Advances in Bioresearch
Adv. Biores., Vol 13 (5) September 2022: 156-159

Print ISSN 0976-4585; Online ISSN 2277-1573
Journal's URL:http://www.soeagra.com/abr.html
CODEN: ABRDC3
DOI: 10.15515/abr.0976-4585.13.5.156159

Advances in Bioresearch

ORIGINAL ARTICLE

Assessment of Validity of the SSORTT Score in Predicting Emergency Laparotomy in Blunt Abdominal Trauma Patients

1Mariam Malik, 2Khalid Rehman Yousaf, 3Aamenah Malik, 4*Ambreen Tauseef,5Khalid Javed, 6Adnan Rashid, 7Safdar A. Malik
1Department of Radiology, Consultant Radiologist THQ, Pasrur.
2Department of Radiology, Sir Ganga Ram Hospital, Lahore.
3Professor, Department of Biochemistry, CMH, Lahore Medical College & IOD, Lahore.
4*Professor, Department of Physiology, CMH, Lahore Medical College & IOD, Lahore.
5Department of Radiology, Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore.
6Department of Radiology, Sargodoha, Lahore.
7Professor, Department of Radiology, Alnoor Clinic, Lahore.
***Corresponding Author's** ambertauseef@hotmail.com

ABSTRACT
Trauma is a major reason for human demise and blunt abdominal trauma (BAT) plays a considerable role among these patients. Emergency doctors are faced with a challenge in the initial triage of trauma patients to the operating room. SSORTT (Sonographic Scoring for Operating Room Triage in Trauma) is a recent ultrasound scoring system that timely evaluates patients requiring therapeutic laparotomy among BAT patients. It is a combination of Focused Assessment with Sonography in Trauma (FAST) findings, systolic blood pressure, and pulse rate which together give a score to predict laparotomy.This prospective observational study was conducted at the emergency department of the tertiary care Hospital from May 2018 to May 2019. FAST scan using portable ultrasound machine was performed on all patients meeting inclusion criterion to look for hemoperitoneum. SSORTT score (Range 0 - 6) was determined. These patients were followed for three subsequent days to determine their outcome. This study included 117 patients; M: F ratio was 5:1. Out of 117 patients, 22 cases had emergent laparotomy. We observed sensitivity of 95.2% and specificity of 93.6% with an accuracy of 93.9% for a score of >3 in predicting the need for laparotomy. The positive predictive value was 76.9% and the negative predictive value was 98.9% in this study.SSORTT score of ≥3 appropriately identifies patients needing a therapeutic laparotomy. The use of the SSORTT score can prevent unnecessary emergency laparotomies and investigations like CT scans by alleviating the unwarranted concern of visceral damage and resultant hemoperitoneum.
Keywords: SSORTT Score, *laparotomy, hemoperitoneum*

Received 01.04.2022 Revised 19.07.2022 Accepted 28.09.2022

How to cite this article:
M Malik, K Rehman Yousaf, A Malik, A Tauseef, K Javed, A Rashid, S A. Malik. Assessment of Validity of the SSORTT Score in Predicting Emergency Laparotomy in Blunt Abdominal Trauma Patients. Adv. Biores. Vol 13 [5] September 2022. 156-159

INTRODUCTION

There has been a worldwide rise in deaths accountable to trauma making it the second most common cause of disease load in hospitals. The WHO in the next five years predicts trauma to become the first or second principal cause of loss of productive years [1]. The emergency team is currently faced with the challenge of evaluating trauma patients [2]. Inability to control massive bleeding is responsible for over 50% of trauma-related deaths. Whereas, aggressive management may lead to non-therapeutic laparotomy [3-5]. FAST is useful as the initial diagnostic tool for abdominal trauma to detect intraabdominal fluid [6-8] and it has become an important part of the initial investigation of trauma patients for intraabdominal and intrathoracic fluid collections [9].Hypotensive patients screened in the emergency department with positive FAST findings may be triaged directly to therapeutic laparotomy, depending on the results of the sonographic examination, without the need for CT [10].

In order to better quantify free intraperitoneal fluid, a number of scoring systems exist and those which include the shock state of patients have been proven to be more precise [11]. A recent and different aspect of crisis ultrasonography for quicker triage is the Sonographic Scoring for Operating Room Triage in Trauma (SSORTT score). This score incorporates FAST findings and vitals i.e systolic blood pressure and heart rate and allows the emergency team to reliably predict the need for laparotomy in trauma patients [12]. If the patient is immediately SSORTT scored upon arrival, crucial time can be saved by urgent life-saving interventions. The rationale of this study is to validate this scoring system and establish a cutoff useful in our setting so that SSORTT scoring could be implemented in centers with limited resources. This study aimed to determine the best cutoff and validity of SSORTT score as a prognostic indicator for laparotomy in patients with blunt abdominal trauma (BAT).

MATERIAL AND METHODS

After getting approval from Institutional Review Board, a prospective observational cohort study was conducted on a total of 117 subjects in the emergency department of Services Hospital, Lahore, Pakistan. Written informed consent was obtained for all subjects. All those subjects above 18 years of age were included who presented in the emergency with suspected blunt abdominal trauma (BAT) with bruises, abdominal tenderness, or fractures. However, patients with subcutaneous emphysema, penetrating injuries, known ascites, pregnancy, morbid obesity, and skull and spine injuries were excluded. Later on, the patients who met the selection criteria had their vitals assessed and recorded on a questionnaire. They subsequently had an abdominal scan using a portable machine and their ultrasound score was recorded based on the presence of fluid in one or more than one location. SSORTT score was calculated. These patients were admitted and followed up for 3 days to see how many of them underwent laparotomy.

STATISTICAL ANALYSIS

Data was recorded on proforma and entered by SPSS 25 for analysis. Qualitative data was assessed by using frequencies and percentages. The precision of the SSORTT Score in estimating patients for therapeutic laparotomy was established by evaluating sensitivity, specificity, PPV, NPV of individual SSORTT scores to determine the most suitable cut-off value. ROC curve was applied to determine the diagnostic accuracy of SSORTT score for predicting the need for therapeutic laparotomy.

RESULTS

All those patients who fulfilled the inclusion criteria had abdominal scans using a portable machine and their ultrasound score was recorded based on the presence of fluid in one or more than one location. SSORTT score was calculated (Table.1). These patients were admitted and followed up for 3 days to see how many of them underwent laparotomy.

Parameters	Variables and Points	Total SSORTT Score
Ultrasound score	0 (no free fluid) = 0 point 1(fluid in one location) = 2 points 2(fluid in more than one location or more than 2mm in Morrison's or Douglas pouch) = 3 points	0-6
Pulse	<120 bpm = 0 points > 120bpm = 2 points	
Systolic Blood Pressure	>90 mmHg = 0 point <90mmHg = 1 point	

Table 1: SSORTT scoring criteria

Table *2* shows the number of patients along with their outcomes (laparotomy vs no laparotomy) at individual SSORTT scores. Out of 117 patients, there were 22 laparotomies and 95 patients had nonoperative management. Two patients expired during the course of our study out of which one had a SSORTT score of 3 with retroperitoneal hematoma and the other having SSORTT score of 6 with massive hemoperitoneum and pancreatic head transection. The laparotomy rate in this study was 14% and the mortality rate (Table:3)

laparotomy predictions at various cut-off levels of SSORTT scores. Usually, there is an increase in values of specificity at various cut-off levels of SSORTT scores with an increase in SSORTT score and a decrease in values of sensitivity at the various cut-off levels of the SSORTT score with an increase in score. We observed similar findings in our study.

At SSORTT score 0, sensitivity = 100% and specificity = 0

At SSORTT score 6, sensitivity = 13.6 and specificity = 100

At SSORTT score 0, PPV = 18.8 and NPV = 0

At SSORTT score 6, PPV = 100 and NPV = 83.3

SSORTT cutoff	Specificity	PPV (%)	Sensitivity	NPV(%)	Accuracy
0	0	18.8	100	0	18.8
>1	85.2	61.1	100	100	88
>2	92.6	75	95.4	98 .8	93
>3	95.7	82.6	86.3	96.8	94
>4	97.8	84.6	50	89.4	88.8
>5	98.9	85.7	27.2	85.4	85.4
6	100	100	13.6	83.3	83.3

Table 2: Laparotomy predictions at selected cut-offs

We then calculated the area under the curve of SSORTT score and the AUC (area under curve) was 0.88 indicating the high accuracy of this test.
We observed sensitivity of 86.3%, specificity of 95.7%, and diagnostic accuracy of 94% at cut-off SSORTT score of >3 in reliably predicting the need for laparotomy. The positive predictive value was found to be 82.6% and the negative predictive value of 96.8%. Hence this score was chosen as our cut-off value owing to optimum sensitivity and specificity along with high accuracy. We correlated outcome of patients of our study with cut off SSORTT score 3. The patients with 82.6% of patients with SSORTT score >3 underwent laparotomy while 96.8% patients who had SSORTT score <3 had non operative management. This highlights that SSORTT score >3 reliably predicted the need for therapeutic laparotomy in blunt abdominal trauma patients presenting in the emergency department.

DISCUSSION

This study intends to verify the precision of the SSORTT score i.e., a sum of the ultrasound score, systolic blood pressure, and pulse rate. It works on the principle of combining a hemoperitoneum score with physiologic parameters of blood pressure and pulse rate. SSORTT score had very high accuracy for recognizing patients that required therapeutic laparotomy at SSORTT scores > 3.
Major findings of our study were that sensitivity of the SSORTT score reduces from 100% at 0 to 13.6% at SSORTT score of 6. Specificity gradually increased from 0 at SSORTT score 0 and increased to a maximum of 100% at SSORTT score of 6. At the cutoff SSORTT score >3 we observed an optimum sensitivity of 86.3% and specificity of 95.7% with an accuracy of 94% for identifying the patients that required therapeutic laparotomy. The value for AUC was 0.88 when the ROC curve was plotted.
This study was inconsistent with a study conducted by Musiitwa, Galukande [12] who also concluded that the need for laparotomy increases with an increase in score. In his study, patients with a score ≥of 2 SSORTT had a high probability of requiring an exploratory laparotomy with a sensitivity of 91%, specificity of 90%, PPV 53% NPV of 98%, and area under the curve was 0.94 indicating high accuracy. Similarly, another study carried out by Manka, Moscati [13] concluded that patients with scores of 1or 0 were less likely to require laparotomy with sensitivity and specificity of 89 % and 70% respectively, and positive predictive value of 99% and area under the curve of 0.85. The specificity of the previous study is lower than findings in the current study and possible explanations could be differences in the sample size of this study.
Bobadilla et al in 2014 conducted a study on score SSORTT as a prognostic indicator for laparotomy in patients with abdominal trauma in Bethlehem hospital of Trujillo, Spain. He found the best cutoff value was at SSORTT score of 3 and sensitivity, specificity, positive, and negative predictive values were 87%, 74%, 74%, and 85% respectively [14].
Therefore, relative to the aforementioned publications, our study presents the best cut-off of SSORTT score 3 as an accurate prognostic indicator of the need for laparotomy with an AUC of 0.88 indicating high accuracy.

CONCLUSIONS

This study concluded that SSORTT score has high precision for predicting the need for therapeutic laparotomy. It can result in timely decisions for laparotomy at cut-off scores >3. It is a non-invasive, quick, reproducible, inexpensive test that can be performed easily and reliably in an emergency setup equipped with ultrasound. Routine implementation of SSORTT score is required in the initial clinical assessment and management of BAT patients. Tertiary care community hospitals and rural emergency physicians could use the SSORTT algorithm to make earlier decisions to transfer patients to a trauma center.

REFERENCES

1. Mock CN, Jurkovich GJ, AmonKotei D, et al.: (1998). Trauma mortality patterns in three nations at different economic levels: implications for global trauma system development. . The Journal of trauma. 44:804-12. 10.1097/00005373-199805000-00011.
2. Kirschning T, Brenner F, Stier M, et al.: (2009). Pre-hospital emergency sonography of trauma patients. Der Anaesthesist. 58:51-60. 10.1007/s00101-008-1447-2
3. Simmons JW, Powell MF: (2016). Acute traumatic coagulopathy: pathophysiology and resuscitation. British journal of anaesthesia. 117:31. 10.1093/bja/aew328
4. MacLeod JB, Lynn M, McKenney MG, Cohn SM, Murtha M: (2003). Early coagulopathy predicts mortality in trauma. . The Journal of trauma. 55:39-44. 1097/01.TA.0000075338.21177.EF
5. Maegele M, Lefering R, Yucel N, et al.: (2007). Early coagulopathy in multiple injury: an analysis from the German Trauma Registry on 8724 patients. Injury. 38:298-304. 10.1016/j.injury.2006.10.003.
6. Rozycki GS, Ochsner MG, Jaffin JH, et al.: (1993). Prospective evaluation of surgeons' use of ultrasound in the evaluation of trauma patients. . The Journal of trauma. 34:516-26. 1097/00005373-199304000-00008.
7. Thourani VH, Pettitt BJ, Schmidt JA, et al.: (1998). Validation of surgeon-performed emergency abdominal ultrasonography in pediatric trauma patients. Journal of pediatric surgery. 33:322-8. 1016/s0022-3468(98)90455-9.
8. Shackford SR, Rogers FB, Osler TM, et al.: (1999). Focused abdominal sonogram for trauma: the learning curve of nonradiologist clinicians in detecting hemoperitoneum. . The Journal of trauma. 46:553-62. 1097/00005373-199904000-00003.
9. Nandipati KC, Allamaneni S, Kakarla R, et al.: (2011). Extended focused assessment with sonography for trauma (EFAST) in the diagnosis of pneumothorax: experience at a community based level I trauma center. Injury. 42:511-4. 1016/j.injury.2010.01.105.
10. Lee BC, Ormsby EL, McGahan JP, et al.: (2007). The utility of sonography for the triage of blunt abdominal trauma patients to exploratory laparotomy. AJR American journal of roentgenology. 188:415-21. 10.2214/AJR.05.2100.
11. McKenney KL, McKenney MG, Cohn SM, et al.: (2001). Hemoperitoneum score helps determine need for therapeutic laparotomy. . The Journal of trauma. 50:650-4. 1097/00005373-200104000-00009.
12. Musiitwa PC, Galukande M, Bugeza S, et al.: (2014). Emergency Ultrasound Predicting the Need for Therapeutic Laparotomy among Blunt Abdominal Trauma Patients in a Sub-Saharan African Hospital. Emergency medicine international. :793437. 10.1155/2014/793437.
13. Manka M, Moscati R, Raghavendran K, Priya A: (2010). Sonographic scoring for operating room triage in trauma. . The western journal of emergency medicine. 11:138-43.
14. Bobadilla Reyes CL: (2014). Ssortt score as a prognostic indicator of laparotomy in patients with blunt abdominal trauma at the Belén de Trujillo hospital [Undergraduate]: Antenor Orrego Private University -. UPAO.