Original Research Article

A comparative study of Shock index and Modified shock index as a tool for triage in Emergency Medicine Department in patients presenting with Polytrauma

Dr. Mehul Shrivastav[1] (Senior Resident), Dr. Shailendra Singh[2] (Assistant Professor), Dr. Manish Banjare[3] (Professor) & Dr. Sumit Shukla[4] (Professor)

Department of Emergency Medicine, MGM Medical College & M.Y. Hospital, Indore, M.P.[1,2&4]
Dept. of Anaesthesiology, MGM Medical College & M.Y. Hospital, Indore, M.P.[3]

Corresponding Author: Dr. Sumit Shukla

Abstract
Background & Methods: The aim of the study is to compare study of Shock index and Modified shock index as a tool for triage in Emergency Medicine Department in patients presenting with Polytrauma.
Results: Initially we triaged all 100 patients according to conventional method, we then calculated shock index for 50 patients and Modified shock index for the rest 50 patients. Patients were divided into Red, yellow and Green category using three tier system.
Conclusion: To conclude the present study which reveals MSI as a better and improved tool since it best reflects the hemodynamic status of patients but in centers where multipara monitors are unavailable Shock index can be used for triage which will still be a better tool as compared to conventional parameters.

1. Introduction

Trauma remains a leading cause of death among all patients in Emergency Department, death due to trauma can be prevented by proper timely management hence triaging plays an important role[1].
Triaging is done by experienced person based on parameters such as heart rate, Blood pressure, mechanism and severity of injury etc. based on individual's experience.
In our study we tried to incorporate Shock index and Modified shock index in triage of patients presenting in our casualty and compare their results with each other based on mortality and morbidity within 4 hours and also we compared their results with triage based on conventional parameters[2].
Recently, the concept of shock index (SI) has regained attention in the area of polytrauma patient management. Value is calculated as the heart rate (HR) divided by systolic blood pressure (SBP), and not considered independent of HR or SBP. Shock index between 0.7 to 0.9 is normal values above and below it is abnormal[3]. Based on its simplicity and clarity, studies have been conducted on a marker that predicts bleeding in patients with polytrauma and reflects the acute volume loss of hemorrhagic shock. However, few studies have

investigated differences in outcomes according to SI at different time points or scale of SI change.

We investigated the correlation between the SI at the pre-hospital trauma scenario and patient outcomes including mortality and between the SI at the inhospital emergency room (ER) and patient outcomes[4]. Moreover, we also investigated the gap between ER and pre-hospital SIs, so-called delta SI, on whether it has a correlation with outcomes in patients with trauma.

Triage at emergency department is performed to identify patients who are relatively more serious and require immediate attention and treatment. Despite current methods of triage, trauma continues to be a leading cause of morbidity and mortality[5].

Aims and Objective
- The idea of this study was to use shock index and modified shock index as a triage tool in allocating patients in different categories namely Red, Yellow and Green.
- Comparing the results of both these indices with each other and with triage using conventional parameter.

2. Material and Methods

- Study type-Comparative Longitudinal study
- Study Centre- Department of Emergency Medicine of MGM Medical college and M.Y. hospital Indore
- Sample Size- 100 patients.
- Duration of study- 1st January 2023 to 31st May 2023 after taking permission from institute's ethical committee.

Inclusion criteria
All patients with polytrauma between 15years to 60 years presenting in our casualty.
Exclusion criteria
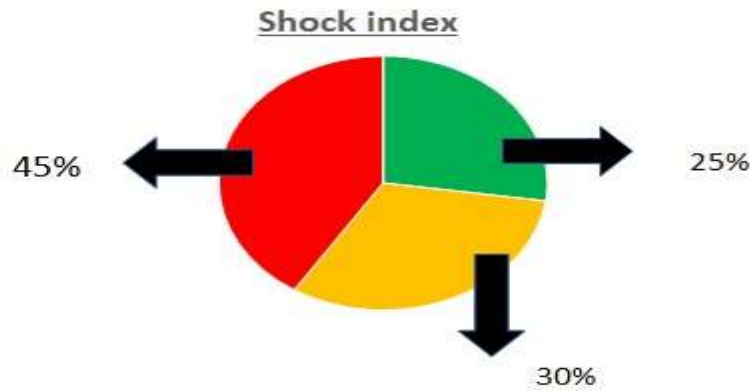Patients primarily resuscitated and referred from outside.
All head injury patients.

3. Result

Table 1:

In the First Group-

CATEGORY	SHOCK INDEX
GREEN	0.5 TO 0.9
YELLOW	0.9 TO 1.0
RED	>1.0

In the second Group-

CATEGORY	MODIFIED SHOCK INDEX
GREEN	0.7 TO 1.3
YELLOW	>1.3 TO <1.5
RED	>1.5

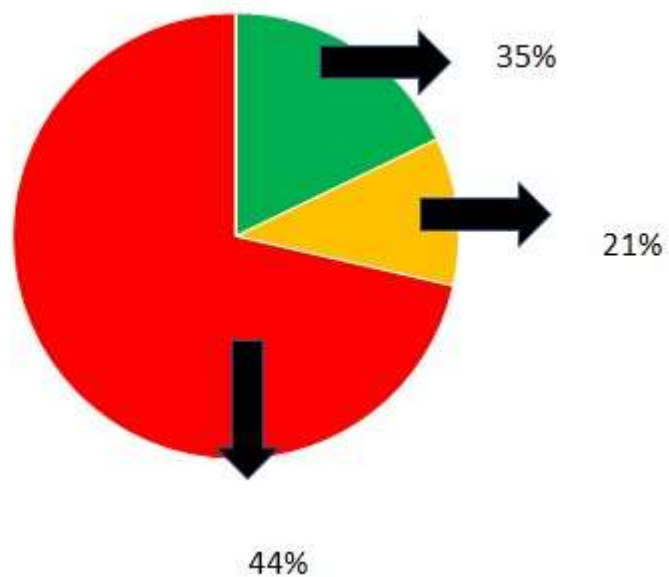**Fig 1:**

Shock index

45%   25%

30%

Pie chart :

Table 2:

• In the first Group using Shock Index we observed the following values

CATEGARY	PATIENT PERCENTAGE	NUMBER OF PATIENTS	SHOCK CATEGARY	TREATMENT
GREEN	25%	12	MILD OR NO SHOCK	NO OR MINMAL FLUID REQUIRED
YELLOW	30%	15	MODERATE SHOCK	FLUID REQUIRED
RED	45%	23	SEVERE SHOCK	BOTH FLUID AND BLOOD REQUIRED

Fig 2:

MODIFIED SHOCK INDEX

35%

21%

Pie chart:

44%

Table 3:

- In the Second Group using Modified Shock Index we observed the following values

CATEGARY	PATIENT PERCENTAGE	NUMBER OF PATIENTS	TREATMENT	MORTALITY/ MORBIDITY
GREEN	35%	15	MINIMAL FLUID THERAPY	NO MORTALITY
YELLOW	21%	11	FLUID THERAPY REQUIRED	SOME MORBIDITY
RED	44%	24	BOTH FLUID AND BLOOD REQUIRED URGENTLY	HIGH MORTALITY 40% IN 4 HOURS

Table 4:

Comparison between conventional triage and Shock Index

CATEGARY	CONVENTIONAL	SHOCK INDEX
GREEN	30%	25%
YELLOW	35%	30%
RED	35%	45%

Table 5:

Comparison between conventional triage and Modified Shock Index

CATEGARY	CONVENTIONAL TRIAGE	MODIFIED SHOCK INDEX
GREEN	35%	25%
YELLOW	21%	12%
RED	44%	65%

We gathered data of patients such as age, gender, vital signs, level of consciousness, presenting complaints etc.

Initially we triaged all 100 patients according to conventional method, we then calculated shock index for 50 patients and Modified shock index   for the rest 50 patients.

Patients were divided into Red, yellow and Green category using three tier system.

4. Discussion

Triage is a term derived from French verb 'trier' meaning to sort or choose and is defined as prioritization of patients care(or victims during disaster) based on illness/injury, severity, prognosis and resource availability to get the right patient to the right place at the right time with right care provider[6].

Most trauma centres triage the trauma patients presenting to their emergency room into life threatening, possible life threatening and no urgency. However, it is practically difficult to quantify the severity of these life-threatening conditions. In a previous study,[7] the vital signs such as SBP less than 90 mmHg, DBP less than 60 mmHg, and HR more than 120 beats per minute were found to be the important predictors of outcome of these emergency patients. The observations and results of the present study confirm the above observations.

In the present study, we observed that among traditionally used predictors SBP <90 mmHg had the maximum odds of mortality (OR = 2.6); however, both cut-offs of MSI, *viz.* <0.7 and >1.3, had higher odds of mortality (1.2 times and 1.55 times higher than for SBP <90 mmHg), thus showing the relative superiority of MSI in the prediction

of hospital mortality. SI is known as hemodynamic stability indicator. This index is used to assess the amount of blood loss and the degree of hypovolemic shock. It is considered as a better marker for assessing the severity of shock than HR and BP alone. Thus, in clinical practice, SI has been used to assess the severity of emergency patients. However, while calculating SI, DBP is totally neglected. Most studies used SBP to predict the outcome of the emergency patients. Diastolic blood pressure is a better indicator of tissue perfusion thus better reflects severity[8].

Trauma is the number one cause of death in patients under 45 years of age. This is a common phenomenon in not only Korea but also the United States and the world. Mortality rate reduction and improvement of outcomes depend on how quickly we detect and control bleeding in patients with trauma[9].

SBP and HR are sensitive indicators of bleeding or shock and can be easily measured in any situation. However, because of early physiologic compensation or pain in patients with trauma, it is difficult to determine the relationship between changes in these vital signs and actual bleeding. Lactate and BE are also good indicators of patient's shock status; however, it takes about an hour to obtain results after arrival at the hospital. Scoring system, such as ISS and TRISS, was also found to be highly correlated with the prognosis of patients with trauma; however, early diagnosis is limited because these scores are the final results after all workups have been completed[10]. An image study, such as computed tomography (CT), can show definite bleeding. However, CT is often difficult to perform depending on the patient's condition, and the advanced trauma life support guideline recommends not to perform CT at the primary surveillance stage.

5. Conclusion

To conclude the present study which reveals MSI as a better and improved tool since it best reflects the hemodynamic status of patients but in centers where multipara monitors are unavailable Shock index can be used for triage which will still be a better tool as compared to conventional parameters.

6. References

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