

ASSESSMENT OF BATSS (BLUNT ABDOMINAL TRAUMA SCORING SYSTEM) IN PATIENTS OF BLUNT ABDOMINAL TRAUMA

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Abstract

The objective of the study is to apply Blunt Abdominal Trauma Scoring System (BATSS) to all patients of polytrauma and to evaluate its role in planning management and predicting outcome of patients with blunt abdominal trauma. An observational study was undertaken applying BATSS to polytrauma patients, visiting the Emergency department at Himalayan Institute of Medical Sciences, over a period of 12 months (January 2018 to December 2018) and then recording management protocol done for the patients with blunt abdominal trauma. Outcome assessment was done at 72 hours. The study included 95 patients of which 46% were in the age group of 20-40 years and 84% were males. The most common mechanism of trauma was road traffic accidents (67%) followed by fall from height. Specific organ injuries were found in 59% of the cases and of all the organ injuries recorded, 38% were injuries to the liver and 34% to the spleen. BATSS was applied to all patients and 57% patients fell in the high-risk category, 4% in moderate risk and 39% in the low risk category. Overall, 21% of all the cases underwent operative management while 79% were managed non-operatively. Among the high-risk category patients, 65% were managed with non-operative management and no mortality was recorded in these cases. BATSS was found to be a useful tool for clinical grading of trauma patients in the emergency department but was not found adequate for deciding management or predicting outcome of patients with blunt abdominal trauma in this study cohort.

Keywords: BATSS, abdominal trauma, non-operative management

Introduction

Trauma related injury is one of the major causes of deaths in India and worldwide. According to the World Health Organization (WHO), more than 5 million people die annually as a result of injury due to incidents, such as road traffic accidents, falls, etc. [1]. The Ministry of Road Transport and Highways in India reported 4,64,910 road traffic accidents in the year 2017 and recorded 1,47,913 fatalities because of the same [2]. The primary factors for mortality in

cases of blunt abdominal trauma are hemorrhage and sepsis [3]. Most deaths in early cases of blunt abdominal trauma (BAT) are due to hemorrhage. Blood in the abdomen can be clinically inconspicuous due to sequestration within the peritoneal cavity [4]. It is therefore essential to carry out thorough clinical examinations serially accompanied by radiological investigations.

Assessment of trauma needs a score which is rapid, cost effective, reliable and can be easily executed. None of the existing scores have been validated to be of gold standard and are used

based on the specifics of the center concerned. To date, Computed Tomography (CT) scan is the gold standard for assessing BAT.

In a recently published study, Shajoe et al, 2014 [5] have reported a new 24-point scoring system called Blunt Abdominal Trauma Scoring System (BATSS) for intra-abdominal injury diagnosis after blunt trauma, which was developed by evaluating 261 trauma patients presenting to two Level 1 trauma centers in Tehran, Iran.

Patients were divided into low (score <8), moderate ($8 \leq \text{score} < 12$) and high risk (score ≥ 12). The study suggested that the patients in high risk category needed immediate laparotomy, moderate group needed further assessment and low risk group had to be kept under observation. The present study was undertaken to determine the effectiveness of BATSS as a scoring system and assess its role in planning management and predicting outcome of patients with BAT in polytrauma cases at our center.

Materials and Methods

This observational prospective study was conducted in polytrauma patients with blunt abdominal trauma visiting the emergency department of the Himalayan Institute of Medical Sciences, Dehradun over a period of 12 months (January 2018 to December 2018).

Cases of penetrating abdominal trauma, pregnant women with gestational age more than 3 months, age less than 18 years and patients on warfarin or those with GCS < 13 were excluded.

The following protocol was followed for all patients after initial resuscitation based on ATLS guidelines (Figure 1).

Statistical analysis was performed by the SPSS program for Windows, version 17.0. Continuous variables are presented as mean \pm SD, and categorical variables are presented as absolute numbers and percentage. Data were checked for normality before statistical analysis and categorical variables were analyzed using the chi square test. For all statistical tests, a p value less than 0.05 was taken to indicate a significant difference.

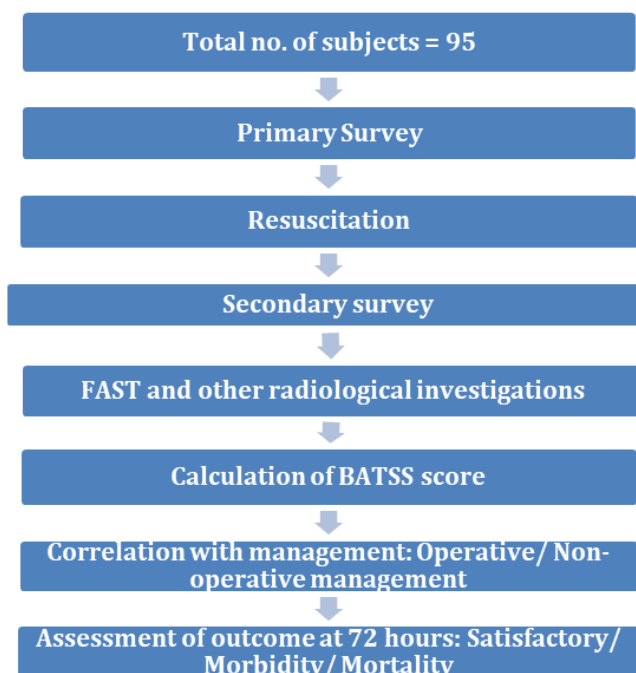


Figure 1 – Study protocol followed for subjects

Results

A total of 95 subjects were recruited for the study after obtaining written informed consent and BATSS was applied at the time of presentation. The study was approved by the institutional ethics committee (SRHU/HIMS/ETHICS/2019/57). The subjects were divided into 3 groups based on the risk stratification as per BATSS – 54 out of 95 patients (57%) were found to be in high risk category, 4 out of 95 patients (4%) were found to be in moderate risk category and 37 out of 95 (39%) were found to be in low risk category (Figure 2).

The management done for the subjects was recorded; – operative and non-operative management and outcome was assessed at 72 hours; - satisfactory, morbidity, mortality. Majority of the recruited subjects (46%) were found in the age group of 20-40 years and predominantly males (84%). The mean age was 40.57 years.

Most cases (67%) were due to Road traffic accidents. Other recorded causes include fall from height (FFH), assault and other (including animal mauling, electrocution or fall of a heavy object over the abdomen).

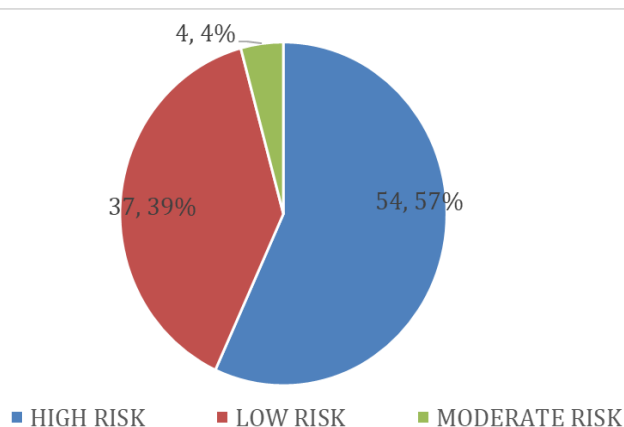


Figure 2 – Distribution of subjects into high, moderate and low risk categories based on application of BATSS (N=95)

Specific organ injuries were found in 56 instances and these were categorized based on the injured organ. Some cases revealed injury to more than one organ in the same patient and were recorded as 2 separate entities.

All 12 of bowel injury cases were taken up for surgery without further investigations. Out of the 44 cases with solid organ injury, only 5 patients did not undergo a CT scan of the abdomen. The other 39 cases were graded based on the AAST (American Association for the Surgery of Trauma) score based on CT scans (Table 1).

AAST Grade	I	II	III	IV	V	VI	Total
Organ injured							
Liver	1	5	6	6	0	0	18
Spleen	0	2	11	1	3	0	17
Pancreas	0	0	1	1	1	0	3
Kidney	0	1	0	0	0	0	1

Table 1 – AAST scores of various organ injuries recorded in the study based on CT scan results (N=39)

Out of the 5 patients who did not undergo CT scanning, 3 were suspected to have liver injury based on USG abdomen and 2 were found to have splenic injury.

Persistent hemodynamic instability despite resuscitation, hollow viscus injury and a high clinical suspicion remained the deciding factors for operative intervention which was done in 20 patients.

Conservative or non-operative management was done for 65% (35 out of 54) of the patients

falling under high-risk category who were otherwise declared under the operative category as per the BATSS Score.

Satisfactory outcome was seen in 32 out of 35 patients managed non-operatively despite a high-risk category score (Figure 3). Three patients managed non-operatively showed morbidity while no mortality was reported in non-operative management cases.

Satisfactory outcome was seen in 13 out of 19 operated patients while morbidity was noted in 4 cases and mortality in 2.

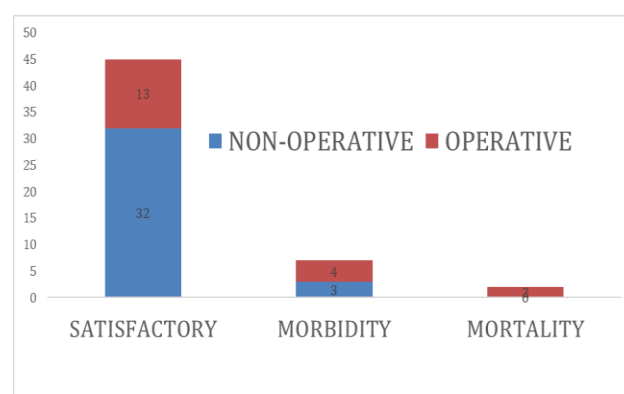


Figure 3 – Distribution of subjects to assess outcome of patients under high risk category who were managed with either operative or non-operative management (N= 54)

Out of the 4 patients in moderate risk category, 3 were managed conservatively while 1 was operated. Of the 3 patients managed non-operatively, 2 showed satisfactory results while 1 had morbidity. The one case which was managed surgically showed morbidity and no mortality was observed.

All 37 patients under low risk category were managed conservatively, which was in sync with what the score suggests. One patient in low risk category showed mortality while 3 showed morbidity. The patients, 33 out of 37, managed non-operatively showed satisfactory outcome.

A significant correlation was observed between the chosen management option and the risk stratification as given by BATSS, using Chi square test ($p < 0.001$) (Table 2). It suggested that a non-operative approach was the preferred management choice for patients even for cases with a high-risk stratification.

	Non-operative	Operative	Total	p value
High risk	35 (64.81%)	19 (35.18%)	54 (100%)	<0.001
Moderate risk	3 (75%)	1 (25%)	4 (100%)	
Low risk	37 (100%)	0 (0.0%)	37 (100%)	

Table 2 – Correlation between high, moderate and low risk stratification on application of BATSS and operative or non-operative management (N=95)

The relation between outcomes of the subjects and their respective risk stratification as given by the BATSS score was assessed and found to be

insignificant (Table 3). This suggests that BATSS played little role in predicting the outcome of the subjects.

	Satisfactory	Morbidity	Mortality	Total	p value
High risk	45 (83.33%)	7 (12.96%)	2 (3.70%)	54 (100%)	0.207
Moderate risk	2 (50%)	2 (50%)	0 (0.0%)	4 (100%)	
Low risk	33 (89)	3	1	37 (100%)	

Table 3 – Correlation between high, moderate and low risk stratification on application of BATSS and outcome at 72 hours (N=95)

The total number of subjects with a satisfactory, morbidity and mortality outcome were 80 (84.21%), 12 (12.63%) and 3 (3.16%) respectively; these were then analyzed retrospectively and their association with BATSS was studied.

The 80 subjects who showed satisfactory outcome in the study were divided into 2 groups, those who underwent non-operative management

and those who underwent operative management. These 2 groups were then separately studied and their BATSS scores were correlated using chi square test; this showed a significant p value (0.002) (Table 4). This augments the finding that non-operative management showed successful outcome in patients of all the 3 risk categories and had better outcome overall.

	High risk	Moderate risk	Low risk	Total	p value
Non-operative	32 (47.76%)	2 (2.99%)	33 (49.25%)	67 (100%)	0.002
Operative	13 (100%)	0 (0.0%)	0 (0.0%)	13 (100%)	

Table 4 – Correlation between operative and non-operative management and the risk stratification into high, moderate and low risk as given by BATSS application in cases which showed satisfactory outcome at 72 hours (N=80)

Discussions

Trauma is a subject gaining tremendous attention in the present day in developing as well as developed nations. Blunt abdominal trauma is an entity which is difficult to diagnose and manage because of its conspicuous nature when compared with penetrating injuries. The 95 subjects of polytrauma recruited herein were mostly males, between the age group of 20-40 years. Most of the cases were due to road traffic accidents. Similar demographic patterns have earlier been noted in Indian [6] and International studies [7].

Spleen and liver were found to be the most commonly injured organs in the polytrauma patients in our study and most of these had

injuries had an AAST grade of III or above. Similar trends were found in the study by Tinkoff et al done based on the National Trauma Data Bank in USA [8] and in the study by Nishijima et al [9].

A significant correlation was observed by us between the chosen management option and the risk stratification as per BATSS, which suggested that non-operative management was the preferred option even for patients under high risk category.

Further, the findings of our study suggested that the BATSS was not effective in predicting the outcome of this study group of polytrauma patients when compared with their respective risk category as per BATSS.

Among the 80 subjects with satisfactory outcomes at 72 hours, further categorized into non-operative and operative groups; it was found that, while all cases in the operative group had a high-risk score; 32 (47.76%) subjects who had a high-risk score underwent non-operative management.

The satisfactory outcome observed in these 32 patients even with non-operative management, thereby avoiding an unwarranted surgical procedure, suggests that a non-operative approach was the preferred management choice for patients, even those with a high-risk stratification by the BATSS.

Furthermore, we did not observe any significant morbidity or mortality associated with cases having a high-risk score that were managed with a non-operative approach.

This shift in management trend towards the non-operative approach is supported by the findings of various studies including the likes of a study by Okus et al [10] which found a success rate of 86.3% with non-operative management.

In this study, we monitored polytrauma patients from the time of presentation until 72 hours and also recorded the cases failed due to the chosen management protocol; however, the associated complications were not addressed and is a limitation. Osler et al [11] identified a list of 82 different complications which contributed significantly to mortality in trauma patients and suggested that if all complications were eliminated, then two-thirds of deaths could be prevented.

A study conducted by Chaudhry et al [13] showed that post-complications in trauma in Indian patients included a high wound infection rate (50-500%), intra-abdominal abscess (25-8%), enterocutaneous fistula (20-25%) and abdominal hypertension (20%) [12].

Our study found that non-operative management showed successful results overall. Non-operative management was also effective in patients graded as high risk according to BATSS. Operative intervention was justified only in cases of hollow viscus injuries and in patients who remained hemodynamically unstable despite resuscitation. We observed that solid organ injuries even with a high AAST grade on CT imaging could be managed successfully with non-operative management. Morbidity and mortality could not solely be assessed based on

the risk stratification given by BATSS or based on AAST grade of solid organ injuries. Morbidities were noted primarily in cases who needed prolonged ventilator support due to poor chest condition and in those needing continued inotropic support after surgery.

Another limitation of this study is that being an observational study, a precise comparison between groups managed operatively and non-operatively could not be done. Also, the post-trauma and post-operative complications in the patients could not be assessed due to lack of a follow up design due to time constraints.

Despite the drawbacks, our study identified very low rates of morbidity and mortality in the study subjects which indicates a good trauma protocol at our center. The study found the increasing use of non-operative management which is the current trend based on evidence-based studies done by other Indian and international groups

Conclusion

To conclude, the Blunt Abdominal Trauma Scoring System (BATSS) was found to be an effective tool for clinical grading of trauma patients admitted to the emergency department of our center. The BATSS however was found to be of little value in correlating management protocols and predicting outcome of patients with blunt abdominal trauma.

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