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Original Research Article

Novel Scoring System in Predicting Severity of Blunt Trauma Abdomen at MKCG MCH Berhampur, Odisha

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Abstract:

Background: Now days when Blunt Trauma Abdomen (BTA) is an important cause of morbidity & mortality, it is required to prepare a scoring system for assessing the severity of Intra-Abdominal Injury (IAI). A scoring system that would produce results compared to compute tomography (CT) scans and which would be easily applicable and affordable.

Methods: Cross-sectional observational study was performed from July 2022 to June 2023 for patients who presented to Trauma care centre, MKCG Medical College & Hospital, Berhampur, and Odisha with BTA. All patients were managed according to Trauma protocol. CECT abdomen and pelvis is the gold standard for diagnosis. Relevant data were recorded based on the mode of injury, clinical examination, FAST (Focused assessment with sonography for trauma), and CECT scan findings. Variables with a substantial relationship with CT scan were included in multivariate regression models, where a coefficient () was assigned to the variables. The scoring system was developed based on the obtained total of each variable.

Results: 122 patients with BTA were assessed. A 7-point scoring system for BTA was devised using those variables with significant p values. Patients were divided into 2 groups: > 0.43 were high risk and < 0.43 were low risk. In the high-risk group, immediate laparotomy should be done, and the low-risk group should be kept under observation. The receiver operating characteristic curve indicated a close relationship between results of laparotomy and Novel score (sensitivity=76.9% specificity =74.3%).

Conclusion: A novel scoring system is a bedside tool for precisely predicting the severity of IAI in BTA and reducing unnecessary CECT and expenses.

Introduction

Abdominal injury following trauma is the third most common cause of death [1]. However, early diagnosis and treatment can reduce mortality by 50 % [2]. BTA often presents a substantial diagnostic challenge.

Pre-hospital transportation, initial assessment, thorough resuscitative measures and correct diagnosis are essential in trauma management. IAI (intraperitoneal and retroperitoneal) following blunt (80%) or penetrating (20%) trauma causes a substantial proportion of traumatic deaths. Motor vehicle collisions and falls are the most common causes of blunt trauma abdomen [3]. Therefore, this study was carried out to devise a predictive scoring model for determining IAI severity following BTA. A new scoring system for intraabdominal injury diagnosis after blunt trauma was conducted in 2014 using a 24-point blunt abdominal trauma scoring system (BATSS) was developed. The purpose of our study is to validate the existing new scoring system with more variables.

Aims and objectives: To device a predictive scoring model for determining the severity of intraabdominal injury following blunt trauma abdomen.

Materials and Methods

Patient Population

All patients above 18 years of age who presented to Trauma

Care centre, MKCG MCH, Berhampur with BTA were included in the study, from July 2022 to June 2023.

Patients aged less than 18 years, those with a penetrating abdominal injury, and those with a Glasgow Coma Scale Score of <8 (patient who did not have reliable history / physical examination - GCS less than 8) were excluded from the study population. Pregnant women with BTA were also excluded from the study population.

Data collection: Clinical data were collected & history was obtained from patients and their relatives at the presentation to the Emergency Department (ED). Based on ED protocol, all patients were assessed first and initiated on appropriate treatment. Relevant data, including age, sex, details of the trauma, including the duration in seeking medical attention, mode of injury, use of helmet / seatbelt, alcohol intake, associated injuries, first aid at the field were collected and filled in a pre-validated proforma. Clinical symptoms include abdominal pain, distension, vomiting, hematemesis, hematuria, seatbelt sign, guarding, rigidity, abdominal tenderness, rebound tenderness, bowel sounds, coastal margin tenderness, concomitant injuries, bleeding per rectum and bony injuries were carefully examined and documented in the proforma. Vital signs like pulse, blood pressure, temperature, respiratory rate and GCS were recorded. Laboratory studies haemoglobin, hematocrit, liver and renal functions, and Imaging studies [X-ray and FAST] were documented. All the patients in the study group underwent CECT abdomen and pelvis.

Statistical analysis: Statistical analyses of the data were performed using SPSS version 21.0. The relationship between each factor and outcome (conservative or laparotomy) was assessed by Chi-square test, and any statistical significance was recorded as a "p-value" less than 0.05. Factors with a significant relationship were imported in logistic regression analysis models.

In logistic regression analysis, the factors associated with management were determined and based on coefficient (beta), each came at the rated score system. The scoring system was developed based on the obtained total beta of the factor. Patients were divided into low risk or high-risk groups.

Results

Totally 122 patients presented to the trauma care centre, MKCG MCH, Berhampur with blunt abdominal trauma (109 male) and (13 female) were assessed in our study. Of the 34 variables studied, these 7-variable showed a significant p-value. These variables were taken in logistic regression analysis, and a beta value was derived for each variable.

The risk score function was derived from these variables. Risk score function:

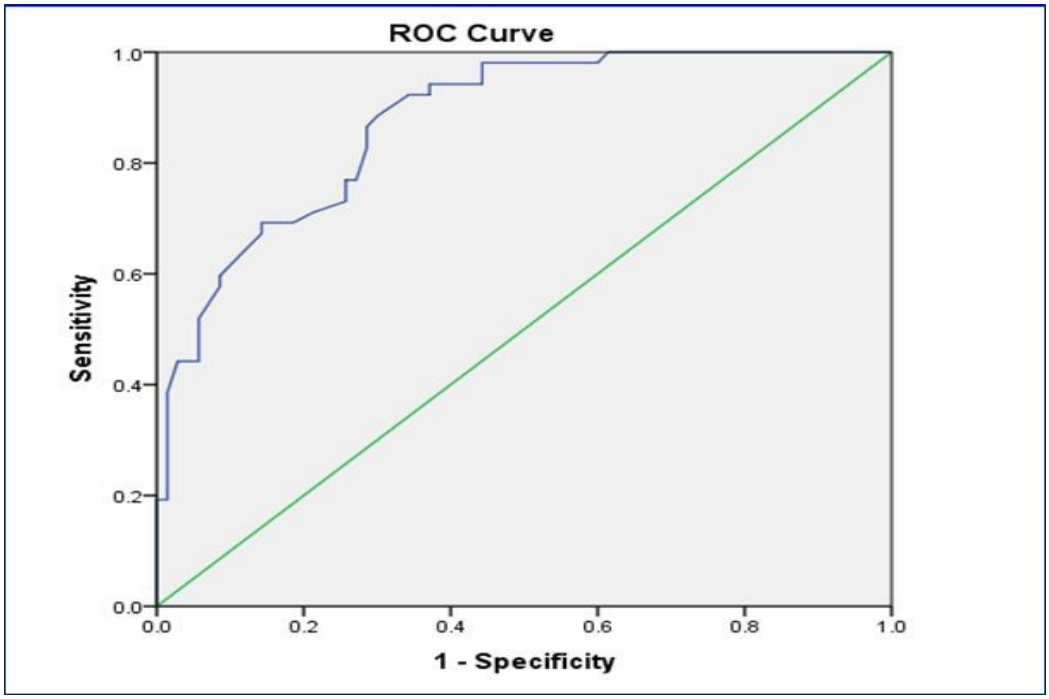

Figure 1:

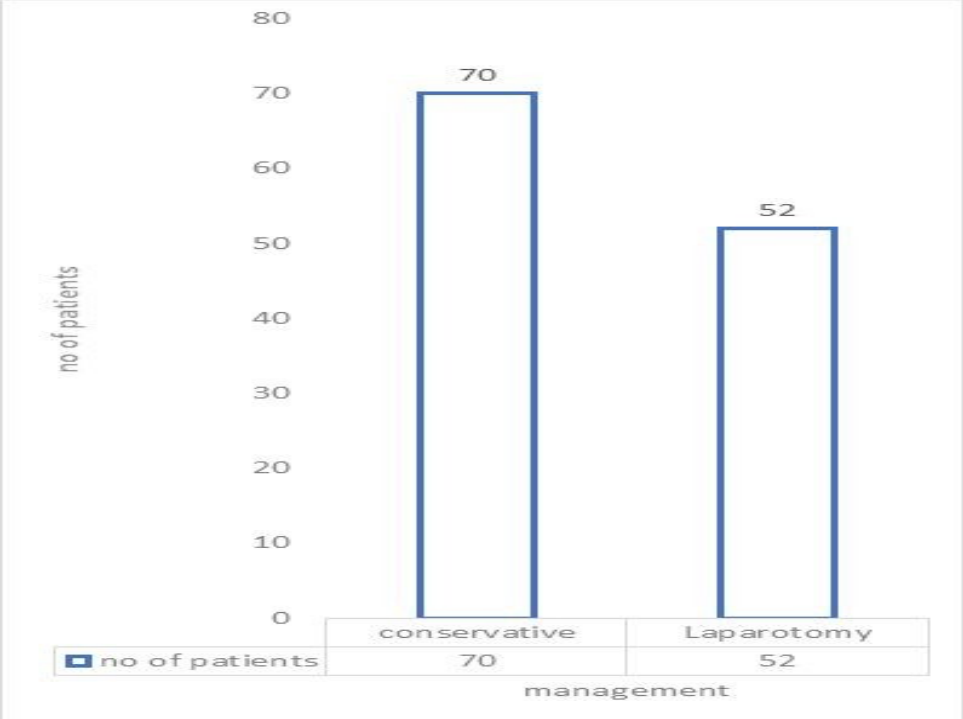

Figure 2:

Exp(3) -4.278+(2.216*gross fluid in abdomen)+(1.396*Pelvic fracture)+(2.255*Absence of bowel sounds)+(2.024*Rebound ten- derness)+(2.049*rigidity)+(1.916* Vomiting)-(1.129*Not receiving first aid) calculated in excel sheet. The sensitivity of the Novel scoring system is 76.9%, specificity of 74.3% and the index score of 0.43 as cut off was derived. If the value is more than or equal to 0.43 patient should be considered for laparotomy. If the score is less than 0.43 patient can be managed conservatively.

Table 1:

Variables	Beta values	significance
1.First aid	-1.129	0.28
2.Vomiting	1.916	0.007
3.Rigidity	2.092	0.008
4.Rebound tenderness	2.024	0.015
5.Bowel sound absent	2.255	0.005
6.Pelvic fracture	1.396	0.016
7.Gross free fluid on FAST	2.216	0.011

Specificity of 74.3% and the index score of 0.43 as cut off was derived. If the value is more than or equal to 0.43 patient should be con sidered for laparotomy. If the score is less than 0.43 patients canbe managed conservatively.

Discussion

This study provides a highly accurate scoring system for intraabdominal injury diagnosis in patients with blunt trauma abdomen based on clinical presentation such as patient history, physical exam, laboratory values and bedside FAST. In the current study, males were 8 times more commonly injured than females. Fifty-two patients underwent laparotomy for intraabdominal injury, and seventy patients were managed conservatively. The mean age was found to be 31.6 years, and most of the patients belonged to the age group of 19-35 years. A time delay of more than one hour was noticed in 100 patients, whereas 22 patients presented to the trauma care centre within 60 minutes of the accident (golden hour).

The most common mode of injury was road traffic accidents which were noted in 83 patients. Accidents were common in bike riders which constitute about 63 of the total RTA. 33 patients had a history of falls from height—at the same time, working on electrical poles, areca nut trees, coconut trees and skid and fallof elderly individuals.

In a road traffic accident case, 5 out of 78 wore a helmet, 7 hada history of alcohol intake and associated injuries were noted in 86 patients of a total of 122 patients. Among the 122 patients,44 received first at a local hospital and were referred to MKCG MCH, Berhampur for further management, and 68 patients did not receive any first aid. The most

common presenting complaint is pain abdomen (119) followed by abdominal distension (42), vomiting (25) and haematuria (7) figure (clinical symptoms).On physical examination, abdominal tenderness was present in 115 patients, concomitant injuries present in 84 patients, contusions over the abdominal wall and extremities noted in 57 patients, costal margin tenderness in 55 patients, rigidity was present in 26 patients, bowel sounds were absent in 20 patients, and rebound tenderness noted I 14 patients and no patient had seatbelt sign.

Vitals: 6 patients presented with bradycardia (60 beats per minute) and 25 with tachycardia (100 beats per minute).11 patients presented with hypotension (<90 mmHg), and 2 patients presented with hypertension.48 patients presented with tachypnoea (respiratory rate >20 per min). 2 patients had GCS between 8-12.

Lab values: 16 patients presented with haemoglobin of less than 8.9 gm/dl, and 42 patients had haemoglobin between 9-12 gm/dl. 67 patients had elevated AST, and 52 patients had ALT. 16 patients had elevated creatinine of more than 1.5 mg/dl.

Radiological assessment: 15 patients of 122 patients had pneumothorax and 5 had pneumoperitoneum, 45 had pelvic fractures. Bedside FAST scan done with linear probe of frequency 5-12 MHz and curvilinear probe of 3-6 MHz showed 31 patient had gross free fluid in abdomen (all the four-quadrant fluid was noted) and solid organ injury in 65 patients. Most common injured organ was the liver. All the patients with BTA underwent CECT abdomen and pelvis, and all the patients were positive for IAI.

The scoring system can prevent unnecessary CT scans in patients with suspected IAI after BTA and predict the need for laparotomy or conservative management. According to the novel scoring system, patients are classified into low and high risks groups. Low risk patients (score<0.43) do not need an abdominopelvic CT scan after BTA and can be discharged or kept under observation in the hospital without additional tests.

All high-risk patients (score>0.43) suffer IAI and immediately need medical or surgical care. 70 patients of 122 were in the low-risk group were managed conservatively, and 52 patients were in a high-risk group and were taken up for surgery (figure outcome).

A novel scoring system can predict whether the patient can be managed conservatively or requires surgery following blunt trauma abdomen as an accurate diagnosis benchmark. This system can also reduce healthcare costs of radiation in hemodynamically unstable patients and is easily applicable. A novel scoring system is a valuable tool, especially in hospitals where CECT is unavailable. Studies have been designed to present a reliable scoring system for IAI detection in BTA patients. In a study carried out by Afifi et al. [4], a 15 point scoring system based on five parameters including ED admission time post- trauma, pulse, systolic blood pressure, Glasgow coma score and 3 clinical signs of abdominal trauma consisting of abdominal pain, tenderness and guarding was designed. Patients have then categorized into three groups accordingly. Group I (score12) immediate laparotomy should be done. Group II (score between 11-9) requires further assessments, and patients under group III (score8) should be kept under observation.

Erfantalab-Avini et al. [5] also used Afifi's scoring system, and the reports were equivalent results with good sensitivity and specificity. Despite the importance and worthiness of Afifi's scoring system, it cannot be used in vast age groups. Afifi et al. Include children over two years old in their study, while the rate of hypotension in this age range is different from the adults. More importantly, all parameters have the same scores in their scoring system, while in practice, evaluated criteria have different weights. In their important study, cotton et e[6] showed out that the absence of abdominal tenderness, abrasion, ecchymosis, and normal liver enzymes in children can rule out IAI with a sensitivity of 100%. Poleti et al. [7] also found that IAI can be ruled out if abdominal physical exam, ultrasound, chest X-ray and laboratory findings (hematocrit, white blood cell, and serum glutamic oxaloacetic transaminase or aspartate transaminase) are normal.

Majid Shojaee et al. [8] used a 24-point blunt abdominal trauma scoring system (BATSS) developed based on sums obtained from each factor and categorized patients into low, moderate and high risk for IAI.

In our study, clinical presentation, laboratory values, and FAST results were taken. In the New scoring system laboratory, investigations were not considered, which was taken into consideration in our study. However, the laboratory variables in our study did not show a significant p-value. This scoring system helps the emergency physician to have a quick and ac- curate IAI diagnosis in patients suspected of BTA.

The small assessed population is a potential limitation of our present study. Large sample size may change other indices into statistically significant factors related to IAI diagnosis. However, this study may still be the most important and accessible diagnostic criteria because trauma is more common among the age range used. The limitations of this study include: delay in examining the patients on arrival to trauma care centre, administration of analgesics and intravenous fluids during resuscitation that may alter the vital measurements

and the investigators were not blinded during the study.

Conclusion

This Novel scoring system has the potential to reduce unwanted CT scans. But more research is required to increase the accuracy and identify potential errors.

References

1. Minino AM, Heron MP, Murphy SL, et al. Deaths: final data for 2004 [J]. Natl Vital Stat Rep. 2007; 55(19):1-119.
2. Chardoli M, Rahimi-Movaghar V. Analysis of trauma out- comes at a university hospital in Zahedan, Iran using the TRISS method [J]. East Afr Med J. 2006; 83(8):440-2.
3. Kendall JL, Kestler AM, Whitaker KT, et al. Blunt abdomi- nal trauma patients are at very low risk for intra-abdominal injury after emergency department observation [J]. West JEmerg Med. 2011; 12(4):496-504.
4. Afifi RY. Blunt abdominal trauma: back to clinical judge- ment in the era of modern technology [J]. Int J Surg. 2008;6(2):91-5.
5. Erfantalab-Avini P, Hafezi-Nejad N, Chardoli M, et al.Evaluating clinical abdominal scoring system in predict- ing the necessity of laparotomy in blunt abdominal trauma [J]. Chin J Traumatol. 2011;14(3):156-60.
6. Cotton BA, Beckert BW, Smith MK, et al. The utility of clinical and laboratory data for predicting intraabdominal injury among children [J]. J Trauma. 2004; 56(5):1068-74.
7. Poletti PA, Mirvis SE, Shanmuganathan K, et al. Blunt ab- dominal trauma patients: can organ injury be excluded without performing computed tomography [J]? J Trauma. 2004; 57(5):107281.
8. Majid Shojaee, Gholamreza Faridaalaee, Mahmoud Youse- fifard, Mehdi Yaseri, Ali Arhami Dolatabadi, Anita Sabzghabaei, Ali Malekirastekenari. New scoring system for intra-abdominal injury diagnosis after blunt trauma. 2014; 17(1):19-24. 19.