Section: Emergency Medicine

Original Research Article

CLINICAL ABDOMINAL SCORING SYSTEM (CASS) AND BLUNT ABDOMINAL TRAUMA SCORING SYSTEM (BATSS) IN PREDICTING THE NEED OF LAPAROTOMY IN ADULTS WITH BLUNT ABDOMINAL TRAUMA

Kalyan Borah[1], Nibir Nath Sarma[2], Rupjyoti Das[3], Jahnabi Das[4]

[1]*Assistant Professor, Department of Emergency Medicine, Tinsukia Medical College, Makum, District Tinsukia, Assam, India.*
[2]*Assistant Professor, Department of Community Medicine, Nagaon Medical College, Assam, India.*
[3]*Assistant Professor, Department of Medicine, Tinsukia Medical College, Makum, District Tinsukia, Assam, India.*
[4]*Assistant Professor, Department of Community Medicine, Gauhati Medical College, Bhangagarh, Guwahati, Assam, India.*

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Corresponding Author:
Dr. Jahnabi Das,
Assistant Professor, Gauhati Medical College, Bhangagarh, Guwahati, Assam, India.
Email: jahnbi@gmail.com

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ABSTRACT

Background: Blunt abdominal trauma (BAT) is a major contributor to morbidity and mortality, particularly among young adults involved in road traffic accidents. Early identification of patients requiring laparotomy remains a challenge, especially in resource-limited settings where advanced imaging may not be readily available. Clinical scoring systems such as the Clinical Abdominal Scoring System (CASS) and Blunt Abdominal Trauma Scoring System (BATSS) may aid in rapid assessment and decision-making. The objective is to evaluate and compare the effectiveness of CASS and BATSS in predicting the need for laparotomy in adult patients with blunt abdominal trauma.

Materials and Methods: A prospective observational analytical study was conducted in the Department of Emergency Medicine, Gauhati Medical College and Hospital, Guwahati, from July 2020 to June 2021. Fifty-two adult patients with blunt abdominal trauma were included after applying inclusion and exclusion criteria. Clinical evaluation, FAST examination, radiological investigations, and scoring using CASS and BATSS were performed for all patients. Patients were categorized into low-, medium-, and high-risk groups based on respective scoring criteria.

Results: The majority of patients were males (84.6%) and belonged to the 21–30 years age group (48.1%), with a mean age of 32.84 ± 11.85 years. Road traffic accidents were the most common mode of injury (57.7%). According to CASS, 59.6% patients were classified as low risk, 19.2% as medium risk, and 21.2% as high risk. BATSS categorized 55.8% patients as low risk, 13.5% as medium risk, and 30.8% as high risk. BATSS identified a comparatively greater proportion of patients in the high-risk category than CASS. Both scoring systems effectively stratified patients according to severity and clinical risk.

Conclusion: Both CASS and BATSS are useful and practical tools for early assessment and risk stratification in blunt abdominal trauma. BATSS demonstrated a greater tendency to identify high-risk patients, suggesting better utility in recognizing severe cases requiring urgent surgical intervention.

Keywords: Blunt abdominal trauma, Clinical Abdominal Scoring System, CASS, Blunt Abdominal Trauma Scoring System, BATSS, Laparotomy.

INTRODUCTION

Trauma is a leading cause of death around the world, especially in younger population.[1] Among all traumas abdominal trauma ranks third in prevalence after head and chest trauma. Majority of abdominal traumas are due to blunt abdominal trauma (BAT). Blunt abdominal trauma is injury to intra-abdominal or retroperitoneal viscera as a result of a non- penetrating force. It is commonly due to rapid deceleration or acceleration in combination with shearing and rotational forces.[2,3] The main causes of BAT are motor vehicle accidents, direct blow to abdomen and fall from heights.[4] Because of industrialization and developing urban population there is increase in incidence of abdominal trauma.[5] Reports show that more than 50% of mortalities due to vehicular accident led BAT are preventable. Precise management and in time laparotomy help in reducing mortality.[4] Proper evaluation of the patients guides the surgeon for on time surgical intervention. Focused abdominal Sonography in Trauma (FAST) is used for such evaluation. Since the ability of FAST in determining necessity of laparotomy at times cannot be determined and the fact that emergency sonography is not always available (especially in developing countries), there is an essential need for a rapid evaluating method to define patients requiring a laparotomy on clinical signs.[6]

The diagnostic approach for abdominal injuries is influenced by many factors, includes the mechanism of injury, the patient's hemodynamic and neurologic status and associated injuries. Approximately 25% of all blunt abdominal trauma victims will require abdominal exploration. Blunt abdominal trauma is usually not obvious so often missed unless repeatedly looked for.[7]

A new scoring system by Afifi, clinical abdominal scoring system (CASS) based upon clinical signs and time of presentation after trauma, has been found useful in predicting the need for laparotomy.[8] Similarly Shojaee M. et al9 gives a 24-point blunt abdominal trauma scoring system (BATSS) was developed based on sums obtained from each factor, this system furnishes a high precision and reproducible diagnostic tool for BAT detection.[9]

Objectives: To determine CASS and BATSS in each patient.

MATERIALS AND METHODS

The study was carried out in the department of Emergency Medicine of Gauhati Medical College and hospital (GMCH), Guwahati after proper clearance taken from the institutional ethical committee.Patients presenting with blunt abdominal trauma in the department of Emergency Medicine during the study period were included in the study after implementation of the inclusion and exclusion criteria.The Study was a Prospective observational analytical study carried out during a period of one year from July 2020 to June 2021.

Following criteria were applied

Inclusion criteria

All adult Patients Age > or =18 yrs with blunt abdominal trauma coming to the department of Emergency Medicine, GMCH

Exclusion criteria

1. Pregnant patients
2. Patients with co morbidities
3. Patients who left in between the treatment
4. Patients attending emergency department who were already operated outside for BAT and now attending emergency department.

Data Collection

A proforma (as outlined in annexure) is prepared to include all relevant data from history, physical examination, investigations and outcomes for every patient included in the study.On arrival to the emergency department, the primary survey was done and the patients were examined for ABCDE i.e airway, breathing, circulation, disability, exposure.After initial resuscitation and achieving, hemodynamic stability, all patients were subjected to careful examination, depending on the clinical findings, the clinical abdominal scoring system score (CASS) was calculated. All patients underwent the FAST ultrasound and plain radiograph of chest, x-ray pelvis and Blunt abdominal trauma scoring system (BATSS) is calculated then.Decision was taken for further investigations and CT scan if the patient is stable.If patient is hemodynamic unstable, the patient is resuscitated and planned for emergency surgery, if operated patient is excluded from study.The data collected was put on a Performa specially prepared for this study and analyzed the data to determine which scoring system is better in predicting the need of laparotomy.

RESULTS

In our study, majority of the patients belonged to the age group of 21 to 30 years i.e. 25 cases (48.8%), followed by age group 31-40, i.e. 13 cases (25%). Least common patients (1.92%) were in the age group of 60 years and above. The age range in the study was 18 to 80 years. The mean age was 32.84 years with a standard deviation of 11.852.

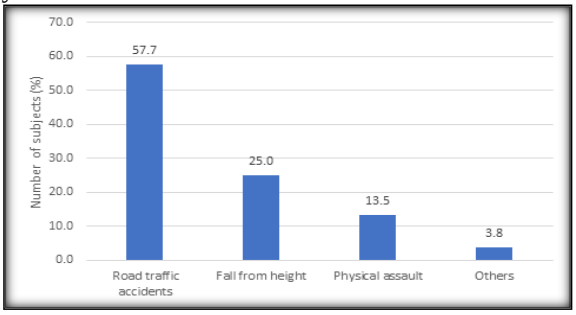

Figure 1: Distribution according to mode of injury

Mode of injury was road traffic accident in 30(57.69%) patients, fall from height in 13(25%), physical assault in 7 (13.46%) and other modes in 2 (3.85%) patients.

Table 1: Distribution according to age and gender

Age group in years	Number of subjects	Percentages
18-20	3	5.8
21-30	25	48.1
31-40	13	25.0
41-50	6	11.5
51-60	3	5.8
61-70	1	1.9
Above 70	1	1.9
Gender		
Male	44	84.6
Female	8	15.4

Table 2: Frequency distribution of CASS and BATSS

Cass	No. of Patients	Percentage
Low Risk (Upto 8)	31	59.62
Medium Risk (9 To 11)	10	19.23
High Risk (12 And Above)	11	21.15
Total	52	100.00
Batss	No. of Patients	Percentage
Low Risk (Less Than 8)	29	55.77
Medium Risk (8 To 11)	7	13.46
High Risk (12 And Above)	16	30.77
Total	52	100.00

In our study the range of value obtained for CASS is from 5 to 15, and for BATSS is 0-24. With regards to CASS patients were categorized into three groups low risk (upto 8), medium risk (9 to 11) and high risk (12 and above) based upon the risk profile of the patients. Similarly, with regards to BATSS patients were categorized into three groups low risk (less than 8), medium risk (8 to 11) and high risk (12 and above)

Frequency Distribution of Cass

According to pattern of score distribution patients were group into three categories low risk group (upto 8), medium risk (9-11) and high risk (12 and above) this is adopted from Afifi RY.[8]In our study of 52 patients 31 (59.6 %) patients had score upto 8 belongs to low risk group, 10(19.2 %) patients had score between (9-11) belongs to medium risk group and 11 (21.2%) patients score 12 and above belongs to high risk group.

Frequency Distribution of Batss

Similarly in BATSS, patients were group into three categories Low risk group (less than 8), medium risk (8-11) and high risk (12 and above) this is adopted from Shojaee M et al,[9]In our study of 52 patients 29 (55.8 %) patients had scoreless than 8 belongs to low risk group, 7(13.5 %) patients had score between (8-11) belongs to medium risk group and 16 (30.8%) patients score 12 and above belongs to high risk group.

Table 3: Age wise distribution of cases in BATSS and CASS group

Bats Group	18-20	21-30	31-40	41-50	51-60	61-70	71andabove
Low risk(Less than 8)	1	17	3	4	2	1	1
Medium risk(8 to11)	0	1	4	1	1	0	0
High risk(12 and above)	2	7	6	1	0	0	0
Total	3	25	13	6	3	1	1
P value 0.096							
Cass group	18-20	21-30	31-40	41-50	51-60	61-70	71andAbove
Low risk(Upto8)	1	17	3	5	3	1	1
Medium risk(9to11)	1	2	7	0	0	0	0
High risk(12 and above)	1	6	3	1	0	0	0
Total	3	25	13	6	3	1	1
Pvalue0.014							

In CASS low risk group out of 31 majority of 17 patients belongs to age group 21-30 followed by 5 in age group 41-50, 3 in age group 31-40,51-60. whereas only 1 patient belongs to age group 18-20, 61-70 and 71 and above. In medium risk out of 10 patients 7 patients belong to age group 31-40 only 2 patients in age group 21-30, 1 in age group 18-20. In high-risk group out of 11 patients 6 belongs to age group 21-30, 3 in 31-40, 1 in each 18-20, 41-50.

In BATSS low risk group out of 29 patients maximum of 17 patients belongs to 21-30 age group followed by 4 in 41-50, 3 in 31-40, 2 in 51-60, whereas only 1 patient belongs to age group 18-20, 61-70 and 71 and above. In medium risk out of 7 patients 4 patients belong to age group 31-40, only 1

patient belongs to age group 21-30, 41-50, 51-60. In high-risk group out of 16 patients 7 belongs to age group 21-30, 6 belongs to age group 31-40, 2 belongs to 18-20 and only 1 patient in age group 41-50.

Table 4: Mode of Injury Distribution in Relation To CASS and BATSS Group.

Cass Group	Fall From Height	Physical Assault	Road Traffic Accidents	Others	Total
Low Risk (Upto 8)	10	5	14	2	31
Medium Risk (9 To 11)	1	0	9	0	10
High Risk (12 And Above)	2	2	7	0	11
Total	13	7	30	2	52
P Value 0.275					
Batss Group	Fall From Height	Physical Assault	Road Traffic Accidents	Others	Total
Low Risk (Upto 8)	10	5	12	2	29
Medium Risk (9 To 11)	1	0	6	0	7
High Risk (12 And Above)	2	2	12	0	16
Total	13	7	20	2	52
P Value 0.275					

In our study most common mode of injury was road traffic accident in 30 (57.69%) patients of which 14 patients belong to low-risk group, 9 belongs to medium risk and 7 belongs to high-risk group.Second most common mode is fall from height in 13(25%),of which 10 patients belong to low risk 1 belongs to medium and 2 high risk group.Third most common is physical assault in 7 (13.46%) of which 5 patients belong to low risk and 2 patients in high-risk group and 2 (3.85%) patients had other mode of injury both belongs to low-risk group.

In our study most common mode of injury was road traffic accident in 30(57.69%) patients of which 12 patients belong to low-risk group, 6 belongs to medium risk and 12 belongs to high-risk group. Second most common mode is fall from height in 13(25%),of which 10 patients belong to low risk 1 belongs to medium and 2 high risk group. Third most common is physical assault in 7 (13.46%) of which 5 patients belong to low risk and 2 patients in high-risk group and 2 (3.85%) patients had other mode of injury both belongs to low-risk group.

DISCUSSION

In our study majority of the patients belonged to the age group of 21 to 30 years, i.e. 25 cases (48.8%). The age range in the study was 18 to 80 years. The mean age was 32.84 ± 11.852. Similar study conducted by Mehta N et al10 also found most common age group was 21–30 years, with a mean age of 25 years. Singh SP et al,[11] found most common age group was 21–30 years and mean age of 25.1 years. According to Amutha J et al,[12] the most common age group was 21–30 years and mean age was 39. Study by Rahman S et al,[13] also reported the most common age group as 21–30 years with a mean age of 30.82 years. Agarwal C et al,[14] found the most common age group was 21–30 years with a mean age of 34.20 years.These data are well comparable to the observations made by others and is tabulated below. [Table 1]

In our study, the majority of the patients were male 44 (84.62%), whereas females were fewer in number 8 (15.38%), with a male to female (M:F) ratio of 5.5:1. These data are well comparable to the observations made by others and are tabulated below. Study conducted by Mehta N et al,[10] found 56 males and 15 females with an M:F ratio of 3.7:1. Study conducted by Aziz A et al,[15] found 41 males and 9 females with an M:F ratio of 4.5:1. Singh SP et al,[11] found 75 males and 25 females with an M:F ratio of 3:1. Umare GM et al,[16] and Agarwal C et al,[15] found similar results of 42 males and 8 females with an M:F ratio of 1:0.19 in their study population. [Table 1]

In our study, Road Traffic Accidents (RTA) were the most common cause of Blunt Abdominal Trauma (BAT), accounting for 30 (57.69%) cases, followed by fall from height 13 (25%), physical assault 7 (13.46%), and other mechanisms 2 (3.85%).

Similar observations were also found in the studies conducted by Mehta N et al,[10] Singh SP et al,[11]Amuthan J et al,[12]Ramachandra M et al,[17]Shukla S et al,[18] and Bhandari V et al,[19] where road traffic accidents were found to be the most common cause of blunt abdominal trauma.

CONCLUSION

The present study was conducted to determine and evaluate CASS and BATSS scoring systems in patients with blunt abdominal trauma. The study population predominantly comprised young adults, with the majority belonging to the 21–30 years age group (48.8%), and a mean age of 32.84 ± 11.852 years, indicating that trauma is more common in the active productive age group.

Both scoring systems demonstrated a wide range of values, with CASS ranging from 5 to 15 and BATSS from 0 to 24, allowing effective categorization of patients into low, medium, and high-risk groups. In the present study, the majority of patients were classified into the low-risk category by both scoring systems (CASS: 59.6%, BATSS: 55.8%), followed by high-risk and medium-risk groups. However, BATSS identified a comparatively higher proportion of patients in the high-risk group (30.8%) than CASS (21.2%),

suggesting a tendency of BATSS to classify more patients as high risk.

Age-wise distribution across risk categories revealed that the 21–30 years age group consistently constituted the majority in both scoring systems, across low, medium, and high-risk categories, indicating a strong association between younger age and higher incidence of trauma as well as severity.

With respect to the mode of injury, road traffic accidents were the most common cause (57.69%) in both scoring systems, followed by fall from height and physical assault. A considerable proportion of patients with road traffic accidents were distributed across all risk categories, including high-risk groups, highlighting the severity associated with this mode of injury.

Overall, both CASS and BATSS were found to be useful and practical scoring systems for risk stratification in blunt abdominal trauma patients. While CASS classified a greater number of patients into the low-risk group, BATSS identified a higher proportion of high-risk patients, indicating its potential utility in identifying more severe cases.

Thus, both scoring systems are effective tools for initial assessment and categorization of patients, aiding in clinical decision-making and prioritization of management in blunt abdominal trauma.

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