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Prospective Study Comparing The Clinical Abdominal Scoring System (Cass) With Blunt Abdominal Trauma Severity Scoring (Batss) In Predicting The Necessity of Laparotomy

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Abstract: *OBJECTIVES: Trauma is among the leading causes of death. Medical management of blunt abdominal trauma (BAT) relies on judging patients for whom laparotomy is mandatory. This study aimed to determine BAT patients'signs, as well as paraclinical data, and to clarify the accuracy, sensitivity, specificity, positive and negative predictive value of clinical abdominal scoring system (CASS), a new scoring system based on clinical signs, in predicting whether a BAT patient needs laparotomy or not.*
METHODS: Totally 100 patients suspected of BAT that arrived at the emergency department of govt. Rajaji hospital,Madurai fromJanuary 2017 to December 2017were included in this study. They were evaluated for age, sex, type of trauma, systolic blood pressure, Glasgow coma scale (GCS), pulse rate, time of presentation after trauma, abdominal clinical findings, respiratory rate, temperature, hemoglobin (Hb) concentration, focused abdominal sonography in trauma (FAST) and CASS.
RESULTS:Our measurements showed that CASS had an accuracy of 94%, sensitivity of 100%, specificity of 88%, positive predictive value of 90% and negative predictive value of 100% in determining the necessity of laparotomy in BAT patients. Moreover, in our analysis, systolic blood pressure, GCS, pulse rate, Hb concentration, time of presentation after trauma, abdominal clinical findings and FAST were also shown to be helpful in confirming the need for laparotomy (P less than 0.05).
Conclusion: *CASS is a promising scoring system in rapid detection of the need for laparotomy as well as in minimizing auxiliary expense for further evaluation in BAT patients, thus to promote the cost-benefit ratio and accuracy of diagnosis.*

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I. Introduction

Abdominal trauma is one of the most common causes among injuries caused mainly due to road traffic accidents. Motor vehicle accidents account for 75 to 80 % of blunt abdominal trauma. Blunt injury of abdomen is also a result of fall from height, assault with blunt objects, sport injuries, and fall from riding bicycle.

Blunt abdominal trauma is usually not obvious. The knowledge in the management of blunt abdominal trauma has progressively increasing due to the in-patient data gathered from different parts of the world. In spite of the best techniques and advances in diagnostic and supportive care, the morbidity and mortality remains at large. The reason for this could be due to the interval between trauma and hospitalization, delay in diagnosis, inadequate and lack of appropriate surgical treatment, post operative complications and associated trauma especially to head, thorax and extremities. In view of increasing number of vehicles and consequently road traffic accidents, this dissertation has been chosen to study the cases of blunt abdominal trauma with reference to the patients presenting at Govt. Rajaji Hospital Madurai Medical College, Madurai

OBJECTIVES

- To evaluate the most common cause of blunt abdominal trauma.
- To evaluate the impact of blunt abdominal trauma on intraperitoneal organs like liver, spleen and hollow viscera like stomach, small and large intestine.
- To evaluate various modes of presentation in abdominal trauma.
- To evaluate various available radiological investigations for detection of intraperitoneal injuries.
- To determine value of clinical abdominal scoring system (CASS),

a new scoring system based on clinical signs, comparing with the BATSS (blunt abdominal injury severity scoring system) in predicting whether a Blunt abdominal trauma patient needs laparotomy or not in GRH,Madurai

II. Materials And Methods

SOURCE OF DATA:-

This study is a prospective study of blunt abdominal injuries during the period from May 2016 to August 2017 in Trauma Care Centre, Government Rajaji Hospital, Madurai Medical college. Number of cases studied is 100.

ELIGIBILITY CRITERIA

A.Inclusion criteria:

1. Patients who sustained Blunt abdominal trauma and arrived at Trauma Care centre ,GRH Madurai
2. Patients consented for inclusion in the study according to designated proforma

B.Exclusion criteria:

1. Patient not consented for inclusion in the study.
2. Patients suspected to have penetrating abdominal injury along with blunt abdominal trauma

METHODS OF COLLECTION OF DATA: -

Data were collected from the patients by their clinical history, clinical examination with appropriate investigations on those patients who were admitted. Post operative follow up was done to note for complications. After initial resuscitation of the trauma victims, a careful history was taken to document any associated medical problem. Routine blood and urine tests were carried out in all the patients. Documentation of patients, which included, identification, history, clinical findings, diagnostic test, operative findings, operative procedures, complications during the stay in the hospital and during subsequent follow-up period, were all recorded on a proforma specially prepared. Demographic data collected included the age, sex, occupation and nature and time of accident leading to the injury.

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 and all patients undergo the FAST ultra sound and plain radiograph of chest and abdomen scan and Blunt abdominal trauma severity score (BATTSS) 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 indicated

Patients are followed up for a week to determine their possible need for laparotomy

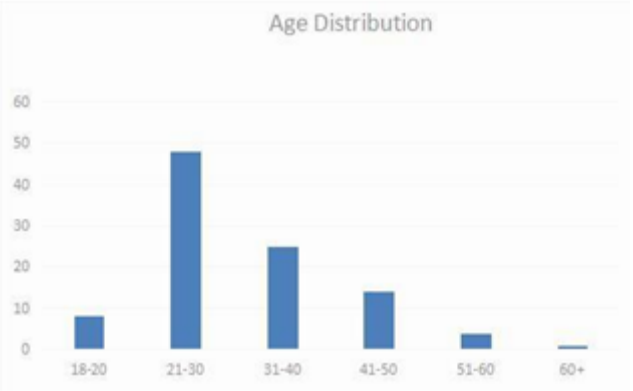
The decision for operative or non operative management depended on the outcome of the clinical examination and results of diagnostic tests.Patients selected for non operative or conservative management were placed on strict bed rest, were subjected to serial clinical examination which included hourly pulse rate, blood pressure, respiratory rate and repeated examination of abdomen and other systems. patients are assesed at the time of presentation Appropriate diagnostic tests especially ultrasound of abdomen was repeated as and when required. CT scan was done in 24 patients in our study, apart from routine investigations, abdomen x ray was done in 52 patients. Ultrasound of abdomen was done in 100 cases

OBSERVATIONS AND RESULTS:-

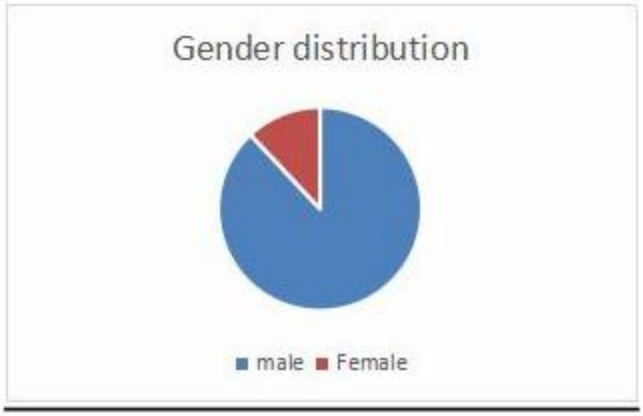
From May 2016 to August 2017, the total number of patients admitted with Blunt abdominal trauma by various General surgical Units in Madurai Medical college was 100.

A) AGE INCIDENCE:-In this series, the majority of the patients belonged to 21-30 years age group, followed by 31-40 years age group

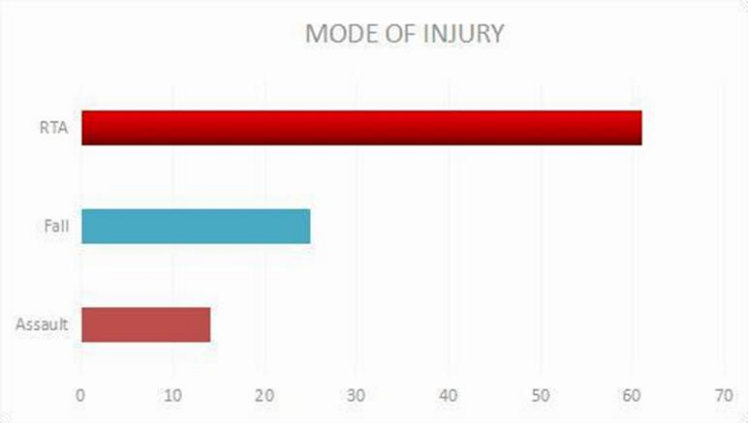
Age	Group number	%
18-20	8	8
21-30	48	48
51-40	25	25
41-50	14	14
51-60	4	4
60+	1	1



SEX INCIDENCE:-
In the 100 cases studied, 88 cases were males, with females accounting for only about12 cases.



MODE OF INJURY:-
Road traffic accident was responsible for 61% of blunt abdominal trauma cases, while fall from heights accounted for 25% of cases and blow with blunt object(assault) was responsible for14% of injuries



THE CLINICAL ABDOMINAL SCORING SYSTEM (CASS)
The clinical abdominal scoring is a purely clinical 15 -point scoring system scoring system based purely on clinical parameters like Time of presentation,history of abdominal pain, Pulse rate, Systolic Blood pressure Glasgow Coma scale ,and abdominal examination findings like tenderness, guarding, rigidity

TIME of	*< 2 h = 1*
PRESENTATION	*2-6 h = 2*
AFTER TRAUMA	*>6 h = 3*
(hours)	
PULSE RATE	*<90 =1*
	90 - 110=2
	>110 = 3
SYSTOLIC BLOOD	*>120 = 1*
PRESSURE	*90-120 = 2*
	<90 = 3

GLASGOW **COMA SCALE**	*13-15 = 1* *9-12 =2* *<9 =3*
ABDOMINAL	*Pain = 1*
CLINICAL **FINDINGS**	*Guarding = 2* *Tenderness&Rigidity =3*

This score is tabulated in the proforma at the time of recieving the patient and the score is documented. Patients are classified into three groups based on the score

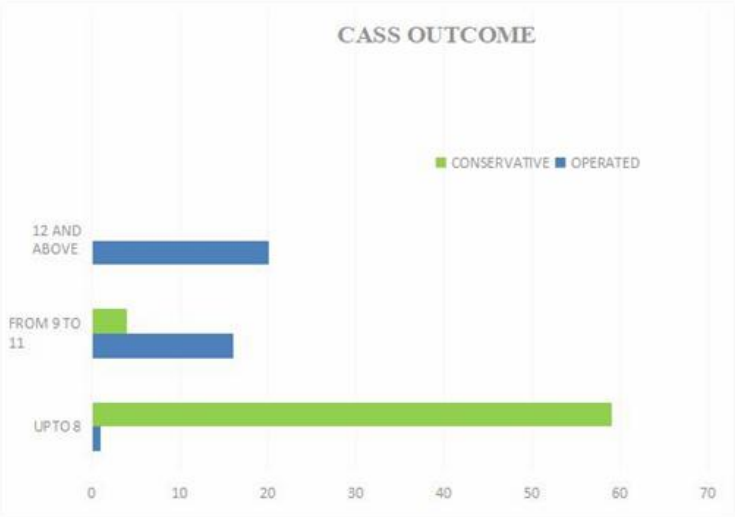
- Low risk upto 8
- Medium risk 9 to 11
- High risk 12 and above

The patients were followed up for a period of 1 week whether the patient is taken up for laparotomy or whether the patient is managed conservatively
Patients are shifted to **FAST** scan for further evaluation

CASS SCORE AND OUTCOME OF PATIENTS

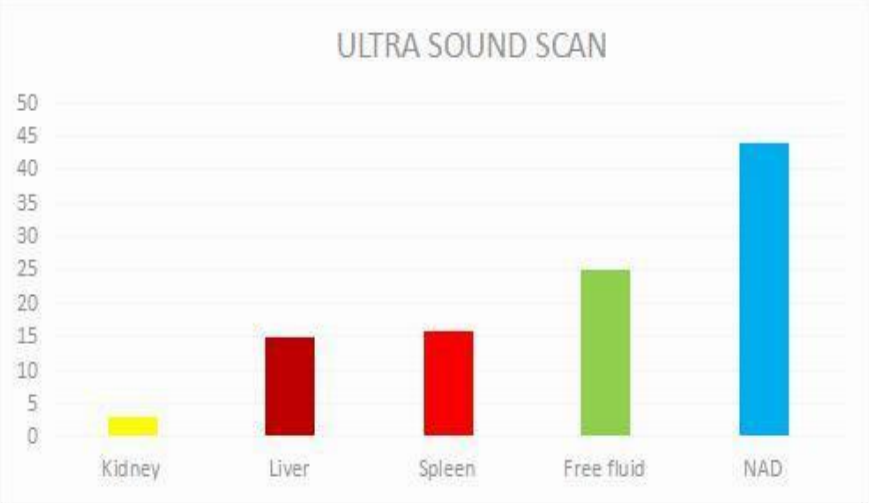
Outcome	UPTO 8	FROM 9 TO 11	12 AND ABOVE
OPERATED	1	16	20
CONSERVATIVE	59	4	0

The AverageCASSscore of the non operative (conservative management) groupwas**6.35**withastandarddeviationof**1.56**



The average CASS score of operative group is 11.56 with a standard deviation of 2.02
ULTRASOUND EXAMINATION:

All 100 patients out of 100 were subjected for ultrasound examination. T Out of which 29 patients had scan detected solid organ injuries for which they underwent laparotomy and found to have significant injuries. 19 patients had scan detected only free fluid and found to have hollow viscus or solid organ injury at laparotomy.



BATSS SCORE- BLUNT ABDOMINAL TRAUMA SEVERITY SCORE

This is a 24 - point blunt abdominal trauma scoring system was developed based on factors like abdominal pain, abdominal tenderness, Systolic blood pressure, pulse rate ,chest wall sign , pelvic fracture, FAST

VARIABLES	score
PULSE RATE	
SBP	> 100 bpm : 1
Abdominal Pain	
AbdominalTenderness	<100mm Hg : 4
Chest wall sign	
Pelvic Fracture	Absent 0
FAST	Present 2
	Absent 0
	Present 2
	Absent 0
	Present 1
	Absent 0
	Present 5
	0-8

This score is tabulated in the proforma at the time of receiving the patient and the score is documented. Patients are classified into three groups based on the score

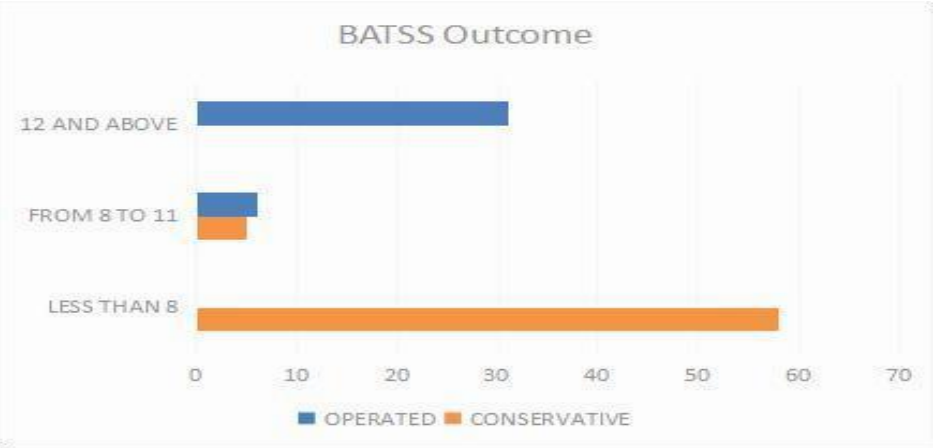
Low risk less than 8
Medium risk 8 to 11
High risk 12 and above

The patients were followed up for a period of 1 week whether the patient is taken up for laparotomy or whether the patient is managed conservatively

BATSS SCORE AND OUTCOME OF PATIENTS

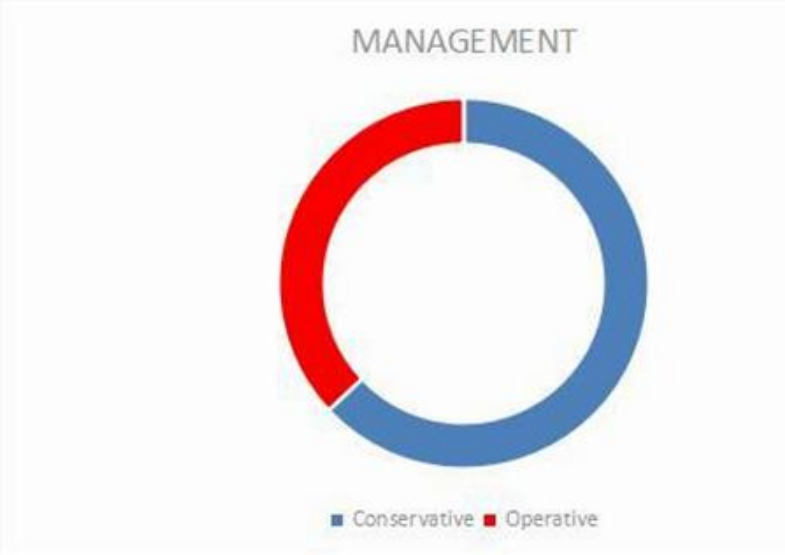
The mean BATSScore of the non operative (conservative management)group was **3.76** with a standard deviation of **2.32**

The mean BATSScore of the operative group was **13.4** with a standard deviation of **2.17**



RATIO OF OPERATIVE TO CONSERVATIVE TREATMENT:-

After a detailed clinical evaluation and suitable investigations, 37 patients with pneumoperitoneum or hemoperitoneum with hemodynamic instability underwent exploratory laparotomy. 63 patients were selected for non operative management because they had no signs of peritonitis or they had hemoperitoneum without hemodynamic instability



ORGANWISE INJURY:

In the present series, small bowel was the most commonly involved organ. It was involved in 27% of cases, spleen in 25% and liver in 22% of cases

ORGAN INJURED	NO. OF CASES	PERCENTAGE
Spleen	15	15%
Small bowel	12	12%
Liver	11	11%
Stomach	1	1%
Bladder	4	4%
Colon	2	2%
Retroperitoneum	5	5%

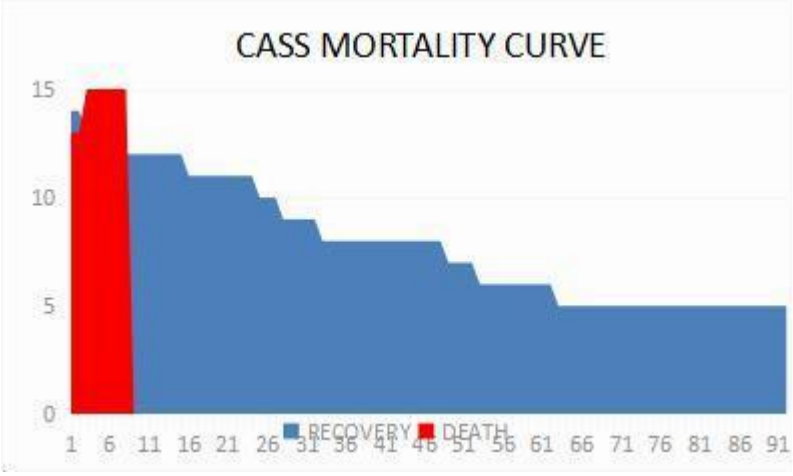
OPERATIVE PROCEDURES:

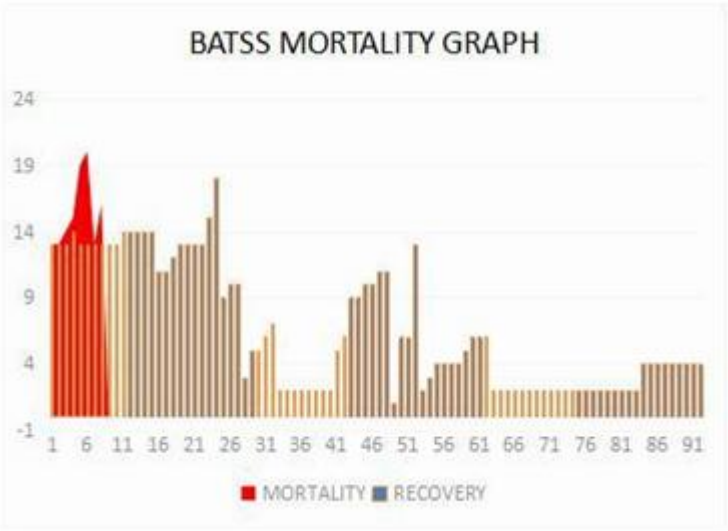
The following table shows the various operative procedures carried out among the patients who underwent exploratory laparotomy. Liver injuries were usually graded as I and II. Out of the 13 patients with liver injury, only 6 patients underwent hepatorraphy with gel foam packing and rest of them were treated with gel foam packing alone. Out of 15 patients with splenic injury, 10 patients underwent splenectomy, 3 patients were treated by splenorrhaphy and 2 were managed conservatively. Bowel perforations were treated with 2 layered closure, with only 2 patients requiring resection and anastamosis. Omental and mesenteric injuries were treated by simple suturing and ligating the bleeding points.

MORTALITY:

A total of 8 patients died in the present study. All patients belonged to operative group and died in the intra-op/post-operative period, majority of them due to hypovolemia/ peritonitis/septicaemia.Three patients had liver injuries. One patient was a case of duodenal perforation who developed post operative leak septicemia. 5 patients had splenic injuries among which one had a pelvic fracture. Therefore the mortality in the present study is 8%.

In this study there is strong correlation of higher CASS and BATSScoreswith increased mortality as demonstrated in the mortality curves below





III. Discussion

Trauma is one among the leading causes of death. The evaluation of patients who have sustained blunt abdominal trauma (BAT) may pose a significant diagnostic challenge to the most seasoned trauma surgeon. .Medical management of blunt abdominal trauma (BAT) relies on judging patients for whom laparotomy is mandatory. However, difficulty in diagnosing the intraabdominal injury explains the real need for an accurate and in hand method to evaluate the patients who require further surgical interventions

In the study *Evaluating clinical abdominal scoring system in predicting the necessity of laparotomy in blunt abdominal trauma By Peyman Erfantalab-Avini, Nima Hafezi-Nejad, Mojtaba Chardoli* and Vafa Rahimi-Movaghar**

In their analysis of 400 patients the CASS score had an accuracy of 94%, sensitivity of 100%, specificity of 88%, positive predictive value of 90% and negative predictive value of 100%

In the study ***New scoring system for intra-abdominal injury diagnosis after blunt trauma*** by *Majid Shojaee, GholamrezaFaridaalaee*, Mahmoud Yousefifard, Mehdi Yaseri, Ali Arhami Dolatabadi, Anita Sabzghabaei, Ali Malekirastekenari in the Chinese Journal of Traumatolgy*, the value of BATSS was evaluated in 261 patients combiningtheuseofFASTinthesettingofBluntabdominaltrauma.

They recommend that In the high risk group (score more > 12) immediate laparotomy should be done, moderate group needs further assessments, and low risk group should be kept under observation. Low risk patients did not show positive CT-scans (specificity100%).

Our study revealed that strong correlation of higher CASS and BATSScores with increased mortality .The Average CASS score of the operative group was **11.56** with a standard deviation of **2.02.** The mean BATSScore of the operative group was **13.4** with a standard deviation of**2.17**

The higher scores of both CASS and BATSS needed laparotomy (value of more than 12) with a specificity of 100% for both scoring systems.

Further it can be concluded that the group with BATSscores less than 8 does not need laparotomy and can be observed after an Ultra sound. Lower BATSS value is found to be significant in ruling out intra-abdominal trauma and thus preventing unwarranted CT investigations.

IV. Conclusion

BATSS AND CASS SCORES AS PREDICTORS FOR LAPAROTOMY CASS

It is demostrated in this study that CASS score was significantly higher is patients requiringalaparotomyp(<0.01). calculations reveal CASS has a specificity of 100% sensitivity of 54%positive predictive value of 100%and negative predictive value of 78.7%

BATSS

Clinical examination is combined with radiography and USG to obtain this score . Our study report that a value more than 12 can be strong predictor for laparotomy

With a specificity of 100% sensitivity of 83.5% positive predictive value of 100% and negative predictive value of 91.3%

A value of 12 or more in either scoring system is associated with need of laparotomy and such patients should be planned for laparotomy as soon as the patient is received in the casualty. This will help in the triage of patients and in helping in reducing the time in shifting the patient to operative table.

A value of 8 or less in BATSS scoring systems are associated with no mortality and no need for laparotmy and no need for further imaging after FAST. Hence found to be superior to CASS.

V. Summary

- This was a prospective study of 100 cases of non-penetratingabdominal trauma in Madurai medicalcollege
- Non-penetrating trauma abdomen is a major cause of morbidityand mortality in young and economically productiveage-group.
- Road traffic accident is the major causativeagent.
- Males are predominantly affected. 21-30 yrs is the most commonage group.
- The most common organ injured in the present study wasspleen.
- Small bowel is the second most commonly injured viscera andmajority of them were managed bysuturing.
- The present study showed a mortality of8%.
- Conservative line of management is safe and effective in a hemodynamically stable patient without any signs ofperitonitis.
- CASS and BATSS systems of trauma severity scoring in setting of blunt abdominal trauma in segregating patients into low risk medium risk and high risk categories.
- Higher values are associated with increasing need of laparotomy and increasingmortality
- Lower values are associated with No or Low need of laparotomy and nomortality and no need for further imaging like CT scan

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