

The role of Q-sofa score in predicting the clinical outcome in patients with hollow viscus perforation.

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Abstract

Background & objectives: Gastrointestinal perforation is one of the most common causes of acute abdomen and is a surgical emergency. Peptic ulcer being the most common cause.

Even with advanced surgical care hollow viscus perforation is associated with high mortality of up to 20%. There are many scoring systems that predict the clinical outcome in patients with sepsis. One of the widely used scoring systems is the q-sofa score.

This study is to determine the usefulness of q-sofa score in predicting the clinical outcome in patients with hollow viscus perforation.

Methods: A total of 40 cases were enrolled in the study and was conducted in department of general surgery, ESICMC & PGIMSR, Bangalore. All patients diagnosed clinically or radiologically with hollow viscus perforation in the age group of 18-60 years were the study subjects.

Q-sofa score was recorded at the time of presentation before resuscitation. A relationship was then established between the q-sofa score and the clinical outcome of the patients.

Results

- out of the 40 patients studied, 37 were diagnosed with pre-pyloric perforation and 3 with ileal perforation.
- 36 of the study subjects survived and 4 died. of the 4 deaths, 3 were diagnosed with ileal perforation and 1 with pre-pyloric perforation.
- The mean q-sofa score in patients who survived was 1.41 and in those who died was 3.

Interpretation & conclusion

- Our study shows that q-sofa score can be used to predict the outcome in patients with sepsis due to hollow viscus perforation.
- It uses only 3 criteria which is easy to record and does not need any lab tests or imaging facilities.

- The study showed that higher the q-sofa score higher was the mortality.
- This scoring system can be used in primary health care set-ups where imaging facility and lab tests may not be available.

Keywords: Hollow viscus perforation; q-sofa score; sepsis; sirs; pre-pyloric perforation; ileal perforation.

Introduction

Hollow viscus perforation is a form of complex penetration of the stomach wall, small intestine, large intestine due to leak of the contents of the intestine into the abdominal cavity. Perforation of the intestine has the potential for bacterial contamination in the abdominal cavity (this condition is known as peritonitis). Gastric perforation develops into a chemical peritonitis caused by a leak of gastric acid into the abdominal cavity. This kind of infection can cause sepsis. Sepsis is a complex state of the body that is stimulated by infection and then triggers an excess body immune response. Three important signs of sepsis are inflammation, excessive coagulation and suppression of fibrinolysis. This inflammatory cascade and coagulation mainly mediate the progression of sepsis, causing hypoxia and tissue ischemia which continues to organ dysfunction. Sepsis that has failed organ function can be categorized as severe sepsis. Some are said to be septic shock if the conditions mentioned above are accompanied by refractory hypotension.^{1,2}

The use of scoring systems for surgical risk assessment in clinical practice has been known since 1941 when the American society of anesthesiologists (asa) developed a physical status scoring system for patients undergoing surgery. Since then, various efforts to find an ideal scoring system that correctly predicts the risk of mortality continues to occupy medical scientists.³ finding

an ideal scoring tool is key in accurately predicting outcomes and selection of treatment options.⁴ there are many scoring systems to predict the outcome of patients with sepsis such as sofa, saps, apache, mpm and a number of other scoring systems. One of the most widely used scoring systems in the world is the q-sofa score.

Despite the global advances in surgical practice and care, intra-abdominal infections arising from secondary peritonitis still remain one of the most significant causes of morbidity and mortality world over.⁵ in the setting of septic shock, mortality of up to 30% has been reported.⁶ in order to accurately predict these adverse outcomes of secondary peritonitis, a number of risk assessment scoring tools have been developed and used with various performance levels in different clinical settings. Q-sofa is one such ancillary scoring tools that have been used extensively inside and outside the intensive care unit (ICU) setting globally. Q-sofa is a surrogate for sofa and it assigns one point for each of its 3 parameters which are systolic blood pressure less than 100 MMHG, respiratory rate greater or equal to 22 breaths per minute and Glasgow coma scale of less than 15.

In a study in korea, it was concluded that the prognostic utility of the q-sofa score at icu entry for patients with bacteremia was very useful as a screening tool to predict clinical severity and use of medical resources within 72 hours after admission. In addition, the comparison of the q-sofa score with other scoring system parameters shows that the q-sofa score is simpler and useful in the korean ICU.

Methodology

This is a cross-sectional study conducted in the inpatient department of general surgery hospital, ESIC medical college & PGIMSAR, Bangalore. Ethical clearance was

approved from institutional ethical committee of ESIC medical college & PGIMSAR. The duration of the study was for a period of 18 months from march 2021 to august 2022. The study included patients admitted in the department of general surgery hospital, who fulfilled the inclusion criteria.

Sample size calculation

Based on a previous study conducted by uwais et al, it was found that the mean q-sofa score among the deceased was 2.8.⁴⁸ assuming the expected population standard deviation to be 0.5, the study required a minimum of 40 patients to estimate a mean with 95% confidence level and precision of 0.2. Therefore, a total of 40 patients were included in the study. The patients were included for the study based on the inclusion and exclusion criteria mentioned as follows:

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Inclusion criteria

1. Patients willing to give informed consent for the study.
2. Patients diagnosed clinically or radiologically with gastrointestinal perforation.
3. Includes either gender with age between 18 to 60 years.

Exclusion criteria

1. Patients not willing to give informed consent.
2. Traumatic perforations.
3. Malignant perforations.

Methodology

Patients with either gender, aged 18 – 60 years, diagnosed with gastrointestinal perforation clinically or radiologically were included in present study. Data was collected among patients having gastrointestinal perforation, after meticulous history taking, clinical examination, radiological examination such as plain

radiographs of erect abdomen showing gas under the diaphragm. Q-sofa score was recorded at the time of presentation of the patient before resuscitation. A relationship was then tried to establish between the q-sofa values and the clinical outcome of the patient.

Quick sequential organ failure assessment or q-sofa score included 3 parameters: -

1. Systolic bp < 100 mmhg,
2. Respiratory rate > 22 cpm,
3. Altered mental status with gcs <15

A score of 1 is given for each parameter if present and 0 if absent. Therefore, the score varied from 0 to 3.

Statistical analysis

Data was entered in ms excel and analyzed using spss 21.0 version software.

1. Quantitative variables such as age of the patient, were summarized using descriptive statistics such as mean and standard deviation.
2. Qualitative variables such as nature of surgery, diagnosis, post op complications, etc. were analyzed using frequency and percentage.
3. Chi square test was used to find the association between q-sofa score and the clinical outcome.
4. Sensitivity, specificity, ppv, npv of the q-sofa score was tested using roc analysis.

Observations and results

Table 1: Age and Gender distribution of the study participants

| Age Category | | Female | Male | Total | P-value |
|--------------|---------|--------|--------|---------|---------|
| <40 Years | Number | 7 | 10 | 17 | 0.422 |
| | Percent | 17.50% | 25.00% | 42.50% | |
| ≥40 Years | Number | 11 | 12 | 23 | |
| | Percent | 27.50% | 30.00% | 57.50% | |
| Total | Number | 18 | 22 | 40 | |
| | Percent | 45.00% | 55.00% | 100.00% | |

Table 1 shows the age and gender distribution of the study participants in the study. About 45% were females and 55% were males. About 42.5% were less than 40 years and 57.5% were equal & more than 40 years. There was no significant difference between the males and females related to the age distribution.

Table 2: Diagnosis of the disease among Female study participants related to the age

| DIAGNOSIS | Female | <40 years | ≥40 Years | Total | P value |
|---------------------------|---------|-----------|-----------|---------|---------|
| ILEAL PERFORATION TYPHOID | Number | 0 | 2 | 2 | 0.114 |
| | Percent | 0.00% | 11.10% | 11.10% | |
| PRE-PYLORIC PERFORATION | Number | 7 | 9 | 16 | 88.90% |
| | Percent | 38.90% | 50.00% | 88.90% | |
| Total | Number | 7 | 11 | 18 | 100.00% |
| | Percent | 38.90% | 61.10% | 100.00% | |

Table 2 shows the diagnosis of the disease related to the age among female study participants. About 89% of the study participants were diagnosed with Pre-Pyloric Perforation and 11% were diagnosed with Ileal Perforation. There was no significant difference of diagnosed cases between <40 years and >40 years.

Table 3: Diagnosis of the disease among Male study participants related to the age

| DIAGNOSIS | Male | <40 years | ≥40 Years | Total | P value |
|---------------------------|---------|-----------|-----------|---------|---------|
| ILEAL PERFORATION TYPHOID | Number | 1 | 0 | 1 | 0.411 |
| | Percent | 4.50% | 0.00% | 4.50% | |
| PRE-PYLORIC PERFORATION | Number | 9 | 12 | 21 | 95.50% |
| | Percent | 40.90% | 54.50% | 95.50% | |
| Total | Number | 10 | 12 | 22 | 100.00% |
| | Percent | 45.50% | 54.50% | 100.00% | |

Table 3 shows the diagnosis of the disease related to the age among male study participants. About 95.5% of the study participants were diagnosed with Pre-Pyloric Perforation and 4.5% were diagnosed with the Ileal

Perforation. There was no significant difference of diagnosed cases between <40 years and >40 years.

Table 4: Diagnosis wise procedure distribution among the female study participants

| DIAGNOSIS | Female | DIED PREOPERATIVELY | LAPAROTOMY WITH PRIMARY CLOSURE WITH DIVERSION ILEOSTOMY | MODIFIED GRAHAM'S OMENTAL PATCH REPAIR | Total | P-value |
|---------------------------|---------|---------------------|--|--|---------|---------|
| ILEAL PERFORATION TYPHOID | Number | - | 2 | 0 | 2 | 0.007 |
| | Percent | - | 11.10% | 0.00% | 11.10% | |
| PRE-PYLORIC PERFORATION | Number | - | 0 | 16 | 16 | 88.90% |
| | Percent | - | 0.00% | 88.90% | 88.90% | |
| Total | Number | - | 2 | 16 | 18 | 100.00% |
| | Percent | - | 11.10% | 88.90% | 100.00% | |

Table 4 shows the diagnosis wise procedure distribution among the female study participants. None of the study participants died preoperatively in both ILEAL PERFORATION and PRE-PYLORIC PERFORATION cases. Two of the female patients went for LAPAROTOMY WITH PRIMARY CLOSURE WITH DIVERSION ILEOSTOMY had ILEAL PERFORATION and 16 those have undergone MODIFIED GRAHAM'S OMENTAL PATCH REPAIR had PRE-PYLORIC PERFORATION.

Table 5: Diagnosis wise procedure distribution among the male study participants

| DIAGNOSIS | Male | DIED PREOPERATIVELY | LAPAROTOMY WITH PRIMARY CLOSURE WITH DIVERSION ILEOSTOMY | MODIFIED GRAHAM'S OMENTAL PATCH REPAIR | Total | P-value |
|---------------------------|---------|---------------------|--|--|---------|---------|
| ILEAL PERFORATION TYPHOID | Number | 1 | - | 0 | 1 | 0.045 |
| | Percent | 4.50% | - | 0.00% | 4.50% | |
| PRE-PYLORIC PERFORATION | Number | 0 | - | 21 | 21 | |
| | Percent | 0.00% | - | 95.50% | 95.50% | |
| Total | Number | 1 | - | 21 | 22 | |
| | Percent | 4.50% | - | 95.50% | 100.00% | |

Table 5 shows the diagnosis wise procedure distribution among the male study participants. One of the study participants died preoperatively in ILEAL PERFORATION cases. None of the male patients went for LAPAROTOMY WITH PRIMARY CLOSURE WITH DIVERSION ILEOSTOMY and 21 those have undergone MODIFIED GRAHAM'S OMENTAL PATCH REPAIR had PRE-PYLORIC PERFORATION.

Table 6: mean Age and duration of hospital stay

| | OUTCOME | N | Mean | Std. Deviation | Std. Error Mean | p-value |
|---------------------------|----------|----|--------|----------------|-----------------|---------|
| DURATION OF HOSPITAL STAY | DIED | 4 | 2.25 | 1.893 | 0.9465 | 0.006 |
| | SURVIVED | 36 | 4.444 | 1.3824 | 0.2304 | |
| AGE | DIED | 4 | 49.5 | 14.1774 | 7.0887 | 0.523 |
| | SURVIVED | 36 | 38.861 | 9.9086 | 1.6514 | |

Table 6 shows the mean difference of age and duration of hospital stay between the survived and dead patients. The duration of the stay was significantly higher for the survived patients. There was no significant difference of mean age between the survived and dead patients.

Table 7: Q-SOFA score and Survival status of study participants

| Q-SOFA | | DIED | SURVIVED | Total | p-value |
|--------|---------|--------|----------|---------|---------|
| 1 | Number | 0 | 21 | 21 | 0.001 |
| | Percent | 0.00% | 52.50% | 52.50% | |
| 2 | Number | 0 | 15 | 15 | |
| | Percent | 0.00% | 37.50% | 37.50% | |
| 3 | Number | 4 | 0 | 4 | |
| | Percent | 10.00% | 0.00% | 10.00% | |
| Total | Number | 4 | 36 | 40 | |
| | Percent | 10.00% | 90.00% | 100.00% | |

Table 7 shows the Q-SOFA score and survival status of study participants. The increase score of Q-SOFA 3 had all the mortality in the study. The lesser Q-SOFA score had higher survival status.

Discussion

The present study was carried out on 40 patients admitted in the Department of General Surgery, ESIC Hospital, Bangalore during the time period of March 2021 to August 2022. These patients were diagnosed clinically and radiologically (plain x-ray Abdomen showing air under the diaphragm) with hollow viscus perforation, 37 With pre pyloric and 3 with ileal perforation. The age among the study participants ranged between 22 to 60 years with the Mean age being 39.9 years. There was no significant difference of diagnosed

Cases related to the age. 22(55%) of the study participants were male and 18(45%) of the participants were female. There was no significant difference of diagnosed cases related to the gender.

Among the male patients 21 were diagnosed with pre pyloric perforation and 1 was diagnosed with ileal perforation. Among the female patients 16 were diagnosed with pre pyloric perforation and 2 were diagnosed with ileal perforation. One of the study participants died pre-operatively in the emergency room. Patients diagnosed with pre pyloric perforation underwent emergency laparotomy with modified Graham's patch repair and patients with ileal perforation underwent primary closure with diversion ileostomy. The Q-SOFA score was recorded at the time of presentation of the patients before resuscitation. 3 parameters i.e., systolic BP, respiratory rate and GCS were used to calculate the Q-SOFA score. Patients had higher mortality (7.5%) in ileal perforation as compared to the pre pyloric perforation (2.5%). Overall, 10% of the study participants died and 90% were survived. The higher the Q-SOFA score the higher was the mortality. Lesser Q-SOFA had higher survival status.

Conclusion

This is a cross-sectional study performed on 40 patients with hollow viscus perforation. There was no significance of age and gender with respect to disease outcome. The higher the Q-SOFA score in the study subjects with hollow viscus perforation, the higher was the mortality rate. There was a relationship between the QSOFA value and the outcome of the patients where the Q-SOFA was significantly lower in subjects who survived than those who died.

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