International Journal of Sciences: Basic and Applied Research (IJSBAR)

ISSN 2307-4531
(Print & Online)

http://gssrr.org/index.php?journal=JournalOfBasicAndApplied

Shock Index As Outcome Predictor in Haemorrhage Trauma Patient

Wahyuni Dian Purwati[a]*, Andi Asadul Islam[b], Wardihan Sinrang[c], Syafri K Arief[d]

[a]*Siloam Hospitals Kebon Jeruk, Jakarta, Indonesia*

[b]*Department of Neurosurgery, Faculty of Medicine, Hasanudin University, Makassar, Indonesia*

[c]*Department of Physiology, Faculty of Medicine, Hasanuddin University, Makassar, Indonesia*

[d]*Department of Anesthesiology, Faculty of Medicine, Hasanuddin University, Makassar, Indonesia*

[a]*Email: unie79@yahoo.com*

Abstract

To evaluate whether the shock index (SI), is useful for predicting mortality in trauma patients accompanied by bleeding with various levels that admitted to the emergency department of Siloam Hospitals Kebon Jeruk, Jakarta, Indonesia. A database of trauma patients with 1 to 4 hemorrhage degree that admitted between January 2017 and November 2017 was constructed; the result according to the shock index was determined, generating a dichotomous variable with two groups: Group A (SI < 0.8) and Group B (SI > 0.8). Univariate analysis was performed. A total of 9 patients were analyzed, the mean of SI was 0,812 ± 0,311. The average injury severity score was 13,81 ± 1,46. All patients were survive. The results showed that there was a change of shock index in trauma patients with different degrees of hemorrhage after resuscitation. The change in shock index depends on the SI type prior to resuscitation. The higher the SI value before resuscitation the greater the SI decrease occurs.

Keywords: trauma; hemorrhage; shock index.

---

* Corresponding author.

1. Introduction

Trauma is one of the biggest causes of death at a young age, aged less than 35 years. In the 1990s about 5 million people worldwide died from trauma, it is estimated that by 2020 trauma deaths will increase to 8 million people worldwide. It is estimated that more than 30% of deaths are due to trauma caused by shock bleeding. References [1, 2] shows that bleeding shock is a poor predictor of outcome in patient trauma. The incidence of hypotension accompanied by bleeding in the prehospital as well as the incidence of arriving at the hospital is associated with complications such as multiorgan and secondary failure such as pneumonia and sepsis [3]. Proper management and therapy in trauma with hemorrhagic shock may reduce complications and improve outcomes [3]. The initial phases of hemorrhagic shock with vasoconstriction response and when shock is prolonged without therapy vasodilatation occurs and will not respond to conventional resuscitation strategies performed.Resuscitation in bleeding patients is one of the challenging aspects of traumatized patient care. Conventional therapy is to provide large amounts of intravenous fluids to maintain circulating homeostasis. In trauma with hemorrhagic shock that is difficult to control fluid administration in large quantities is controversial, fluid administration may exacerbate bleeding as an increase in arterial blood pressure can affect the formation of blood clots or damage the already formed blood clot [4]. Blood loss due to trauma is one form of stimulus that activates the hypothalamo-pituitary-adrenal axis, causing the release of stress hormones such as cortisol and endogenous vasopressin. In some previous studies it is known that vasopressin plays a role in the regulation of blood flow in the condition of shock bleeding and cardiac-pulmonary resuscitation. Vasopressin regulates blood flow from the intestines, muscles and skin to the major organs of the heart and brain, resulting in improved blood flow in vital organs, coronary perfusion pressure, resuscitability and long-term survival [5]. The shock index (SI) is the physiological score obtained from the pulse rate and systolic blood pressure (HR / SBP) ratio. This score is used to determine the stage of trauma and suggests early signs of shock hemorrhage [6]. Several studies related to the relationship between shock index and patient outcome have been done and it is proven that shock index ais useful to predict mortality at 24 h of trauma in patients admitted to emergency departments [7]. The purpose of this study is to find out whether the shock index can be used to determine outcome of trauma patients with bleeding who came to the emergency room Siloam Hospitals Kebon Jeruk.

2. Materials and methods

2.1. Design

This is an observational, retrospective cohort study of trauma patients admitted to the emergency room of the Siloam Hospitals Kebon Jeruk, from January 2013 to November 2017. The variables were evaluated, and the result according to the rate of shock was determined by generating two groups: Group A (SI < 0.8) and Group B (SI > 0.8).

2.2. Inclusion and exclusion criteria

We have included in the study those trauma patients admitted to the institution with shock index taken during admission. We excluded from the study patients severe head trauma with GCS < 8, patients younger than 15

years, patients with history of hypertension, metabolic syndrome, and patients older than 60 years.

2.3. Data collection and statistical analysis

The method used for data collection was direct observational non-participatory. We performed a review of medical records, and then filled a form with epidemiological, clinical and social data. The results obtained in the study were stored and analyzed by a statistical software SPSS version 21; Measures of central tendency and dispersion for continuous variables were calculated. A student t-test was used to compare continuous variables, and Pearson Chi-square was used to compare categorical variables. Statistical significance was defined with a P 0.05.

3. Result and Discussion

The number of patients who met the study criteria to date is as many as 9 patients, consisting of 6 men and 3 women. The mean age of the patients was 34.11 years (34.11 ± 18.43). Based on the mechanism of injury, it was found that 8 patients had blunt trauma and 1 patient had a sharp trauma (stab wound). Recorded vital signs, recorded systolic blood pressure is at least 79 mmHg and a maximum of 202 mmHg (131.8 ± 35.0), diastolic blood pressure of at least 50mmHg and a maximum of 120mmHg (71.6 ± 10.9). The recorded heart rate is 62x / min with a maximum of 120x / min (99.0 ± 20.8).

Table 1: Clinical and sociodemoFigureic characteristics of trauma patients

Variable	n (%)	Min/Max	Mean ± SD
Age (year)	9 (100,0%)	15/66	34,11 ± 18,43
Gender (M/F)	6/3 (66,7%/ 33,3%)	-	-
Type of trauma	8/1 (0,88%/0,11)	-	-
Sistolic Blood Pressure	9(100,0%)		
Diastolic Blood Pressure	9(100,0%)	79/202	131,8 ± 35,0
Heart Rate	9(100,0%)	50/86	71,6 ± 10,9
Shock Index	9(100,0%)	62/120	99,0 ± 20,8
ISS	9(100,0%)	0,46/1,46	0,812 ± 0,3
		12/16	13,81 ± 1.46

Patients performed shock index record (SI) before and after resuscitation at the hour 0 and hour 2. Shock index is the ratio between heart rate with systolic blood pressure. Shock index is a physiological score that can be used to distinguish the severity of the trauma and detect the initial condition of hemorrhagic shock. The listed SI is 0.46 and the maximum is 1.46 (0.812 ± 0.311).

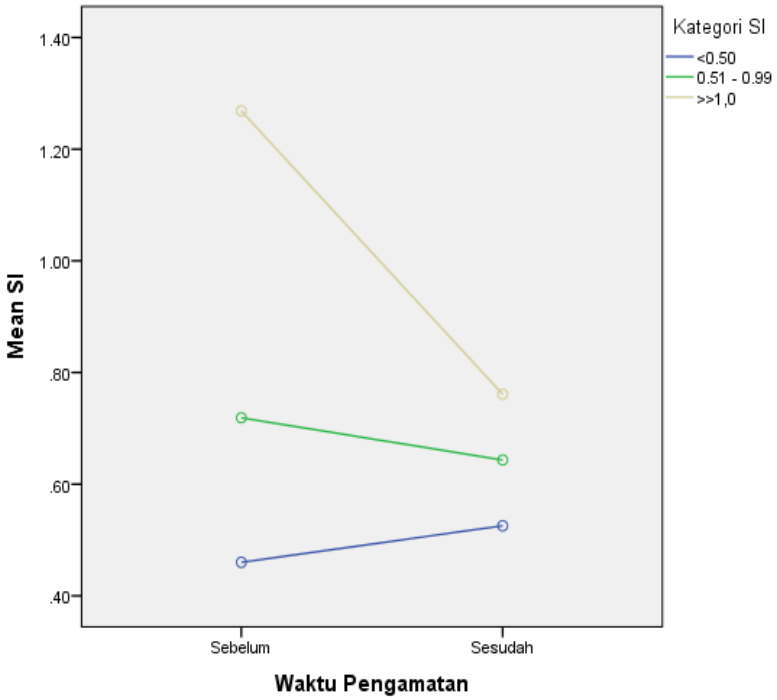

Figure 1: SI change after Resuscitation

Figure 1 shows changes in SI values before and after resuscitation. SI changes depend on SI category before resuscitation. Patients with high SI scores had decreased SI after resuscitation. The higher the value of the previous SI score, the greater the SI decrease.

Table 2: SI change based on initial SI category

SI Category	(Mean±SD) SI			
	Before	After	Difference	
Light	0,64±0,15	0,62±0,13	0,02±0,13	0,736
Severe	1,15±0,28	0,72±0,09	0,43±0,28	0,116

Table 2 indicates SI changes before and after resuscitation. SI values are differentiated into light and heavy, it appears that the changes are not significant.

4. Conclusion

The results showed that there was a change of shock index in trauma patients with different degrees of hemorrhage after resuscitation. The change in shock index depends on the SI type prior to resuscitation. The higher the SI value before resuscitation the greater the SI decrease occurs. The limitations of this study are very small sample quantities so that the results obtained also can not be generalized.

5. Recommendation

Recommendations for conducting further research, with larger sample quantities, so that the results obtained are better.

Reference

[1]. Raab H, Lindner KH, Wenzel V. Preventing cardiac arrest during hemorrhagic shock with vasopressin. Crit Care Med. 2008 Nov;36(11 Suppl):S474-80. PubMed PMID: 20449913.

[2]. Voelckel WG, Raedler C, Wenzel V, Lindner KH, Krismer AC, Schmittinger CA, et al. Arginine vasopressin, but not epinephrine, improves survival in uncontrolled hemorrhagic shock after liver trauma in pigs. Crit Care Med. 2003 Apr;31

[3]. Angele MK, Schneider CP, Chaudry IH. Bench-to-bedside review: latest results in hemorrhagic shock. Critical care. 2008;12

[4]. Sharma RM, Setlur R. Vasopressin in hemorrhagic shock. Anesthesia and analgesia. 2005 Sep;101(3):833-4, table of contents. PubMed PMID: 16116000.

[5]. Westermann I, Dunser MW, Haas T, Jochberger S, Luckner G, Mayr VD, et al. Endogenous vasopressin and copeptin response in multiple trauma patients. Shock. 2007 Dec;28(6):644-9. PubMed PMID: 18092379.

[6]. Gutierrez G, R.H., Wulf-Guetierrez ME 2004. Clinical Review: Hemorrhagic shock. Crit Care, 8, 378-81.

[7]. Montoya, J.D.C. 2015. Shock Index as a mortality predictor inpatients with acute polytrauma. Journal of Acute Disease, 4(3), 202-204.