

## EVALUATION AND MANAGEMENT OF BLUNT TRAUMA ABDOMEN: EXPERIENCE WITH 132 CASES AT CHITTAGONG MEDICAL COLLEGE HOSPITAL

M A Mushfiqur Rahman<sup>1</sup> Md Abdullah Al Farooq<sup>1</sup> Md Akbar Husain Bhuiyan<sup>2</sup>  
Md Minhajuddin Sajid<sup>1</sup> Tanvir Kabir Chowdhury<sup>3</sup> Md Shahid Hossain<sup>4</sup>

### Summary

*Identification and management of serious intra abdominal and associated injuries due to blunt mechanisms are challenging. This study aims to evaluate current approach to manage such patients in a leading teaching hospital of a low income country. Methods: This prospective study was carried out in the departments of General surgery and Paediatric surgery, Chittagong Medical College and Hospital; Chittagong; Bangladesh from July, 2001- June, 2002. Total 132 patients suffering from blunt abdominal trauma (BAT) were evaluated. Results: The majority of the trauma victims aged 30 years and below with male predominance. Road traffic accident (RTA) was the leading cause (57.57%). Sixty eight percent (68%) patients were brought to the hospital within 24 hours of injury. Abdominal pain was the commonest mode of presentation (83.33%). External signs of injury in abdomen were noticed in only 39% patients. The most important abdominal finding was features of peritonitis (generalized muscle guard/ rigidity 56% and localized 42%) and absence of bowel sound (73%). Plain X-ray abdomen (100%) and Ultrasonography (USG) were the principal imaging tool (46.87%). Extra abdominal associated injuries were found in 55% patients. Thirty four patient (26.56%) were managed non-operatively. Ileum injury was maximum (21.87%) and liver was the most frequently injured solid organ (14.06%). Wound infection (23.40%), wound dehiscence (17%) and anastomotic leakage (10.63%) were the complications related with laparotomy. Total 8 patients died (mortality 6.06%). Conclusion: Early detection of abdominal visceral injury by proper clinical evaluation and imaging is the key for successful management. The main danger is on delay, not always to the extent of injury- as most of the blunt abdominal trauma patients are amenable to surgical treatment.*

1. Assistant Professor of Pediatric Surgery  
Chittagong Medical College & Hospital, Chittagong
2. Associate Professor of Pediatric Surgery  
Chittagong Medical College & Hospital, Chittagong
3. Post Graduate Student of Pediatric Surgery  
Chittagong Medical College, Chittagong
4. Professor of Surgery  
Dhaka Medical College, Dhaka

Correspondence : Dr M A Mushfiqur Rahman  
e-mail : piku71@yahoo.com

### Key words

Blunt abdominal trauma; evaluation; management.

### Introduction

Blunt abdominal trauma (BAT) is a leading cause of morbidity and mortality among all age groups. Evaluation of patients with BAT may pose a significant diagnostic challenge even to the most seasoned trauma surgeon. Blunt trauma produces a spectrum of injury from minor single system injury to devastating multisystem trauma. Many injuries may not manifest during the initial assessment and treatment period. Trauma surgeons must have the ability to detect the presence of intra abdominal injuries across its entire spectrum. Associated injury may divert the physician's attention from potentially life threatening intra abdominal pathology. A review from Singapore described trauma as the leading cause of death in 1-44 years age group and BAT accounted for 79% of causes [1]. Similar paper from India reported that BAT is more frequent in males aged 21-50 years; the majority was injured in automobile accidents [2]. A study from Nigeria showed that majority of the BAT patient are due to RTA and mortality was 17.24% [3]. A review from Australia of 'intestinal injuries in blunt trauma' reported that 85% of injuries occurred from vehicular accidents, mortality rate was 6 percent [4]. In the United States one review from the National Pediatric Trauma Registry by Cooper et al reported that 8% of all pediatric trauma patients had abdominal injuries and 83% of them from blunt mechanisms and 9% of them died; fifty nine percent (59%) of these blunt abdominal traumas were automobile related [5]. We conducted a prospective study to evaluate current management approach of BAT in a teaching hospital with limited facilities.

### Materials and methods

All patients admitted in the general surgery and pediatric surgery units of Chittagong Medical College Hospital with abdominal trauma due to blunt mechanisms during the period July, 2001 to June, 2002 were included in this study. Few patients left hospital within few hours of admission prior to proper evaluation and so excluded. Total 132 (n=132) patients were evaluated according to a

performed protocol with immediate resuscitative measures if required. Age and sex distribution, mode of injury, mode of presentation, time lapse following injury, clinical findings in abdomen, imaging and procedures were done , associated extra abdominal injuries, injured intra abdominal organs, complications in operatively and non-operatively treated patients, mortality were all recorded. Four died during the process of resuscitation so imaging and definitive treatment were not possible in these patients.

**Results**

*Age and Sex distribution (Fig -1)*

The majority of the trauma victims aged 30 years and below and most of the patients were male.

*Mode of injury (Fig-2)*

In our study RTA was the leading cause. Blow on abdomen and fall from height were the other two important mechanisms.

*Time lapse following injury*

Most of the patients were brought to the hospital within 24 hours (<6hr- 38%; 6-24 hours-30%) of injury. Thirty two percent (32%) patients admitted after 24 hours.

*Mode of presentation*

Pain abdomen (83.33%) was the commonest mode of presentation in abdominal trauma. Few patients presented with shock (16.66%). Hematuria (19.69%) and retention of urine (13.63%) were important presentation in genitourinary trauma.

*Clinical findings in abdomen (Table-I)*

External signs of injury in abdomen like bruise, abrasion, hematoma were noticed in only fifty-two patients. The most important finding was features of peritonitis in the form of generalized or, localized muscle guard and rigidity and absence of bowel sound.

*Imaging investigations used to assess BAT (n=128)*

Plain X-ray abdomen (100%) and USG (46.87%) were the common imaging modalities used in BAT patients. Intravenous urography (IVU) was done in selected cases of genitourinary trauma (08 patients, 6.25%). Beside these Diagnostic peritoneal lavage (DPL) was helpful in ten patients.

*Frequency of associated injuries (Fig-3)*

Extra abdominal injuries were found in 72 patients. Commonly affected areas were limb, head, chest and pelvis.

*Abdominal visceral injury as revealed by laparotomy and imaging (Table II)*

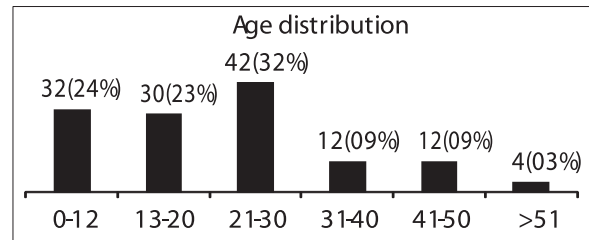
Gut injury constituted the main bulk of abdominal visceral injury in this series. Small gut was affected far more than large gut. Ileal injury was the highest. Liver was the most frequently injured solid organ in comparison to spleen and kidney.

*Management*

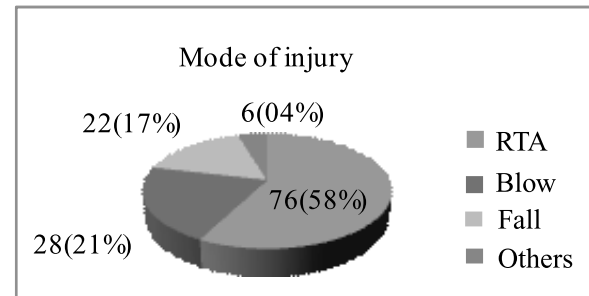
Out of 128 patients 34 patients (26.56%) were managed nonoperatively and 94 patients (73.44%) needed surgical exploration.

*Complications (Table III)*

Phlebitis was the most common complication observed in both group of patients treated either nonoperatively or, operatively. Wound infection, wound dehiscence and anastomotic leakage were the complications related with laparotomy. Total eight (6.06%) patients died. Out of them 4 patients due to irreversible shock prior to any surgical intervention and four died after surgical intervention due to septicemia with Multi Organ Dysfunction Syndrome (MODS).



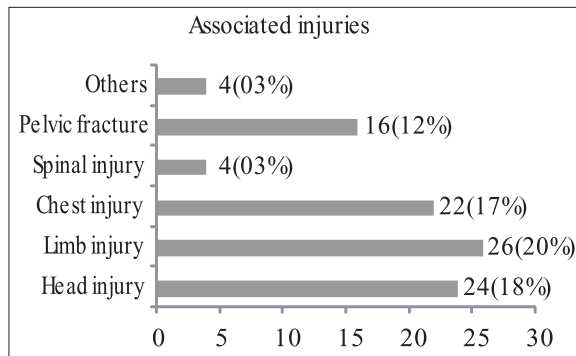
**Fig 1:** Age distribution in number of patients



**Fig 2:** Mode of injury in number of patients

**Table I :** Examination findings in abdomen

Examination findings	Number of patients (n=132)	Percentage (%)
Bruise/ Abrasion/Hematoma	52	39
Abdominal distension	80	61
Generalized muscle guard	74	56
Localized muscle guard	56	42
Absent bowel sound	96	73



**Fig 3:** Associated injuries in number of patients

**Table II:** Abdominal visceral injury

Viscera affected		Number of patient (n=128)	Percentage (%)
Solid organs	Liver	18	14.06
	Spleen	14	10.93
	Kidney	14	10.93
GI Tract	Duodenum & Pancreas	04	3.12
	Jejunum	20	15.62
	Ileum	28	21.87
	Colon	08	6.25
	Rectum	02	1.56
	Appendix	02	1.56
	Mesentery	08	6.25
Urinary tract	Urinary Bladder	06	4.68
	Urethra	08	6.25
	Prostate	02	1.56
Retroperitoneum	Hematoma	20	15.62

**Table III :** Complications in nonoperatively and operatively treated groups

Complications		No. of patients	Percentage (%)
Non-operatively treated (n=34)			
	Phlebitis	08	23.52
	Respiratory tract infection	06	17.64
	Urinary tract infection	05	14.70
Operatively treated (n=94)			
	Wound infection	20	21.27
	Wound dehiscence	16	17.02
	Respiratory tract infection	14	14.89
	Urinary tract infection	14	14.89
	Anastomotic leakage	10	10.63
	Phlebitis	22	23.40
	Malaria	02	1.51
	Septicemia	04	3.03

## Discussion

No age is immune against trauma. The majority of our study group aged 13-30 year (55%), though pediatric trauma patients up to 12 year age constituted an important bulk (24%) as in fig-1. This figure represents that the victims are those who are most active in their daily life and thus they are subjected to trauma both on the road and in working place. In our study male 104, female 28; (M-79%, F-21%) but in western studies it is around 60:40 [6]. Possibly ours is a conservative Muslim society where less women have to travel in public transport and very few of them are involved in violence. A similar study in Nigeria observed BAT was more frequent in male's aged 21-40 years [3].

Majority of the blunt abdominal trauma victims were due to RTA (58%) and blow on the abdomen (21%) due to assault or, during playing or, performing professional work (fig-2). JB Fitzgerald [7] and associates of Houston, Texas showed RTA was the cause in 83.4% of BAT victims. This difference reflects the standard of living between developed and developing countries- where almost every individual has a transport. Violence and assault also reflect the human values in the society. Incidence of fall from height in our study is 17%, a German study observed 5.9% patients of all BAT from vertical deceleration injuries (i.e. fall from height) [6]. In our study fall from height were mostly during climbing trees in summer and early monsoon to pluck common summer fruits specially mango and rest of the accident occurred during construction of multistoried buildings. A paper from Calcutta, India reported 55.32% RTA, 19.15% fall from height, 14.89% blow, 10.64% fall of heavy weight as mode of intestinal injury from BAT [2].

Only sixty eight percent (68%) of BAT patient reached our center within 24 hours of incident of trauma. Patient admitted late were difficult to manage with higher morbidity and mortality [8,9]. Delayed admission was common in gut injuries without any external signs in abdomen. In developed country trauma patients are expected to reach at nearby trauma center within 15-30 minutes of incident of trauma and treatment starts with minimum or, no delay at trauma scene by well trained paramedics [10]. But in our set up it is obvious that significant delay occurred in referral of trauma victims from Thana or, district level where facilities to manage these patients are very limited.

Abdominal pain (83.33%) was the most important complain observed following BAT. Hematuria and retention of urine reflect underlying genitourinary

trauma. Few patients presented with hemorrhagic shock due to solid organ injury and hypovolumic shock due to gut injury with delayed admission. Four patient of shock had died during the process of resuscitation. Abdominal pain with pallor was the symptom observed in late presentation of liver (2 patient) and splenic (2 patient) injury and jaundice was the associated finding in delayed presentation of liver injury. Per rectal bleeding following BAT represents colorectal injury. A study from Nigeria also observed abdominal pain, tenderness and hypovolumic shock as main presentation [3].

Serial systemic examination of abdomen plays the pivotal role for evaluation and management of BAT patients with or, without any external evidence of injury in abdomen after resuscitation if needed. Two studies from Nigeria, Africa recommended proper clinical examination is the maintool to evaluate BAT patient in countries with limited facilities [11,12].

In our series only 39% patient had external signs like bruise, abrasion, hematoma in abdominal wall (Table-I). The most important finding to be emphasized are features of peritonitis in the form of generalized (56%) or, localized muscle guard and rigidity (42%) and absent bowel sound (73%); which indicate significant injury to intra abdominal organs and these findings are enough to adopt an operative approach specially in suspected gut injury [10,13,14]. The more efficiently a surgeon will elicit these findings on examination, the less the chance of mismanagement of these patients.

Plain X-ray abdomen (100%) and Ultrasonography (46.87%) were the most available imaging facility in our center. It was recommended that USG should be the imaging of choice in hemodynamically unstable patient and CT scan for stable patient as diagnosis of abdominal injury by clinical examination alone is unreliable [15]. DPL was helpful in unstable or, equivocal patients where decision of laparotomy from clinical data and imaging was either difficult or, unreliable [16,17]. Any lengthy diagnostic workup is counterproductive; the specific tests should be selected after obtaining a reliable physical examination finding, clinical stability of the patient and the providers access to a particular modality [1,6].

In our series extra abdominal associated injuries were found in 72 (55%) patient. Injury to head, limb, chest and fracture pelvis were the most frequent association (fig-3). All observed associated injuries in extremities, chest and head in 28 (about 48%) out of 58 BAT patient [3]. So, appropriate attention should be paid for detection and management of other associated injuries.

Proper application of head to toe examination as instructed in secondary survey of ATLS guideline should be practiced in managing any trauma patient [10,18]. The more is the incidence of RTA the more will be the patients of multiple injuries and most of these patients succumb to these associated injuries specially head and chest; but not due to abdominal trauma [7,19,20].

The pattern of abdominal visceral injuries in this series (Table-II) was different from findings of some similar western studies. Kemmeter et al observed only 5.3% enteric injuries in BAT patients that needed laparotomy [21]. A study carried out by Ameh and Nmadu found 23% gut injury [22]. In our study gut affected in 49.98% patients. Predominance of solid organ injury was also obvious in a study by Fitzgerald [7]. This difference in findings was possibly due to failure of solid organ injury patients of our country to reach the hospital in time as most of them in hemorrhagic shock as we lack any well organized pre hospital trauma care like western world [23], so our patients succumbed to this sort of injury prior to hospitalization.

Thirty four patients were successfully treated non-operatively and majority of them (22 in no.) were hemodynamically stable isolated solid organ injury - confirmed with imaging. In modern practice the management protocol for intra-abdominal solid organ injury is conservative by close clinical monitoring with hightech screening facilities specially in hemodynamically stable patients [15, 24 -30]. Laparotomy was done in- all patients of enteric injury, hemodynamically unstable solid organ injury and injury to urinary bladder except two patients of suspected enteric injury with pneumoperitoneum in X-ray; who refused operation. These 2 patients improved with conservative treatment. Small gut injuries were treated either by simple repair or, by resection anastomosis. Colorectal injuries required either repair with proximal colostomy or, exteriorization where feasible. Splenectomy was needed in 12 patients, suture hepatorrhaphy in 5 and in 4 patients of liver injury no active interventions needed as bleeding already stopped at the time of exploration. Nephrectomy was done in one patient for avulsion of renal pedicle. Two pediatric renal trauma patients needed pyeloplasty for ruptured pelvis of hydronephrotic kidneys with congenital pelviureteric junction obstruction - also mentioned by Ameh [12].

Out of 94 operatively treated patients- 61 patients (65%) were operated within 24 hours of admission. Significant delay occurred in rest of the patients and



these patients were in increased risk of morbidity and mortality [8,9,31]. In these cases the patient/patient's guardians took their time to give consent for surgery which reflected poor patients counseling, low level of patient's awareness/education as well as their apprehension about general anesthesia and major surgery.

Phlebitis was the most common complication observed in both group of patients (Table-III) treated either nonoperatively (23.5%) or, operatively (23.4%). Wound infection (23.40%), wound dehiscence (17%) and anastomotic leakage (10.63%) were the complications mostly related with laparotomy for gut injury which were almost similar to the findings of Mukhopadhyay [2] and the reasons behind unusual delay in discharge. Total eight (6.06%) patients died; out of them 4 patients due to irreversible shock prior to any surgical intervention and four died after surgical intervention due to septicemia with MODS. Patients that died after surgery were of pancreatico-duodenal injury (2 in no.) and 2 patients with gut injury having delayed admission. Alli observed 17.24% mortality in his series [3].

### Conclusion

This study reveals that early detection of abdominal injury is the most important part of evaluation for successful outcome. In our perspective clinical evaluation still remains the main tool for diagnosing concealed intra-abdominal injury. Life threatening complications may arise if patients are not able to reach the hospital in time where all facilities to treat the trauma victims should exist. Prompt management and early laparotomy when needed must be the rule rather than exception. Successful trauma care depends on skillful and dedicated team effort comprising surgeons of multiple disciplines led by general surgeons with adequate supporting staffs.

### Disclosure

All the authors declared no competing interest.

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