

## A study on the clinical spectrum and treatment modalities for blunt abdominal trauma at a teaching hospital in North East India

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### Abstract:

**Background:** Blunt abdominal trauma (BAT) caused mostly due to road traffic accidents is a common emergency requiring high degree of suspicion, investigation and management. Trauma is the leading cause of blunt abdominal injury. Blunt abdominal traumas pose diagnostic and therapeutic challenge often even to experienced surgeons. Early diagnosis and effective management help in decreasing mortality in blunt abdominal trauma. This study was conducted to evaluate the clinical spectrum and treatment modalities used for patients presenting with blunt abdominal trauma at NEIGRIHMS Hospital, Shillong.

**Materials and Methods:** This cross-sectional study was carried out on 100 patients of BAT who were managed during the time period between January 2016 to December 2021. Documentation of patients included identification, history, clinical findings, diagnostic tests, operative findings, operative procedures, and complications during the hospital stay and subsequent follow-up period which were recorded on a patient proforma specially prepared. Data was plotted in Microsoft excel sheet, calculated in absolute numbers and presented in percentage scale. Graphical representation of the data is shown in Microsoft word.

**Results:** Blunt trauma to the abdomen was most common in males in the 3<sup>rd</sup> decade of life. Road Traffic Accidents (RTA) was the most common cause of blunt trauma abdomen followed by fall from height. Among the RTA patients, four wheelers were more commonly involved than two wheelers. Liver was the most common organ to be injured followed by spleen and small bowel. Among the hollow viscera, jejunum was the most commonly injured organ. Plain abdominal radiograph in erect position had 100% accuracy in detecting hollow viscus injury. Majority of the patients were managed conservatively and only a third or exactly 38% patients underwent operational exploration. Resection anastomosis was the most commonly performed procedure and wound infection was the most common post-operative complication observed. One patient succumbed to his injuries, while the remaining 99 patients recovered.

**Conclusion:** The productive age group from 20-40 years constitutes a significant proportion of BATs. Males are at a higher risk of RTAs. RTA is the commonest mode of BAT. Liver is the most common organ injured in BAT. Early diagnosis and prompt treatment of BAT was associated with a favourable outcome.

**Key Word:** Trauma; Blunt; Abdomen; Clinical spectrum; Management.

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### I. Introduction

Blunt abdominal trauma (BAT) is one of the leading preventable causes of unnatural death in developed and developing countries [1] accounting for the majority (80%) of abdominal injuries seen in Emergency Department [2]. The rapid increase in number of motor vehicles and its aftermath has caused rapid increase in the number of victims of BAT accounting for as much as 75%–80% of BAT. [3]

BAT is the third most common form of injury in RTA after orthopaedic and head injuries and as the victims are mostly young, productive adults, it has enormous socioeconomic impact. [4] The spleen and liver are the two commonly injured solid organs in blunt injury to abdomen. Injuries to the pancreas, bowel, mesentery, bladder, diaphragm, kidneys, abdominal aorta, are less common. Injuries to the kidney and urinary bladder maybe associated with pelvic fractures and retroperitoneal haemorrhage. [5] About 85% of abdominal traumas are blunt in character. [6] Blunt trauma to abdomen is particularly deceptive as the clinical manifestations of the injury may be delayed for hours or days even though internal damage is serious and

sometimes lethal. Diagnosis of visceral injuries following blunt trauma abdomen is relatively difficult in comparison to the penetrating injuries; which is quiet conspicuous. Diagnosis of abdominal injury is an important step in the treatment process to prevent morbidity or mortality in BAT cases. Rapid identification of cases requiring emergency laparotomy is crucial for life saving, especially in unstable patients. Rapid resuscitation is necessary to save the hemodynamically unstable but salvageable patient with abdominal trauma. Computed Tomography (CT) is currently the most accurate examination for this situation. [7, 8]

## **II. Material And Methods**

This prospective cross-sectional study was carried out on patients of Department of General Surgery at North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences, Mawdiangdiang, Shillong, Meghalaya from January 2016 to December 2021. Total 100 subjects (both male and females) with blunt abdominal trauma were included in this study.

**Study Design:** Prospective cross-sectional study

**Study Location:** This is a tertiary care teaching hospital based study done in Department of General Surgery, at North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences, Mawdiangdiang, Shillong, Meghalaya.

**Study Duration:** January 2016 to December 2021.

**Sample size:** 100 patients.

**Sample size calculation:** The sample size was determined by the number of patients who presented to NEIGRIHMS with blunt abdominal trauma during the study period (January 2016 to December 2021) .

**Subjects & selection method:** The study population was drawn from patients who presented to NEIGRIHMS with blunt abdominal trauma consenting participation in the study.

### **Inclusion criteria:**

All patients of BAT without penetrating injury attending NEIGRIHMS, Shillong consenting to participate in the study were included.

### **Exclusion criteria:**

1. Patients who did not give consent.
2. Patients with penetrating abdominal trauma or combined (penetrating and blunt).
3. Patients with significant other system injury requiring surgery.
4. Patients referred to other centres.
5. Pregnancy.
6. Patients who were so severely injured that they did not survive attempts at resuscitation.

### **Procedure methodology**

This cross-sectional study was carried out on 100 patients of BAT who were managed during the time period January 2016 to December 2021. Primary survey of the patient was conducted in all patients as per ATLS protocol which included assessment of the airway, breathing, circulation, disability/neurologic evaluation and exposure/environmental control.

Secondary survey included systematic head to toe examination including abdomen, chest, genito -urinary system, CNS and musculoskeletal system.

Routine blood investigations were sent for all the patients. Depending on the clinical findings; decision was taken for further investigations such as, abdominal X-ray, abdominal ultrasound and contrast-enhanced CT scan. The decision for operative or non-operative management depended on the outcome of the clinical examination and results of diagnostic tests.

Patients were taken for laparotomy based on one or more of the following findings:

1. Clinical deterioration with increasing abdominal distension.
2. Unexplained sustained hypotension (systolic B.P. & lt; 90 mm. of Hg.) and not responding to I.V. fluid infusion.
3. Free air on erect abdominal radiograph.
4. Hemoperitoneum finding on FAST or DPL.

5. Free intestinal contents on USG guided aspiration.

Patients selected for non-operative management were placed on strict bed rest and subjected to serial clinical examinations that included hourly pulse rate, blood pressure, respiratory rate, and repeated examination of abdomen and other systems.

Appropriate diagnostic tests, especially ultrasound of abdomen, were repeated as and when required. Operative findings were noted wherever laparotomy was performed.

Finally all the data thus collected, was plotted in Microsoft Excel sheet, calculated in absolute numbers and presented in percentage scale. Graphical representation of the data was done in Microsoft word.

### Statistical analysis

Demographic data collected included the age, sex and religion, influence of alcohol and time interval between the incident and arrival to hospital. After initial resuscitation and achieving hemodynamic stability, all patients were subjected to careful examination. Collected data was plotted in Microsoft Excel sheet, calculated in absolute numbers and presented in percentage scale. Graphical representation of the data was done in Microsoft word.

### III. Result

A total of 100 patients were included in the study. The age of the patients ranged from 4 to 75 years. Mean age was 28.87 years. Out of the 100 patients in the study, 78 were males. 28 patients (26 male and 2 female) were under the influence of alcohol.

Sixty two patients were brought to hospital within 6 hours of incident, 9 patients between 6-10 hours and 29 patients were brought after 10 hours of occurrence of incident.

In 69 patients BAT was caused by RTA, 17 had BAT due to fall from height, 7 had BAT due to assaults, 5 suffered BAT due to sports injury and 2 had BAT due to fall of heavy objects in their workplaces.

Among the 69 RTA cases, 2-wheelers were involved in 12 cases, 3-wheelers in 3 cases, and 4-wheelers in 65 cases.

Pain abdomen was the most common symptom, associated in 98 patients, followed by abdominal distension in 48 patients, breathing difficulty in 36 patients, vomiting in 10 patients and urinary retention in 1 patient.

Abdominal tenderness was noted in 72 patients and 20 patients presented with guarding and rigidity. Tachycardia was observed in 50 patients and 38 patients presented with hypotension.

Shown in Table 1 is organ involvement in patients with BAT.

**Table no 1: organ involvement in patients with BAT**

Organ involved	Number of patients
Liver	34
Spleen	30
Small bowel	24
Large bowel	5
Mesentery	5
Kidney	3
Pancreas	2
Urethra	2
Urinary bladder	1
Stomach	1

Among the associated injuries, the most common injury was chest trauma which was present in 36 patients followed by musculoskeletal injury which was present in 34 patients and 22 patients had associated head injury.

Plain abdominal radiograph in erect position showed free air under diaphragm in all 28 cases of hollow viscus injury. FAST detected free fluid/ hemoperitoneum in 80% of BAT cases. CT scan detected liver injuries in 34 cases, splenic injuries in 30 cases, haematomas in 3 patients, urethral injury in 1 patient and mesenteric injury in 1 patient.

Non-operative management was adopted in 62 patients while the rest 38 patients were operated upon. The most commonly performed operation was resection anastomosis of bowel which was done in 15 patients followed by primary repair of perforation which was done in 13 patients. Splenectomy and Primary repair of mesenteric tear was performed in 5 patients each. Colostomy and Ileostomy was performed in 3 patients and 1 patient respectively. 2 patients underwent Distal Pancreatectomy. Right Hemicolectomy, Gastrojejunostomy and Nephrectomy were performed in 1 patient each.

Table 2 is showing the organ wise treatment modality used in the patients.

**Table no 2:** organ wise treatment modality used in the patients with BAT

Organ	Management done	Number
Liver	Conservative	34
Spleen	Conservative	25
	Splenectomy	5
Small bowel	Resection anastomosis	11
	Primary repair of perforation	9
	Both	4
Large bowel	Colostomy	3
	Ileostomy	1
	Right hemicolectomy	1
Mesentery	Primary repair	5
Kidney	Conservative	2
	Nephrectomy	1
Pancreas	Distal pancreatectomy	2
Urethra	Conservative	2
Urinary bladder	Conservative	1
Stomach	Gastrojejunostomy	1

#### IV. Discussion

Majority of patients (40%) in the present study belonged to the productive age group of 21-30 years, which is comparable to studies by Gopalakrishnan V, Anandaraja S, et al. [26], Goyal M, Kumar L, Dobhal D [28], Mousami Singh et al [10] and Nikhil Mehta et al [12].

Males were more commonly involved in patients with BAT than females in the ratio of 3.55:1 which is consistent with the studies by Sisodiya S, Malpani P et al [25], Goyal M, Kumar L, Dobhal D [28], Mousami Singh et al at 3.58:1 [10], Nikhil Mehta et al. at 3.76:1 [12], Vudutha Srihari et al at 4:1 [17] and Surendra K Kala et al at 3.58:1. [18] The male predilection has been postulated to be due to the fact that adult males are more engaged in active outdoor activities like fast driving, aggressive behaviour and influence of alcohol in contrast to females consistent with Davis JJ, Cohn Jr IS et al [21], Sule AZ, Kidmas AT et al [22].

In the present study, 28% of patients were under the influence of alcohol. Sonia Oliveira Lima et al [15] also found influence of alcohol in 31% patients similar to the present study, whereas Jakkam Surender et al. [23] could attribute only 7.41% of their series to alcohol.

Majority of the patients 62% were brought to the hospital within 6 hours of injury, similar to the study by Shantanu Kulkarni et al [20] where 70% of patients presented to the hospital early within 4 hours of trauma. This can be explained by the widespread availability of transportation facilities including dedicated ambulance services.

The most common cause of blunt injury abdomen in the present study was RTA 69%, similar to the findings of Sisodiya S, Malpani P et al [25], Goyal M, Kumar L, Dobhal D [28], Mousami Singh et al. at 70.91% [10], J. L. Kumawat et al. at 68% [14], Amesh Kumar Rajaket al. at 71.66% [16] and Surendra K Kala et al. at 72.72%. [18].

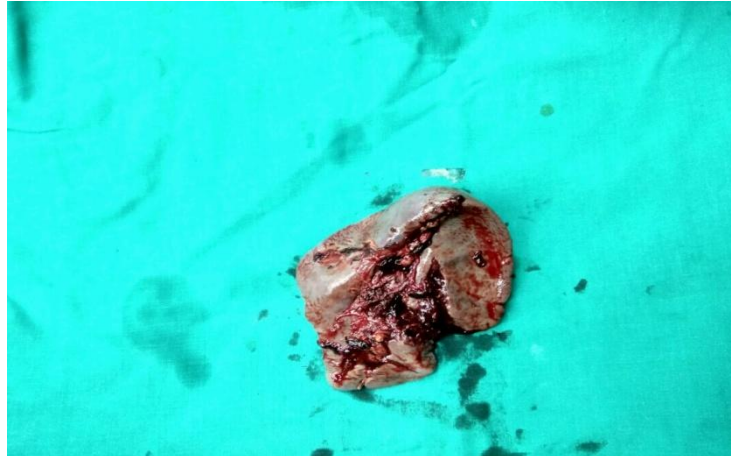
In the present study, liver was the most common organ involved (34%) followed by spleen (30%) which was consistent with the studies by Sisodiya S, Malpani P et al [25], Goyal M, Kumar L, Dobhal D [28], Hemang A Panchal et al. [13] and Arumugam et al. [19]. However, Maurice Asuquo et al. [11], Nikhil Mehta et al. [12], Amesh Kumar Rajaket al. [16] found spleen to be the most common organ injured in their studies.

Plain abdominal radiograph in erect position showed free air under diaphragm in all 28 patients (100%) in the study group with hollow viscus injury, similar to the findings by Vudutha Srihari et al [17] and Mohapatra et al [24].

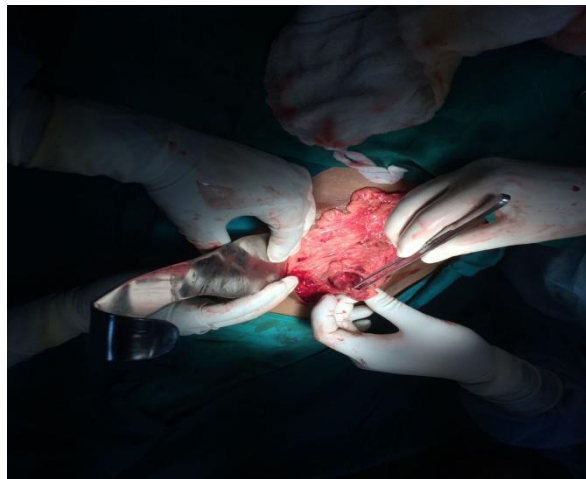
Majority (62%) of cases of BAT were managed non operatively. Only 38% of cases underwent surgery which was similar to the series by Mohapatra et al [24] who reported 39% laparotomy rates in their series.

Wound infection was the most common post-operative complication in the present series at 8.42%. However, higher wound infection rates have been reported in studies by Vudutha Srihari et al [17] and Surendra K Kala et al [18] with incidences at 29.26% and 27.58% respectively.

Mortality rate in the present series was at 1%, which is in sharp contrast to studies conducted by Ahmed MHS, Tamgadge LV, et al who reported a mortality incidence of 13.3% [27], Gupta et al who reported a mortality incidence of 11.11% [9].



**Figure 1:** Splenic Laceration in a 32 year old female due to RTA



**Figure 2:** Colonic perforation in a 32 year old male due to RTA



**Figure 3:** Jejunal Perforation in a 20 year old male due to RTA



**Figure 4:** Ileal Perforation in a 16 year old male due to RTA

## V. Conclusion

The productive age group from 20-40 years constitutes a significant proportion of BATs. Males are at a higher risk of RTAs. RTA is the commonest mode of BAT. Liver is the most common organ injured in BAT. Early diagnosis and prompt treatment of BAT was associated with a favourable outcome.

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