the age of 18 who presented to the surgical ward at Department of General Surgery, Dhanalakshmi Srinivasan Medical College & Hospital, Perambalur, Tamil Nadu, India. with symptoms of perforation peritonitis from June 2018 to May 2019. These symptoms included abdominal tenderness, guarding, rigidity, and rebound tenderness. Additionally, the participants' x-rays showed air under the diaphragm.

Result: 125 patients who were admitted to our hospital during the study period all had their SAPS II scores calculated. There were 102 males and 23 females total. Those with a SAPS II score below 20 may be categorized separately from those with a score between 21 and 40, while those with a score over 40 could be categorized separately from those with a score between 21 and 80. The low-risk category included those with a SAPS II score of less than 20, who experienced no deaths and required shorter hospital stays. Patients with a SAPS II score between 21 and 40 were considered to be in the moderate risk group; those with a score of 40 or higher had the highest mortality rate.

Conclusion: The severity of a patient's perforation peritonitis can be predicted with high accuracy using the Sequential Organ Failure Assessment (SAPS) II score.

Keywords: Perforation, peritonitis, sequential organ failure assessment, prognosis

Introduction

The medical industry has come full circle in the previous two centuries. The main purpose of medicine in the nineteenth century, especially among French doctors, was not curing sickness but rather making an accurate diagnosis and providing an accurate prognosis of the patient's prospects of survival. The need of finding a treatment for a patient's condition didn't become paramount until the twentieth century. As there were no established norms at the time, prognosis was left up to the discretion of the attending physician. In the latter part of the twentieth century, it became clear that doctors' subjective judgments and estimates for individual patients were based on their own prior knowledge, experience, or intuition [1, 2, 3].

Some of the patients suffered because of this because they weren't treated properly. It was so understood that estimates based on hard facts and precise measurements would be more accurate, uniform, and reproducible than subjective guesses. Different patients may present with a wide variety of signs and symptoms, some of which may be rather complex. We would be better able to educate, assess, examine, and reproduce the complex data if it were given in a straightforward, intelligible, and objective form. Consequently, scoring systems were created to make objective predictions about the patient's prognosis. Prognoses are calculated by these systems, which factor in the objective values of the patient's various physiological parameters and the presence of the patient's numerous chronic conditions [4, 5, 6].

With such precise foresight, the efficacy of critical care and other cutting-edge medical advancements may be evaluated with more precision. With accurate prediction or risk classification before treatment, clinical researchers might compare the quality of care provided by different ICUs and isolate the structural elements of the ICU associated with better patient

Corresponding Author:
Dr. Rajeshwaraiah V
Associate Professor, Department of
General Surgery, Dr. Patnam
Mahender Reddy Institute of
Medical Sciences, Chevella.
Hyderabad, Telangana, India

outcomes through observational studies. By assigning points and grades, we can learn about the occurrence's pattern, any restricting or complicating causes, and the outcomes that occurred. Better clinical decision making based on such data could aid in gauging service quality, pinpointing problem areas, raising patient happiness, and directing the efficient use of healthcare resources. Different surgeons and facilities in different parts of the world can be compared using risk-adjusted data [6,7].

The surgical emergency of perforation peritonitis is all too common. The legendary escapologist Harris Houdini was able to break out of several locks and chains, but a hard blow to his belly ultimately led to his death from perforated peritonitis. A common cause of peritonitis in third world countries is the perforation of the hollow viscus. Perforation management remains a hard, complex, and tough task. There is a dearth of information from India concerning prognostic markers, mortality, and morbidity rates due to the fact that the etiological spectrum of peritonitis in Asia is distinct from that in the West. In light of this, accurate prognostication of the disease and forecasting of mortality and morbidity patterns are essential. Most cases of perforation peritonitis occur in outlying hospitals that do not have access to sophisticated diagnostic equipment. A scoring system that predicts the patient's prognosis with few investigative modalities has to be validated. The Simplified Acute Physiological Scoring System II (SAPSS II) is a prognostic system that uses a variety of clinical parameters, physiological measures, and some fundamental investigations recorded within the first 24 hours of a patient's hospitalization. In the West, it has been utilized in a variety of intensive care unit (ICU) settings for patients with a wide range of diagnoses. We plan to use this scoring system to assess the viability of predicting death in patients with perforation peritonitis [8,9].

Material and Methods

125 adults aged 18 and up who presented to the surgical ward at Department of General Surgery, Dhanalakshmi Srinivasan Medical College & Hospital, Perambalur, Tamil Nadu, India, from June 2018 to May 2019 with symptoms of perforation peritonitis such as abdominal tenderness, guarding, rigidity, rebound tenderness, and an x-ray showing air under the diaphragm were the subjects of a prospective observational study.

Inclusion criteria

1. Have either spontaneous or isolated traumatic perforation peritonitis
2. Be 18 or older

Exclusion criteria

1. Patients under the age of 18
2. Anything outside bacterial or viral peritonitis
3. Patients who have had multiple organ injuries as a result of a severe perforation of the abdomen

Patients' values for the SAPS II variables are gathered. The information was gathered using the Performa form that was included as an appendix. An Excel spreadsheet was used to record the information. Within 24 hours of hospitalization, all patients gave their informed verbal agreement for data collection to take place before their surgeries. According to SAPS II criteria, each patient was given a score.

$\text{Logit} = -7.7631 + 0.0737x(\text{SAPSII}) + 0.9971 \ln[(\text{SAPSII} + 1)]$ was

used to get each patient's SAPS mortality score.

$\text{Life Expectancy Prediction} = e(\text{Logit}) / (1 + e(\text{Logit}))$

Throughout their time in the hospital, the patients were closely monitored. Patients were monitored for signs of improvement or problems. Total hospitalization duration was also determined as a useful measure of patient morbidity. In the event of the patient's demise, the underlying issues were recorded. We then evaluate how well this mortality score predicts the patient's actual morbidity and death outcome.

Result

On 125 different cases with perforation peritonitis, the SAPS II scoring system was utilized. The majority of the 125 cases of perforation were found in males, who accounted for 102 of the cases, while just 23 cases were found in females.

Table 1: Sex distribution

Males	Females	Total
102	23	125

Mortality

It was discovered that there was a mortality rate of 25 out of 125 in the study group. 16 of the fatalities occurred in the male population. Five of the fatalities were caused by females.

Table 2: Mortality rate

	Males	Females
Death	16	5

It was discovered that females had a somewhat greater mortality rate than males.

We may divide the patients into different groups based on the location of the perforation. The majority of the perforations were caused by duodenal perforation, which accounted for 23 of the total instances. Jejunal perforation accounted for 23, followed by gastric (14), ileal (13), and colonic (12). (6). For four patients who had a flank drain inserted, it could not be determined what caused their condition; nonetheless, they did not require any more surgery because they improved with conservative treatment.

Table 3: Anatomical classification.

	Gastric	Duodenal	Jejunal	Ileal	Colonic	Unknown
Number	14	61	23	13	6	8
Death	4	8	6	3	4	0
Hospital stay	15.42days	8.8 days	18.8 days	13.7days	2 days	15.25days

Patients who suffer from duodenal perforations typically have a shorter length of stay in the hospital and make a speedier recovery. Patients who had jejunal perforations had the longest hospital stays, followed by patients who had stomach perforations and then patients who were placed on flank drains. Due to the fact that both of these patients passed away in the early post-operative period, the colonic perforation mortality rate is lower. It was discovered that duodenal perforation was the most prevalent cause, followed by jejunal perforation as the next most common cause. The length of time spent in the hospital after a jejunal perforation was determined to be the longest.

Table 4. Mortality According to Site of Perforation displays the total number of fatalities that occurred as a result of each type of perforation, and the chart directly above displays the mortality

rate for each category. The group that experienced colonic perforation had the highest fatality rate, followed by the group that experienced jejunal perforation. Despite the fact that duodenal perforations made up the majority of the diagnosis, fatality rates were not very high.

The many difficulties that occurred were documented. Infections of the wound and problems related to the respiratory system were found to be the most common types of complications, followed by infections of the urinary tract and enterocutaneous fistulas. The number of intra abdominal abscesses was found to be much reduced.

The various complications were recorded. The most common complications were found to be wound infection and respiratory complications followed by the urinary tract infections and enterocutaneous fistulas. Intra abdominal abscesses were found to be lower in number.

Table 4: Mortality According to Site of Perforation

	WI	WD	RC	UTI	IAA	ECF
Number	21	6	21	14	4	7

WI- wound infection WD- wound dehiscence

RC- respiratory complications

UTI- urinary tract infections

IAA- intra abdominal abscess

ECF- enter cutaneous fistula

Males vs. Females

Table 5: Location of ulcer

	Gastric	Duodenal	Jejunal	Ileal	Colonic	Unknown
Males	9	54	19	10	6	4
Females	5	7	4	3	-	-

Morbidity Analysis

This chart illustrates the prevalence of holes in males and females according to the percentages. Even though duodenal perforation is the most prevalent cause in both males and females, there was a significantly higher number of gastric and ileal perforations in females as compared to males. This is something that can be seen.

Table 6: Complications in Males and Females

	WI	WD	RC	IAA	UTI	ECF
Males	21	6	21	4	10	7
Females	0	0	0	0	4	0

WI- wound infection WD- wound dehiscence

RC- respiratory complications UTI- urinary tract infections

IAA- intra abdominal abscess ECF- enterocutaneous fistula

It was discovered that guys had a higher risk of developing problems. Nearly every consequence was experienced by members of the male population, while just four members of the female population had a complication, which was a urinary tract infection.

SAPS II in study population

The SAPS II scoring system was used on each and every one of these situations. The overall average score on the SAPS II for all of the instances is 22.95. The 15 patients who passed away had a mean SAPSII score of 41, according to the investigation.

It was determined that the jejunal perforations had the highest incidence of complications. Next, there was a perforation in the stomach. It was discovered that jejunal perforations were more likely to result in wound infection, whilst duodenal perforations were more likely to result in respiratory problems. Four patients

who were diagnosed with an intra abdominal abscess also suffered from jejunal perforations. Gastric perforation was shown to be more common in patients with enterocutaneous fistula. The following table provides an overview of the numerous issues that can arise depending on the specific location of the perforation.

Table 7: Complications in individual anatomic sites

	WI	WD	RC	IAA	UTI	ECF
Gastric	5	2	3	0	3	2
Duodenal	4	0	9	0	6	0
Jejunal	8	3	3	3	5	3
Ileal	3	2	4	0	2	2
Flank drain	3	0	3	3	0	0

Gastric perforation

Wound infection was the most prevalent consequence associated with gastric perforation, followed by urinary tract infection and enterocutaneous fistula. Wound infection affected 43% of individuals who had stomach perforation as their primary diagnosis. There was a 22% incidence of enterocutaneous fistula, respiratory problems, and urinary tract infections. 64% of patients diagnosed with gastric perforation experienced some form of problem throughout their treatment.

Duodenal perforation

There were no incidences of wound dehiscence, intra abdominal abscess, or enterocutaneous fistulas. Respiratory problems were the most common consequence reported in duodenal perforation. 15% of the patients were diagnosed with respiratory problems, while 9% of them were diagnosed with urinary tract infections. Overall, only 29% of individuals who had duodenal perforation experienced any kind of consequence as a result of the condition.

Jejunal perforation

Infection of the wound is the complication associated with jejunal perforations that occurs most frequently. Only in cases of jejunal perforation did intra abdominal abscesses present themselves. Both two patients who had wound dehiscence and two patients who had enterocutaneous fistula had complications. Infection of the wound was discovered in 34% of the group that had a jejunal puncture. In total, 43% of patients diagnosed with jejunal perforation experienced some form of problem throughout their treatment.

Ileal perforation

Following wound infection as the most prevalent complication of ileal perforation, respiratory problems were the next most common event. 34% of patients who were diagnosed with ileal perforation also suffered from respiratory difficulties, while 23% of patients were diagnosed with wound infection. In total, 45 percent of patients diagnosed with ileal perforation experienced some kind of problem throughout their treatment.

Unknown perforation/ Flank Drain

Patients who had only a flank drain performed experienced a high risk of complications. In two patients, or fifty percent of the total, an intra abdominal abscess, respiratory problems, and wound infection at the drain site developed. However, it was shown that patients who had flank drain had a survival rate of one hundred percent. This could be a result of the prompt drainage of the peritoneal sepsis, but it's also possible that these individuals benefited from the absence of stress brought on by

the anesthetic and surgery. To demonstrate the efficiency of flank draining without resorting to definitive surgery, additional research could be necessary.

Analysis of complications with SAPS II scoring

Wound infection

When we evaluate the incidence of wound infections according to SAPS II score, we find that when the SAPS score is less than 20, the wound infection rate is very low, whereas when the SAPS score is higher, there is an increased wound infection rate. This is because higher SAPS scores indicate a greater risk of infection. When compared to instances with SAPS between 20 and 40, the rate of wound infection is lower in cases with SAPS above 40 because many of these cases passed away in the early post-operative period before developing wound infection.

Respiratory complications

A linear relationship existed between SAPS II rating and the occurrence of respiratory problems. In reality, the majority of deaths were brought on by difficulties with the respiratory system.

As a result, we find that respiratory difficulties emerge in 60% of patients whose SAPS II score is between 31 and 40, and in 100% of patients whose score is over 40.

Wound dehiscence

This is a cumulative chart that illustrates, as the SAPS scoring climbs, an increasing number of patients that have wound dehiscence. If the SAPS score is less than 20, there will be no wound dehiscence, but if it is between 30 and 40, then 40% of instances will have wound dehiscence.

Intra abdominal abscess

The four patients who were diagnosed with an intra abdominal abscess all fell into the category of having a SAPS II score of between 20 and 40. In all of the cases with a score lower than 20, it was completely absent.

Infections of the urinary tract

The prevalence of urinary tract infections was found to be essentially constant across the entirety of the SAPS score spectrum. This was likely the result of practically all of the patients using bladder catheters, which is significant given that having an indwelling catheter is the single most important risk factor for developing.

Enterocutaneous Fistula

The risk of developing an enterocutaneous fistula was identical to that of developing any of the other problems; the risk was highest in the range of 30 to 40, and it was nonexistent below a SAPS II score of 20.

Relaparotomy

There were a total of five patients that went through with the procedure of relaparotomy. The presence of an enterocutaneous fistula was the reason for the second laparotomy that was performed. An average SAPSII score of 36 was found among the individuals who had relaparotomy performed on them.

Table 8: Comparison of SAPS II scoring in Male and Female group and its association to Hospital Stay

	SAPS II	Hospital Stay
Male	22.95	11.11 days
Female	19.19	9.22 days

It was discovered that the average SAPS II scoring in males is somewhat higher than in females, which correlates well with the increased length of hospital stay as well as the higher morbidity in male population.

The relationship between the SAPS II score and death

In situations when the SAPS II score was less than 20, there was no mortality. One person who was between the ages of 21 and 30 and had a SAPS II score of 28 passed away. There was a mortality rate of one hundred percent in the age group of 31 to 40. Every single one of the patients in this group received a SAPS II score of 38. After the age of 40, the mortality rate increased to 90%. The lone patient who survived with a SAPS II score higher than 40 suffered significant morbidity in the form of an enterocutaneous fistula that required relaparotomy as well as a severe wound infection that led to wound dehiscence.

Table 9: Comparison of Predicted mortality to actual mortality

SAPS II score	Predicted mortality	Actual mortality
0-20	2.75%	0
21-40	11.3%	22.42%
>40	35.75%	91%

The average expected mortality as determined by SAPS II score is presented along with the mortality rate that actually occurred in each of the groups. The mortality rate in patients who are considered to be at high risk can not be accurately predicted using the SAPS II grading system. The predicted mortality has a strong correlation with the actual mortality of individuals with a moderate risk, however it somewhat over predicts mortality in the group with a low risk.

Discussion

In our hospital, perforation peritonitis is a common surgical emergency. There were 125 patients in our study, and men outnumbered women by an 8:1 margin. Most of the patients were in their twenties and thirties. In comparison, the average age in the West is between 45 and 60. A duodenal ulcer was the most prevalent cause of perforation, followed by a jejunal ulcer, an ileal perforation, and a gastric perforation. Duodenal perforation was found to be the most common cause in a previous study by Rajender *et al.* [9, 10].

However, they found that perforations of the stomach and ileum were more common than perforations of the jejunum. The causes of perforation varied between the sexes in our sample population. Males were found to have a lower incidence of gastric and ilial perforations while females had greater incidences of both. There were fewer complications in the female population, and this was reflected in their shorter hospital stays and lower average SAPS II scores.

Perforation of the upper GI tract is more common than that of the lower GI tract, contrary to the data from the West. It's possible that this is because of the higher prevalence of *H. pylori* infection in our population, as well as a lack of awareness among both primary care physicians and the general public about how to effectively treat gastritis and gastroduodenal ulcers. Infection at the surgical site and breathing problems were the leading causes of postoperative death [11, 12].

These findings are consistent with those of other research efforts focusing on perforation peritonitis. The length of hospital stay, which is a measure of a patient's total morbidity and complications from their disease, increases linearly with the SAPS II score. With a SAPS II score of less than 20, the average length of hospital stay is 9 days, whereas with a score of 20 to 40, it increases to around 16 days. Patients with a SAPS II score

of 20–40 have had the highest incidence of problems [13, 14].

Those with a score higher than 40 have a higher mortality rate, therefore they likely did not live long enough for complications to arise. This finding is consistent with prior research on SAPS II scoring for peritonitis and other illnesses. According to Prakash *et al.*, whose work was published in JIACM 2006; 7(3): 202-5, the death rate was 0%, 16%, 62.75%, and 100%, respectively, for SAPS scores of 10, 11-30, 31-60, and >60.

Research by Gauzit, Rémy, *et al.* appears in Volume 10 of Surgical Infections. It has been previously reported (Mary Ann Liebert, April 1, 2009) that a SAPS II score of 38 or higher is related with an increased risk of death. Most of the complications in our study have occurred in patients with a SAPS II score above 20, and all of the deaths have occurred in patients having a SAPS II score above 25. This is consistent with the findings of an article published in the Society for Thoracic and Aortic Surgery in 2008 by Mehmet F. Can, Gohkan Yagci, and colleagues, which indicates that a SAPS II scoring above 25 is a greater risk for morbidity and mortality. Based on their SAPS II scores, our patients can be divided into three distinct groups [15, 16].

In the first, those with a SAPS II score under 20 have an extremely low mortality rate; in the second, those with a score between 21 and 40 have a relatively high mortality rate; and in the third, those with a score beyond 40 have the greatest mortality rate. We found that out of instances, zero deaths occurred in the low risk group, 22.4% of deaths occurred in the moderate risk group, and 91% of deaths occurred in the high risk group consisting of just 10 individuals [17, 18].

Using this system, we can better allocate scarce resources among government hospitals' many patients. The majority of deaths from postoperative complications were due to multi-organ failure caused by septicemia, and patients typically stayed in the hospital for around 5.4 days. These patients are at a high risk during surgery and tend to have subpar outcomes as a result. Patients having a pre-operative Surgical Assessment of Patient Stability (SAPS) score of less than 20 had the best outcomes. But those with a SAPS II score between 21 and 40 had the highest rates of morbidity. These patients may require additional attention because they will thrive under the right circumstances but may rapidly decline if they are neglected [18, 19, 20].

Conclusion

Duodenal ulcer perforation caused perforation peritonitis in most individuals.

Acute generalized peritonitis is 8:1 male. Perforation peritonitis was widespread in the 3rd and 4th decades. Wound and respiratory problems were the most common in perforation peritonitis. Perforation peritonitis with 15% mortality. Acute perforation peritonitis SAPS II scores predicted death well. SAPS II values predict perforation peritonitis complications. Complications rise with SAPS II score. Enterocutaneous fistula was the worst consequence, requiring re-laparotomy. Over 50% died. Though SAPS score may underestimate mortality, patients with higher SAPS scores have increased mortality.

We conclude that SAPS II is a good tool for predicting mortality and morbidity in perforation peritonitis patients and classifying and triaging them into groups for different therapy.

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