

## “A Score to Decide the Management of Blunt Injury Abdomen”

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### Abstract

**Introduction:** Blunt abdominal trauma is regularly encountered in the emergency department. The presence of distracting injuries or altered mental status can make these injuries difficult to diagnose and manage. Patients are frequently kept for observation following blunt abdominal trauma, despite initially negative evaluations. Blunt abdominal trauma accounts for the majority (80%) of abdominal injuries seen in emergency department, and is responsible for substantial morbidity and mortality. The prevalence of intraabdominal injuries among patients presenting to emergency department with blunt injury abdomen is approximately 13-15% (3). In this study a conscious attempt is made to develop a score by correlating clinical findings and investigations to diagnose intraabdominal injuries and decide on management of blunt injury abdomen. Even by using screening technology such as laboratory evaluations, ultrasound, computed tomography, it is unclear and there is always a debate about whether patients require conservative management or laparotomy.

**Materials And Methodology:** This study was obtained from 100 randomly selected patients admitted with blunt injury abdomen during feb 2015 – august 2015. Scoring system was based on Abdominal Pain, Pulse Rate, Systolic Blood Pressure, Peritonitis, Free Fluid, Imaging, Serum Creatinine, White Blood Cell COUNT, Liver Enzymes (Ast/Alt), Other Significant INJURIES. Based on the scoring system patients were divided into 3 groups

Low risk - <14

Intermediate risk – 14 – 18

High risk - >18

**RESULT:** Based on statistical significance of the score, conclusion of study is

Score <14 – can be discharged after initial evaluation

Score 14-18 – need admission and observation

Score >18 – need laprotomy

**Keywords:** Blunt Injury Abdomen, Peritonitis, Clinical Laboratory And Radiological Findings Of Blunt Injury Abdomen

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### I. Introduction

Blunt abdominal trauma is regularly encountered in the emergency department. The lack of historical data and the presence of distracting injuries or altered mental status, from head injury or intoxication, can make these injuries difficult to diagnose and manage. Patients are frequently kept for observation following blunt abdominal trauma, despite initially negative evaluations. Victims of blunt abdominal trauma often have both intra- abdominal and extra-abdominal injuries further complicating care. Blunt abdominal trauma accounts for the majority (80%) of abdominal injuries seen in emergency department, and is responsible for substantial morbidity and mortality. The majority of cases are related to road traffic accidents (75%), blows to abdomen (15%) and falls (6-9%). The prevalence of intra-abdominal injuries among patients presenting to emergency department with blunt injury abdomen is approximately 13-15% (3). The spleen and liver are the most commonly injured solid organs. Injuries to bowel, mesentery, bladder, pancreas and diaphragm, as well as retroperitoneal structures (kidneys, abdominal aorta, etc..) are less common but must also be considered. Even with the current use of screening technology such as laboratory evaluations, ultrasound and computed tomography (CT), it is unclear and there is always a debate about which patients require conservative management and laparotomy. In this study a conscious attempt is made to develop a score by correlating clinical findings and investigations to diagnose intra-abdominal injuries and decide on management of blunt injury abdomen.

**Objectives of this study is**

- 1.To analyse patients based on clinical findings
- 2.To evaluate the patients based on investigations like White Blood Cell count, Serum Creatinine, Liver enzymes(AST/ALT), chest X-ray ,Ultrasound abdomen and Computed tomography abdomen
- 3. Based on the above data to design a score , to decide the management of blunt injury abdomen

**II. Materials and Methods**

The data for this prospective and observational study was obtained from 100 randomly selected patients admitted with blunt injury abdomen in Madras medical college (MMC) and Rajiv Gandhi Government General Hospital (RGGGH). Patients presenting to the trauma ward with blunt injury abdomen during February 2015 to August 2015 at Madras Medical College (MMC) and Rajiv Gandhi Government General Hospital (RGGGH), were counselled for investigations and treatment of blunt injury abdomen.

Inclusion criteria:

- Patients with blunt injury abdomen
- Age more than 18 years and less than 75 years

**2.1Exclusion criteria:**

- Moribund patients
- Age less than 18 years and more than 75 years
- life threatening injuries other than abdomen injury
- penetrating abdominal trauma
- pregnant women
- patients who did not have reliable history or physical exam (Such as GCS less than 15, alcohol intoxication history taking and physical exam, impaired verbal patients)

Assessment of parameters:

All consenting patients with blunt Injury abdomen would be clinically examined after history taking and then subjected to investigations and finally evaluated using the following parameters:

<b>Parameters</b>	
<b>Abdominal pain</b>	Absent – 1 point Present- 2 points
<b>Pulse rate</b>	<90 /min – 1 point 90-110 /min – 2 points >110 /min – 3 points

<p><b>Systolic blood pressure</b></p> <p>&gt;120 mmHg – 1 point          90-120 mmHg -2 points          &lt;90 mmHg – 3 points</p>
<p><b>Peritonitis</b></p> <p>Absent – 1 point          Present – 4 points</p>
<p><b>Free fluid</b></p> <p>Absent – 1 point          Present – 4 points</p>
<p><b>Imaging</b></p> <p>Normal – 1 point          Free fluid – 2 points          Solid organ injury – 3 points</p>
<p><b>Serum creatinine</b></p> <p>&lt; 1.4 mg/dl– 1 point          &gt;1.4 mg/dl – 3 points</p>

<p><b>White blood cell count</b></p> <p>&lt; 10,000 cells/cu.mm – 1 point          &gt;10,000 cells/cu.mm – 2 points</p>
<p><b>Liver enzymes(AST/ALT)</b></p> <p>Normal – 1 point          Elevated – 3 points</p>
<p><b>Other significant injuries</b></p> <p>Absent – 1 point          Present – 3 points</p>

Based upon the above scoring system and outcome (discharged / observation/ laparotomy) the patients were divided into three groups – low risk, intermediate risk and high risk. Scores of 14 and 18 were considered the cut-off points. Patient with a score <14 were identified as low risk for intra-abdominal injury (IAI). Scores of ≥ 18 were identified as high risk for IAI. Scores between 14 and 18 were identified as intermediate risk for IAI.

Frequency distribution of risk for IAI

RISK	Frequency	Percent	Valid Percent	Cumulative Percent
LOW	57	57.0	57.0	57.0
INTERMEDIATE	39	39.0	39.0	96.0
HIGH	4	4.0	4.0	100.0
Total	100	100.0	100.0	

Predominantly most blunt injury abdomen patients in the study were identified as low risk for IAI (score < 14) accounting for 57% of study patients. Out of the 100 patients with blunt injury abdomen in our study, only thirteen (13%) patients had Intra-abdominal injury (IAI). Though blunt injury abdomen is a common entity in our trauma wards, the prevalence of Intra-abdominal injury is low. AGE VS RISK CROSS

#### Tabulation

Age of 100 patients ranged from 20 to 72 years. Most of the patients (29%) were between 20-29 years with mean age of 39.99 years and standard deviation of 14.255 years.

#### Mode of Injury

Among the patients in this study the most common mode of injury was Road traffic accident(RTA) which accounted for 67% of blunt injury abdomen, followed by assault (12%), fall from height (11%), others[fall of object, occupational, accidental fall] (9%) and Train traffic accident (1%). In the studies conducted by Nabachandra H. et al (India) and Mousami Singh et al (India) also revealed that Road traffic accident (RTA) was the leading cause for blunt injury abdomen, 86.4% and 70% respectively.

#### Sex Vs Risk Crosstabulation

As far as gender prevalence of intra-abdominal injury (IAI) in blunt injury abdomen in this study is considered males (table 15) are more at risk compared to females, this bias may be due to the high male to female ratio (4.5:1) in patients with blunt injury abdomen. This study is based on evaluation of blunt injury abdomen patients based on ten important parameters, which are going to be discussed as follows.

#### Abdominal Pain Vs Risk Crosstabulation

Abdominal pain is an important clinical parameter in blunt injury abdomen. In our study fifty five (55%) patients with blunt injury abdomen had abdominal pain (table 4). Out of 55 patients with abdominal pain only 4 (7.3%) patients were identifies as high risk for blunt injury abdomen. According to Pearson Chi Square test, with a value of 5.288 and degree of freedom of 2, the p value obtained is 0.071 which is >0.05 and hence is insignificant.Hence there is no statistical correlation between abdominal pain and risk of IAI, outcome & management of blunt injury abdomen.

#### Pulse Rate Vs Risk Crosstabulation

Fifty six (56%) patients had a pulse rate <90/min, out of the 56 patients, 47(83.9%) patients were identified as low risk for IAI and 9(16.1%) patients were identified as intermediate risk for IAI. Twenty six (26%) patients had a pulse rate between 90-110/min, out of the 26 patients, 6 (23.1%) patients were identified as low risk for IAI and 20(76.9%) patients as intermediate risk for IAI. Eighteen (18%) patients had a pulse rate >110/min, out of the 18 patients 4(22.2%) patients were identified as low risk for IAI, 10(55.6%) as intermediate risk for IAI and 4(22.2%) patients as high risk for IAI . According to Pearson Chi Square test, with a value of 52.817 and degree of freedom of 4, the p value obtained is 0.0001 which is <0.05 and hence is significant.Hence there is a definite statistical correlation between pulse rate and risk of IAI, outcome & management of blunt injury abdomen.

#### Ystolic Blood Pressure Vs Risk Crosstabulation

Fifty five (55%) patients had a systolic blood pressure >120mmHG, out of the 55 patients, 48(87.3%) patients were identified as low risk for IAI and 7(12.7%) patients were identified as intermediate risk for IAI. Thirty four (34%) patients had a systolic blood pressure between 90-120mmHG, out of the 34 patients, 9 (26.5%) patients were identified as low risk for IAI and 25(73.5%) patients as intermediate risk for IAI. Eleven (11%) patients had a systolic blood pressure <90mmHG, out of the 11 patients, 7(63.6%) patients were identified as intermediate risk for IAI and 4(36.4%) patients as high risk for IAI . According to Pearson Chi

Square test, with a value of 74.877 and degree of freedom of 4, the p value obtained is 0.0001 which is <0.05 and hence is significant. Hence there is a definite statistical correlation between systolic blood pressure and risk of IAI, outcome & management of blunt injury abdomen.

#### **Peritonitis Vs Risk Crosstabulation**

Ninety eight (98%) patients had no signs of peritonitis, out of the 98 patients, 57(58.2%) patients were identified as low risk for IAI and 39(39.8%) patients were identified as intermediate risk for IAI. Two (2%) patients had signs of peritonitis and were identified as high risk for IAI According to Pearson Chi Square test, with a value of 48.980 and degree of freedom of 2, the p value obtained is 0.001 which is <0.05 and hence is significant. Hence there is a definite statistical correlation between peritonitis and risk of IAI, outcome & management of blunt injury abdomen.

#### **Free Fluid Vs Risk Crosstabulation**

Ninety five (95%) patients had no clinical signs of free fluid abdomen, out of the 98 patients, 57(60%) patients were identified as low risk for IAI and 38(40%) patients were identified as intermediate risk for IAI. Five (5%) patients had clinical signs of free fluid abdomen, out of the 5 patients, 1(20%) patients were identified as intermediate risk for IAI and 4(80%) patients as high risk for IAI According to Pearson Chi Square test, with a value of 79.487 and degree of freedom of 2, the p value obtained is 0.0001 which is <0.05 and hence is significant. Hence there is a definite statistical correlation between free fluid abdomen and risk of IAI, outcome & management of blunt injury abdomen.

#### **Imaging vs risk crosstabulation**

Eighty seven (87%) patients had a normal imaging study, out of the 87 patients, 57(65.5%) patients were identified as low risk for IAI and 30(34.5%) patients were identified as intermediate risk for IAI. Eleven (11%) patients had free fluid abdomen by imaging study, out of the 11 patients, 9 (81.8%) patients were identified as intermediate risk for IAI and 2(18.2%) patients as high risk for IAI. Two (2%) patients had solid organ injury by imaging study and were identified as high risk for IAI. According to Pearson Chi Square test, with a value of 70.014 and degree of freedom of 4, the p value obtained is 0.0001 which is <0.05 and hence is significant. Hence there is a definite statistical correlation between Imaging and risk of IAI, outcome & management of blunt injury abdomen.

#### **Serum Creatinine Vs Risk Crosstabulation**

Ninety six (96%) patients had normal serum creatinine, out of the 96 patients, 57(59.4%) patients were identified as low risk for IAI, 35(36.5%) patients were identified as intermediate risk for IAI and 4(4.2%) patients were identified as high risk for IAI. Four (4%) patients had elevated serum creatinine and all were identified as intermediate risk for IAI According to Pearson Chi Square test, with a value of 6.517 and degree of freedom of 2, the p value obtained is 0.038 which is <0.05 and hence is significant. Hence there is a definite statistical correlation between serum creatinine and risk of IAI, outcome & management of blunt injury abdomen.

#### **White Blood Cell Count Vs Risk Crosstabulation**

Eight two (82%) patients had normal white blood cell count, out of the 82 patients, 56(68.3%) patients were identified as low risk for IAI and 26(31.7%) patients were identified as intermediate risk for IAI. Eighteen (18%) patients had elevated white blood cell count, out of the 18 patients, 1(5.6%) patient was identified as low risk for IAI, 13(72.2%) patients were identified as intermediate risk for IAI and 4(22.2%) patients as high risk for IAI According to Pearson Chi Square test, with a value of 34.627 and degree of freedom of 2, the p value obtained is 0.002 which is <0.05 and hence is significant. Hence there is a definite statistical correlation between white blood cell count and risk of IAI, outcome & management of blunt injury abdomen.

#### **Liver Enzymes Vs Risk Crosstabulation**

Ninety seven (97%) patients had normal values of liver enzymes, out of the 97 patients, 57(58.8%) patients were identified as low risk for IAI, 38(39.2%) patients were identified as intermediate risk for IAI and 2(2.1%) patients were identified as high risk for IAI. Three (3%) patients had elevated values of liver enzymes, out of the 3 patients, 1(33.3%) patients were identified as intermediate risk for IAI and 2(66.7%) patients as high risk for IAI

According to Pearson Chi Square test, with a value of 32.153 and degree of freedom of 2, the p value obtained is 0.001 which is <0.05 and hence is significant. Hence there is a definite statistical correlation between liver enzymes and risk of IAI, outcome & management of blunt injury abdomen.

**Other Significant Injuries Vs Risk Crosstabulation**

Fifty Eight (58%) patients had no other significant injuries, out of the 58 patients, 41(70.7%) patients were identified as low risk for IAI, 13(22.4%) patients were identified as intermediate risk for IAI and 4(6.9%) patients were identified as high risk for IAI. Forty two (42%) patients had other significant injuries, out of the 42 patients, 16(38.1%) patients were identified as low risk for IAI and 26(61.9%) patients as intermediate risk for IAI According to Pearson Chi Square test, with a value of 17.178 and degree of freedom of 2, the p value obtained is 0.001 which is <0.05 and hence is significant. Hence there is a definite statistical correlation between other significant injuries and risk of IAI, outcome & management of blunt injury abdomen. This is comparable with the study conducted by Shojaee et al, in their study out of the total 261 patients with blunt injury abdomen; only forty eight (18.4%) patients had intra-abdominal injury (IAI).

**Comparison With Other Studies**

A similar study by Shojaee et al,(2) a 24-point scoring system and with cut-off values of score as 8 and 12 had similar distribution of risk pattern for IAI. Here also most blunt injury abdomen patients were identified as low risk for IAI (score < 8), accounting for 70.11%.

Comparison of distribution of Risk for IAI

<b>STUDY</b>	<b>LOW RISK (n, %)</b>	<b>INTERMEDIATE RISK (n, %)</b>	<b>HIGH RISK (n, %)</b>	<b>Total (n, %)</b>
Shojaee et al(2014)	182(69.7%)	41(15.7%)	38(14.6%)	261(100%)
Present study	57(57%)	39(39%)	4(4%)	100(100%)

Inter-study comparison of prevalence of IAI

<b>Study</b>	<b>Prevalence of IAI (n, %)</b>
Shojaee et al(2014)	48(18.4%)
Present study	13(13%)

Inter-study comparison of parameters and their p value

Parameters	Shojaee et al (2014)	Present study
Abdominal pain	<0.0001	0.071
Pulse rate	<0.0001	0.0001
Systolic BP	0.003	0.0001
Peritonitis	<0.0001	0.01
Free fluid	0.003	0.0001
Imaging	<0.0001	0.0001
Other significant Injuries	0.01	0.01

Comparing the p values of common parameters in both studies, except for abdominal pain all other parameters are statistically significant and comparable to the study by Shojaee et al  
Outcome/ Management Vs Risk Cross Tabulation

		RISK			Total
		LOW	INTERMEDIATE	HIGH	
Outcome	Discharged	57(75)	19(25)	0(0)	76(100)
	Observation	0(0)	20(100)	0(0)	20(100)
	Laparotomy	0(0)	0(0)	4(100)	4(100)
Total		57(57)	39(39)	4(4)	100(100)

\*Figures in parenthesis indicates percentages

76 patients were discharged after initial evaluation without admission and observation, out of the 76 patients, 57(75%) patients were identified as low risk for IAI and had scores <14 and; 19(25%) patients were identified as intermediate risk for IAI and had scores between 14 to 18. 20 patients required admission and observation and all of them were identified as intermediate risk for IAI and had scores between 14 to 18. 4 patients required laparotomy and all of them were identified as high risk for IAI and had scores ≥18. Statistical significance of score

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	194.258	20	.0001
Likelihood Ratio	125.141	20	.0001
Linear-by-Linear Association	72.235	1	.0001
N of Valid Cases	100		

According to Pearson Chi Square test, with a value of 194.258 and degree of freedom of 20, the p value obtained is 0.0001 which is <0.05 and hence is significant.

Hence there is a definite statistical correlation between the score and risk of IAI, outcome & management of blunt injury abdomen.

Since there is definite statistical significance of the score, conclusion of this study is,

1. Scores <14 – low risk for IAI and can be discharged after initial evaluation
2. Scores between 14-18 – intermediate risk for IAI and need admission and observation
3. Scores  $\geq 18$  – high risk for IAI and need laparotomy

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