

A NOVEL ABDOMINAL SCORING SYSTEM FOR THE MANAGEMENT OF PATIENTS WITH BLUNT TRAUMA ABDOMEN... AN EXPERIENCE IN RURAL BASED TERTIARY CARE CENTRE



General Surgery

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ABSTRACT

Background: Trauma is one of the leading cause for morbidity and mortality. The most common is abdominal injury followed by extremities and head injury. Early diagnosis and timely intervention reduces the mortality by upto 50%. The common causes for blunt trauma abdomen(BTA) includes motor vehicle crashes, direct trauma and fall from heights

Objectives: (a) To score all the patients with blunt trauma abdomen with Clinical Abdominal Scoring System (CASS). (b) To compare the score of clinical abdominal scoring system with USG/CT abdomen and pelvis findings in patients of blunt trauma abdomen.

Methods: Patients suspected to have blunt trauma abdomen were scored using CASS and radiological investigations were done in the ED. The decision to proceed with the surgery would be taken if the patient had CASS>12 and/or if the radiological investigation shows features of blunt trauma abdomen like air under diaphragm or grade IV/V solid organ injury.

Results: Males were predominantly involved constituting around 81% and the rest being females with 19%. Most common age group involved in is 21-30years. Most common mode of injury was found to be RTA. Most common injured organs are spleen>liver>small intestine (ileum). The CASS have specificity of 84.62%, sensitivity of 99.2%, PPV-33.3%, NPV-100%. Total mortality in the study was 7.1%

Conclusion: Most of the patients who had CASS <11 but hemodynamically stable can be managed conservatively. Patients with CASS of >12 are the potential candidates for the surgery. Thus use of CASS not only helps in timely intervention with better outcome but can be proved to be beneficial for community health centre where a duty doctor can take immediate decision for referring the case without any undue delay.

KEYWORDS

CASS, blunt trauma abdomen, USG abdomen and pelvis.

INTRODUCTION

Trauma is the leading cause for the mortality and morbidity encountered in routine practice. Abdominal injury is common after extremities and head injury^[1]. Early diagnosis and timely intervention can reduce mortality by upto 50%. Few common causes includes motor vehicle crashes, direct trauma and fall from heights.^[2]

The reason for the increase in abdominal trauma are industrialization and rapid development of the rural area thus rapid and timely evaluations plays significant role in the management^[3]. Similarly early diagnosis of bull gore injuries which are common in the rural area, will improve the outcome^[4]. Reports showed that mortalities secondary to BTA can be prevented by more than 50% with timely intervention^[5].

Imaging along with others means of investigation plays a vital role in arriving at a precise diagnosis in most of the cases^[6,7]. However, non-availability of sophisticated investigations with lack of experienced radiologist may be limiting factors in arriving at a timely precise diagnosis^[8,9]. This explains the utmost need for an accurate and handy method for evaluation of such patients who require further surgical interventions. In this study, effectiveness of clinical abdominal scoring system in relation to the radiological investigation will be assessed in the management of patients with blunt trauma abdomen.

In a referral centre like R.L JALAPPA hospital which is rural based and on a highway where abdominal trauma cases are encountered and patients belonging to low socioeconomic status, this clinical abdominal scoring system (CASS) will be useful in timely diagnosis and assessment of severity of blunt trauma abdomen.

Clinical abdominal scoring system (CASS)

Item	Score
1)Time of presentation after the trauma	
Less than 2 h	1
2-6 h	2
More than 6 h	3
2)Pulse rate	
Less than 90 beats/min	1
90-110 beats/min	2
More than 110 beats/min	3
3)Systolic blood pressure	
Above 120 mm Hg	1

90-120 mm Hg	2
Less than 90 mmHg	3
4)Glasgow coma scale (GCS)	
13-15	1
9-12	
Less than 9	3
5)Abdominal clinical findings	
Abdominal pain	1
Guarding 2	
Abdominal rigidity and tenderness	3

Total score range: 5-15.

Patients with score of 12 or above are subjected to immediate laparotomy.

Patients with score of 9-11 are subjected to auxiliary investigations such as CT scanning and USG.

Patients with score of 8 and below are subjected to clinical observation with no auxiliary investigations up every 2 months for 6 months

OBJECTVES OF THE STUDY

- To score all the patients with blunt trauma abdomen with Clinical Abdominal Scoring System(CASS)
- To compare the score of clinical abdominal scoring system with USG/CT abdomen and pelvis findings in patients of blunt trauma abdomen.

MATERIALS AND METHODS

All patients with BTA treated in the Department of General Surgery of R.L. JALAPPA Hospital between the study period of December 2017 and June 2019 were included in the study. The sample size of the study was 242 patients and the duration of the study was 18 months. The inclusion criteria includes: all patient of age group 18-70 years, patients with undisplaced pelvic fractures, rib fractures with pneumothorax, Patients with peritonitis secondary to hollow viscous injury following trauma, patients with solid organ injury. Patient with BTA associated with severe thoracic injury and pregnant women were excluded from the study.

METHOD OF COLLECTION OF DATA:

All patients who are suspected to have blunt trauma abdomen were

scored using CASS and USG abdomen was done in the ED of R L Jalappa Hospital. The decision to proceed with the surgery was taken if the patient had CASS score of more than 12 and/or if the USG abdomen showed features of BTA.

RESULTS

STATISTICAL ANALYSIS:

Data was entered into Microsoft excel data sheet and was analysed using SPSS 22 version software. Categorical data was represented in the form of frequencies and proportions. Continuous data was represented as mean and SD. ANOVA (Analysis of Variance) or Kruskal Wallis test was the test of significance to identify the mean difference between more than two groups for quantitative and qualitative data respectively.

p value (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

Results:- Age and gender distribution:

The most common age group involved was 21-30 years, constituting about 38.1% (92 of 242 patients) followed by 31-40 years constituting (51 of 242 patients) 21.4% , together constituting around 59.5%, thus forming the major bulk of the cases as shown in Fig1. Males were predominantly involved with 81% of cases.

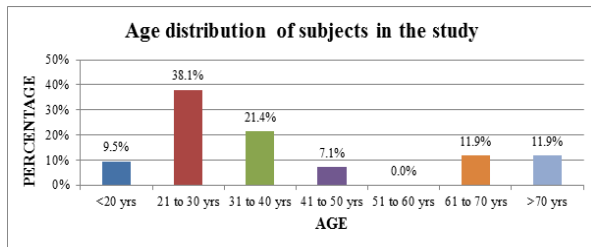


Figure 1: Bar diagram showing Age distribution of subjects in the study

Mode of injury:

RTA is the most common mode of injury with 78.6% of subjects sustaining injury followed by fall from height with 14.3% and the remainder being other mode which includes assault, bull butt injury.

Time of Presentation:-

Out of 242 cases 138 were brought to the casualty after 6 hours of trauma constituting 57.1% of the total cases. 63 of 242 cases constituting 26.2% were brought between 2 and 6 hours. Only 16.7% were brought within 2 hours.

Organs injured:-

Out of 242 patients who were included in the study 190 patients had solid organ or viscus injury. Most commonly injured organ was found to be spleen (75/242) with 31% followed by liver (34/242 cases) constituting 14.3% followed by ileum with 7.1%. Other structures injured includes kidney, colon, omentum. 21.4% of cases with blunt trauma abdomen doesn't had haemoperitoneum as shown in figure 2.

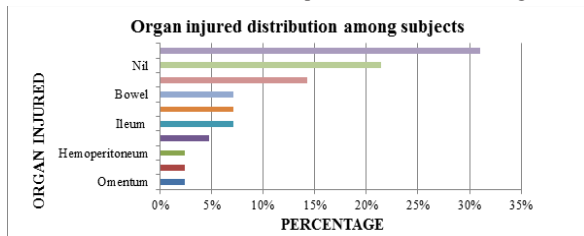


Figure 2: Bar diagram showing Organ injured distribution in study subjects

Management:-

Out of 190 cases who had solid organ injury, 118 cases (61.9%) were managed conservatively, 35 cases had undergone splenectomy as shown in fig 3. 9.5% (18/190 cases) had hollow viscus injury for which primary repair was done. 6 patients had hemoperitoneum without solid organ injury and intraoperatively found to had omental injury for which omental repair was done. 13 cases succumbed to death to his injury forming 7.1% and 11 cases left against medical advice.

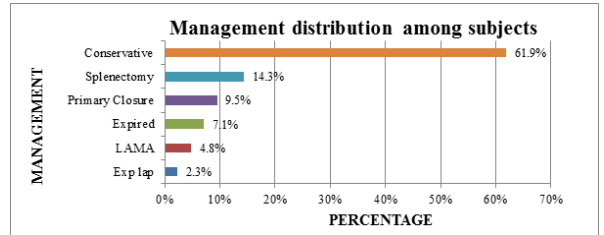


Figure 3: Bar diagram showing Management distribution in study subjects

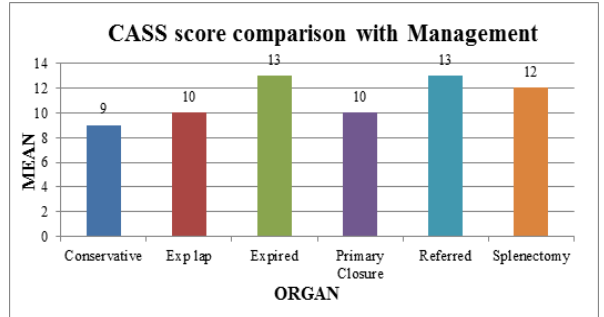


Figure 4: Bar diagram showing Mean distribution of CASS score comparison with Management in study subjects

DISCUSSION

Trauma is one of the common causes for increased morbidity and mortality in the younger age group, across the globe. The evaluation of patients with BTA poses a significant diagnostic challenge to most of the trauma surgeons. Timely diagnosis and intervention improves the outcome of the patient. Thus we need one clinical scoring system which dictates the probable line of management without any undue delay. Thus CASS is one among the other promising scoring system which is going to help in early diagnosis and timely intervention. The advantage of CASS over other is, it is purely based on the clinical features and hence can be applied bedside during initial assessment and resuscitation phase even in the centres where there is lack of FAST or other radiological investigations.

Mode of injury:-

The most common mode of injury, following road traffic accident was found to be 78.6% which is consistent with Rahman S et al^[10] with 67%, Mehta et al^[11] with 53% and Peyman et al^[11] with 80.6%. Mehta et al says increase in the incidence of RTA is because of easily procurable of vehicles, daily migration to urban area for livelihood, unaccustomed to traffic, traffic sense and ignorance of safety measures^[11]. The other mode of injury includes fall from heights which is 14.3% which is comparable to the Rahman S et al.

Gender Distribution:

It has been observed that male were more predisposed for the BTA constituting 81% and remaining being females which is supported by Mehta et al with male being 79% and female 21% and Vikram Yogesh et al^[12] with male forming 75% and rest being female. But Peyman et al showed female were predominantly involved in BTA. The reason for above is more dependency on male gender for earning livelihood and thus migration to urban area and more substance abuse in male gender than female.

Age distribution:-The age group in this study is 18-70 years. Youngest age involved is 18 years and oldest one being 70 years. The most common age group affected belongs to 21-30 years forming 38.1% of the total incidence followed by 31-40 years constituting 21.4% which is similar to study done by Mehta et al, Vikram Yogesh et al and Rahman S et al. This shows that young population which is more vulnerable to RTA, thus leading to loss of young productive group of the people.

CASS and PR, SBP and GCS relation:- There was significant positive correlation between CASS and Pulse rate i.e. with increase in CASS there was increase in Pulse rate and vice versa. Similarly there was significant negative correlation between CASS and SBP and GCS i.e. with increase in SBP and GCS there was decrease in CASS and vice versa as shown in Table 1.

Table 1: Correlation between CASS and PR, SBP, GCS

		CASS	PR bpm	SBP	GCS
CASS	Pearson Correlation	1	0.630**	-0.482**	-0.355*
	P value		<0.001*	0.002	0.021
	N	242	242	242	242

Time of presentation:-

Time of presentation in the ED after trauma is an important deciding factor for the better outcome. In the present study around 57.1% of the patients presented to the casualty after 6 hours of trauma and the reason being lack of awareness of the significance of time, delay in response by the ambulance person, multiple hospital visits before coming to our hospital. As a result of delayed presentation three cases who had severe injury and presented late succumbed to their injury thus showing need for early reference to the referral hospital for the appropriate assessment, resuscitation and management.

Most Common Organs injured distribution:-

In BTA, the most common injured was spleen with 31% of cases followed by liver with 14.3% and then bowel 11.9% which is similar to Singh S et al^[13] where Spleen (28%)> Liver(18%)>Bowel(16%) were injured. But as per Srivastava SK et al^[14] most commonly injured organ is bowel followed by spleen and liver. The reason for more solid organ injury compared to hollow viscus was explained by Vikram Yogish et al who said it is because of crushing injury. Intraabdominal contents are crushed between the anterior abdominal wall and the vertebral column or posterior thoracic cage. This produces a crushing effect, to which solid viscera (e.g. spleen, liver, and kidneys) are especially vulnerable.

Management distribution:

Here in our referral centre we managed 61.9% of cases conservatively because most of them responded well to initial resuscitation and continuously observed for signs of deterioration like hypotension, feeble thready pulse, increased abdominal girth, signs of peritonitis in well-established ICU care. Only 38.1% had undergone surgery and the most commonly performed surgery was splenectomy followed by primary closure of bowel perforations. This shows that most of the cases with BTA can be managed conservatively with keen observation on their vitals and abdominal symptoms and signs. But in study done by Vikram Yogesh et al and Rahman S et al majority of the patients were managed surgically comprising of 71.6% and 60% respectively.

CASS score and management:

In present study we observed that patient with mean CASS score of 8.62 with SD of 1.359 can be managed conservatively and mean CASS score of 11.18 with SD of 1.601 can be managed by surgical intervention. This results are similar to the study done by Vanitha T et al^[15] where patients with mean CASS score of 6.35 with SD of 1.56 were managed conservatively and mean CASS score of 11.56 with SD of 2.02 were managed by surgical intervention.

Patient distribution based on CASS with USG findings (Table No. 2):-

CASS Score	No of Patients	Percentage	USG Abdomen and Pelvis
<8	58	23.8%	Soft tissue injury ± grade I/II splenic/liver/renal injury
9-11	131	54.7%	Bowel injury predominantly ileal perforation± grade II/III splenic/renal/liver injury
>12	53	21.4%	Severe injury in the form of Grade IV/V splenic/complex injury

The number of patients who had a CASS of less than 8 were 58 out of 242 forming 23.8%. the number of patients who had CASS of 9-11 were 131. Thus more than half of the patients (54.7%) had CASS between 9 and 11. Patients with CASS>12 includes 53 of 242 forming around 21.4%.

CASS Score and Management:

All the patients who had CASS <8 were managed conservatively. These patients had minor injuries either in form of the soft tissue injury or grade I/II splenic/renal/liver injury. Among the patients who had CASS>12, 29 patients required surgical intervention, 13 succumbed to their injury and 11 were sent LAMA for whom surgery was the plan. These patients had grade IV and grade V splenic injury and the findings were consistent with the USG and CECT findings. Further, CASS

between 9 and 11 includes 131 patients, out of which 40 required surgical interventions. Out of 40, 29 patients had bowel perforation predominantly ileal perforation for whom primary repair was done without waiting for any other higher radiological investigations. In 6 cases, USG abdomen and pelvis showed gross intraperitoneal collection without solid organ injury and on exploration omental injury was noted. Other 5 patients had grade III splenic injury but patient was transient responder hence patient was planned for the exploratory laparotomy and it was found to be grade IV splenic injury. This shows that radiological investigations had its own fallacy. Rest of the patients however were managed conservatively with close monitoring of the vitals of the patients. Hence those who fall in the CASS 9-11 group may require careful close observation. Though most of them can be managed conservatively, a close observation or monitoring is essential in determining the need for the surgical intervention.

USG abdomen and pelvis and organs injured and management:

It has been observed that USG abdomen and pelvis was positive for 184 cases and had sustained either hollow viscus injury, liver injury, splenic injury and kidney injury and most of them had CASS>8. Out of 184 cases, 69 were managed conservatively and 91 had undergone surgery which includes splenectomy, omental repair and primary repair of the viscus, 13 succumbed to their injuries and 11 left against medical advice. The drawback of USG which was observed that we cannot assess which case to take for surgery or conservative management as it was evident by above observation and reporting is subjective. So in this respect CASS had upper hand in deciding the line of management and it is very economical and can be used in rural based hospital where there is unavailability of USG and radiologist.

Efficacy of CASS:

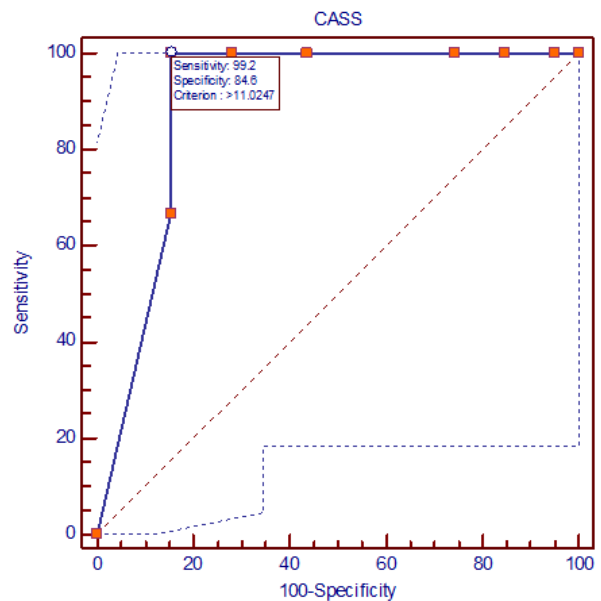


Fig 5: Sensitivity and specificity of CASS

All parameters of CASS i.e. specificity, sensitivity, PPV and NPV were 84.62%, 99.2%, 33.3% and 100% respectively which is comparable study done by Peymann et al where specificity, sensitivity, PPV and NPV were 88%, 100%, 90% and 100% respectively. This shows its efficacy in predicting which case to take for conservative management with better outcome.

Mortality distribution:

The number of mortality observed in the study was 13 out of 242 cases constituting 7.1%. All these patients had a CASS of >12. There is no death for CASS score of less than 11. Thus the mortality is directly proportional to the CASS. Mortality in the study done by Vanitha et al^[15] and Mehta et al was 8% and 4% respectively.

CONCLUSION

Most of the patients who had CASS <11 but hemodynamically stable can be managed conservatively. Patients with CASS of >12 are the potential candidates for the surgery. Thus use of CASS not only helps in timely intervention with better outcome but can be proved to be

beneficial for community health centre where a duty doctor can take immediate decision for referring the case without any undue delay.

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