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**Original Research Article**

# A retrospective clinical study on blunt trauma abdomen and its management

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## ABSTRACT

**Background:** Blunt trauma abdomen is a common surgical emergency which may present as an isolated problem or as a part of poly trauma. Road traffic (automobile) accident is the most common cause of blunt trauma abdomen.
**Methods:** After initial resuscitation and achieving hemodynamic stability, all patients were subjected to careful history and clinical examination. Depending on the clinical findings, decision for further investigations as four-quadrant aspiration, X-ray of chest and abdomen erect view and abdominal ultrasound were taken. The decision to operate or non-operative management depended on the outcome of clinical examination and results of diagnostic tests.
**Results:** This is a clinical study of 100 patients who were admitted, treated and followed up in Gauhati Medical College and Hospital, Guwahati, Assam, India from 1st July, 2015 to 30th June, 2016. In this study, the incidence of blunt trauma abdomen was found to be 69.78% out of all abdominal trauma patients. The most common cause was found to be road traffic accidents (67%). The commonest age group was 21 to 30 years comprises about 39% of patients. The average age was 30.82 years. Spleen was the most common organ involved (44%). 53.52% of patient having solid organ injured was managed conservatively. Out of 60 operative cases, 25 (41.7%) cases were operated within 3-6 hours.
**Conclusions:** Patients with blunt trauma abdomen should have early and accurate diagnosis and prompt, proper and prudent management to improve overall prognosis.

**Keywords:** Blunt trauma abdomen, Non operative management, Operative management, Road traffic accidents

## INTRODUCTION

Abdominal injuries occur in approximately 1% of all trauma patients.[1] Usually, abdominal organ injuries alone are responsible for 10% of total trauma caused mortality.[2]

Blunt trauma abdomen (BTA) is a common surgical emergency which may present as an isolated problem or as a part of poly trauma.[3] Road traffic (automobile) accident is the most common cause of blunt trauma abdomen.[4] Blunt trauma abdomen can result from deceleration, crushing or external compression mechanism.[5]

Abdomen is considered as a diagnostic magic box by the surgeons. Physical examination of abdomen alone is unreliable for decision making in blunt trauma abdomen.[6,7] Few main reasons being the presence of distracting injuries, an altered mental state, and co-existing drug and alcohol intoxication in patients.[8] Sometimes exact injury is diagnosed only when abdomen is opened either during operation or during autopsy.[6]

Generally, different diagnostic modalities in abdominal injuries include diagnostic peritoneal lavage (DPL), focused abdominal sonography for trauma (FAST), and computerized tomographic (CT) scan. Where, these

facilities are unavailable or unaffordable as in developing countries, it is better to open and see the abdomen than to wait.[9]

The initial hours of blunt trauma abdomen are extremely crucial for the patient. Introduction of ambulance services 108 (Toll free number) has given very positive result by early transportation of injured patient.[10] Concealed hemorrhage is the second most common cause of death after blunt trauma abdomen, and missed abdominal injuries are a frequent cause of morbidity and late mortality in patients who survive the early period after injury.[11] Close supervision and early institution of proper management results in decreased morbidity and mortality.[10]

The care of the trauma patient is demanding and requires dedication, diligence and efficiency. Evaluation and diagnosis of a patient of blunt trauma abdomen remains one of the most challenging aspect of acute trauma care.[8]

Automobile injury is the most common cause of admissions in the surgical ward of this hospital. Among these, blunt trauma abdomen cases are quite frequently encountered. In the management of blunt trauma abdomen, the decision to go for emergency exploratory laparotomy is very crucial. Hence, this study was undertaken.

## METHODS

After initial resuscitation and achieving hemodynamic stability, all patients were subjected to careful history and clinical examination. Routine blood and urine tests were carried out in all the patients. Depending on the clinical findings, decision for further investigations as four-quadrant aspiration, X-ray chest and abdomen erect view and abdominal ultrasound were taken. The decision to operate or non-operative management depended on the outcome of clinical examination and results of diagnostic tests.

Patients selected for non-operative or conservative management were placed on strict bed rest, subjected to serial clinical examination, which included hourly pulse rate, blood pressure, respiratory rate, and repeated examination of abdomen and other systems. Appropriate diagnostic tests, were repeated as and when required.

## RESULTS

This is a clinical study of 100 patients who were admitted, treated and followed up in Gauhati Medical College and Hospital (GMCH), Guwahati, Assam, India from 1st July, 2015 to 30th June, 2016.

### *Incidence of blunt trauma abdomen*

The incidence of blunt trauma abdomen was found to be 5.31% out of all trauma patients admitted in the Department of Surgery, 69.78% out of all abdominal trauma patients in Gauhati Medical College and Hospital. The ratio between blunt and penetrating abdominal trauma was 2.31:1, and relative percentages of blunt and penetrating abdominal trauma were 69.78% and 30.22% respectively.

**Table 1: Incidence of blunt trauma abdomen in comparison with penetrating trauma abdomen.**

| Injury | Incidence (%) | Comparison |
|---|---|---|
| Blunt trauma abdomen (BTA) | 69.78% | 2.31 |
| Penetrating trauma abdomen (PTA) | 30.22% | 1.00 |

### *Age incidence*

In this present study, the age of the patients ranged from 14 years to 65 years. The commonest age group was 21 to 30 years which comprises about 39%. Next most common age group was 14 to 20 years (24%). The average age was 30.82 years. Average age for male was found to be 30.52 years and for female was 32.4 years.

**Table 2: Age wise distribution.**

| Age group (yrs) | No. of cases (%) |
|---|---|
| 14-20 | 24% |
| 21-30 | 39% |
| 31-40 | 15% |
| 41-50 | 13% |
| 51-60 | 7% |
| 61-65 | 2% |
| Total | 100 |

### *Causes of blunt trauma abdomen*

The most common cause of blunt trauma abdomen was found to be Road traffic accidents with 67 (67%) cases. Fall from height was found to be the second most common cause with 17 (17%) cases. Other important causes were physical assaults 8 (8%) cases and hit by blunt objects 8 (8%) cases.

**Table 3: Different causes of blunt trauma abdomen of this study.**

| Nature of injury | No. of cases (%) |
|---|---|
| Road traffic accidents (RTA) | 67 |
| Fall from height (FFH) | 17 |
| Physical Assault (PA) | 8 |
| Hit by blunt objects (HBO) | 8 |
| Total | 100 |

In this study 39% patients were found in 21-30 years age group, where RTA was leading cause (27%) and 24% patients were found in 14-20 years age group, where RTA was 15%.

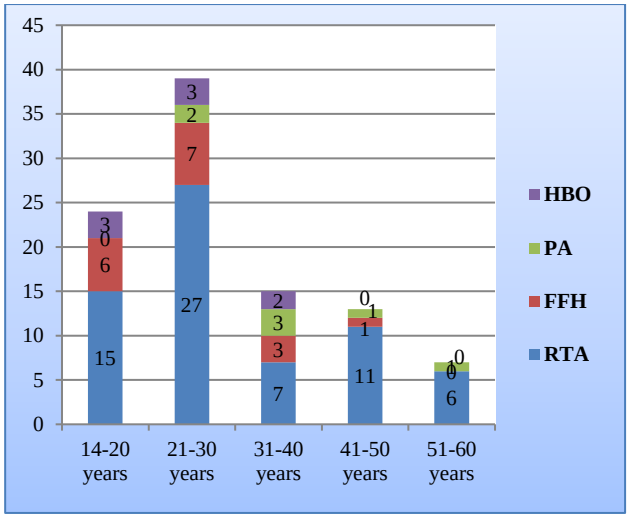


**Figure 1: Age wise the causes of blunt trauma abdomen.**

***Admission to operation interval***

In the present study the time interval between admissions to surgery varied from minimum of 2 hours to maximum of 51 hours and 50 minute, with a mean interval of 9 hrs 18min. Mean interval - 9 hrs 18min, Range: 2 hours- 51 hours and 50 minute.

**Table 4: Admission to operation interval.**

| Admission to operation interval (Hrs) | No. of cases | (%) |
|---|---|---|
| <3 | 10 | 16.7% |
| 3-6 | 25 | 41.7% |
| 6-12 | 14 | 23.3% |
| 12-24 | 4 | 6.7% |
| > 24 | 7 | 11.7% |
| Total | 60 | 100 |

***Frequency of organs involved***

Blunt injury may involve any viscera in the abdomen to varying extent. In this series, it is found that the Spleen is the most commonly involved viscera followed by liver, small intestine, and mesentery in decreasing order.

**Table 5: Management of spleen and liver injury patients.**

| Solid Orgnas | Spleen | | Liver | |
|---|---|---|---|---|
| | NOM | OM | NOM | OM |
| Grade I | 14 | 0 | 5 | 0 |
| Grade II | 10 | 2 | 2 | 4 |
| Grade III | 3 | 0 | 2 | 10 |
| Grade IV | 1 (expired) | 7 | 1 (expired) | 0 |
| Grade V | 0 | 7 | 0 | 0 |
| Total | 28 | 16 | 10 | 14 |

Solid organs were involved in 71 cases, hollow viscus was involved in 25 cases and vascular injury was seen in 4 cases.

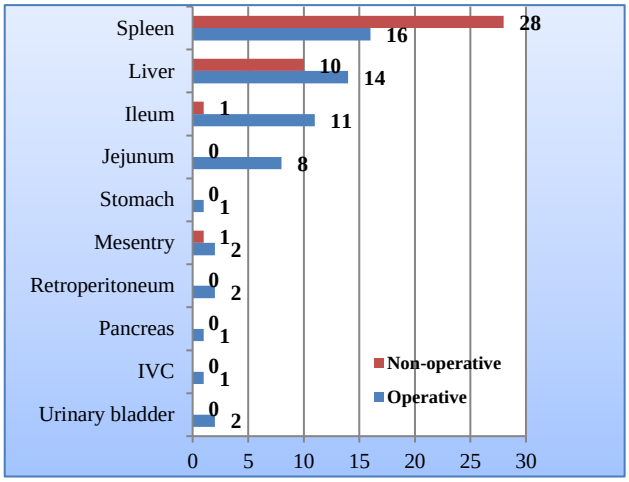


**Figure 2: Frequency of organs involved and their management.**

In this study spleen was the most common organ involved in 44 (44%) cases. Liver was 2nd most common organ injured, it was involved in 24 (24%) cases, Small bowel was 3rd most common organ involved 22 (22%) cases, of which duodenum was involved in 2 (2%) cases, jejunum was involved in 8 (8%) cases and ileum in 12 (12%) cases. 3 cases (3%) had mesenteric injury, stomach in 1 (1%) cases, urinary bladder in 2 cases (2%), retroperitoneal organs in 2 (2%) case, pancreas in 1 (1%) cases, and IVC in 1 (1%) cases.

***Management of blunt trauma abdomen***

Out of 100 cases in this series 60 cases were managed surgical intervention i.e. Operative Management (OM) and 40 cases managed non-operatively i.e. Non operative Management (NOM).

*Operative management (OM)*

Out of 60 operated cases, 22 patients underwent hollow viscous perforation repair. Resection and anastomosis of small bowel was done in 8 cases and primary repair was done in 16 cases. 14 patients underwent splenectomy for splenic injuries, and 2 patients underwent splenorrhaphy. 11 patients underwent hepatorrhaphy and hemostasis was achieved by packing by gel foam in 3 cases of liver injury.

*Non-operative management (NOM)*

Out of 40 patients who were not operated, 37 patients were managed by expectant conservative approach i.e. Non-operative management (NOM) and 3 of them were expired due to shock before any operative intervention could be performed.

Solid organ injured in 71 patients, out of whom spleen was injured in 44 patients, liver was injured in 24 patients, retroperitoneum was involved in 2 patients and pancreas was involved in 1 patient. Out of 71 patients having solid organs injured 38 patients were managed conservatively i.e. Non-operative management (NOM), who were hemodynamically stable at the time of presentation at emergency department undergone CT scan of abdomen on later periods. In this study 53.52% of patient having solid organ injured was managed conservatively i.e. Non-operative management (NOM).

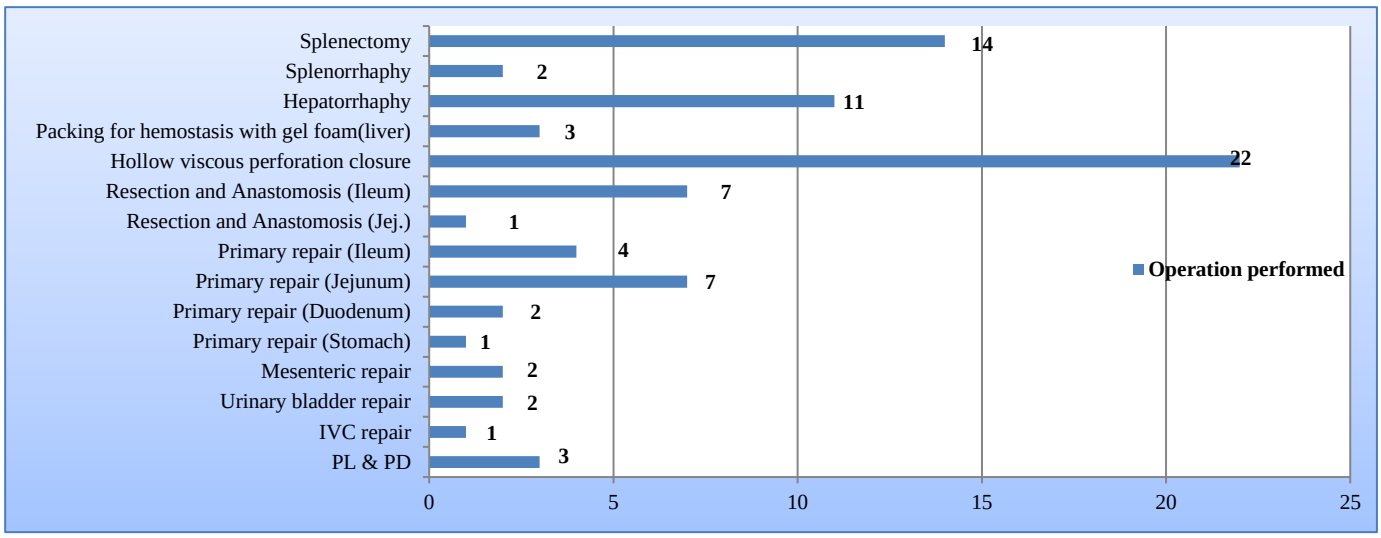


**Figure 3: Different operation performed during this study.**

## DISCUSSION

### *Incidence of blunt trauma abdomen*

In this study the incidence of blunt trauma abdomen was found to be 69.78% out of all abdominal trauma patients in Gauhati Medical College and Hospital. This study results are similar to the study of Gad MA where 69.35% cases had blunt trauma abdomen.[12]

### *Age incidence*

In this present study, the age ranged from 14 years to 65 years. The maximum numbers of cases (39%) were in 21-30 years age group. In this study 91% cases are in age group of 14 to 50 years and 78% cases are in age group of 14-40. There were only 9 (9%) cases beyond 50 years of age. The mean age found in the current series was 30.82 years which almost similar with the results found by Singh RP et al where average age involved were 25.1 year.[13]

The commonest age group was 21 to 30 years having 39% of cases, which is similar to study by Dhaded and Malra where 38.3% cases were in the age group of 21-30 years and study by Singh M et al concluded the peak incidence was observed in the age group of 20-29 years comprising 38.18% of cases.[6,14] The next common age group was 14 to 20 years containing 24% of patients, which is similar to study by Singh RP et al where 24% patients were in the age group of 11-20 years.[13]

Third most common age group is 31 to 40 years having 15% of cases, which is almost similar to study by Dhaded and Malra where 11.6% cases were in the age group of 31-40 years.[14]

This study results are almost similar to Singh RP et al study where out of 50 patients with blunt trauma abdomen, 42 (84%) patients were males and 8 (16%) were females.[13]

### *Causes of blunt trauma abdomen*

In our study the chief cause of blunt trauma abdomen was road traffic accidents (RTA) which is 67%, almost similar to the study by Dhaded and Malra where the most common cause was road traffic accidents accounting (66.6%).[14] It may be because of easy availability of vehicles, daily migration to urban area for livelihood, unaccustomed to traffic, traffic sense and ignorance of safety measure (Mohan).[15]

Fall from height (FFH) was found to be the second most common cause (17%). Other important causes were hit by blunt objects (HBO) is 8% and physical assaults (PA) is 8%. This study is almost similar to the study by Dhaded and Malra where fall from height accounting

(15%) of cases and blow to abdomen with blunt objects accounting (18.3%).[14]

Also, almost similar to the study by Singh S et al where most common cause of blunt trauma abdomen was road traffic accident (60%), fall from height accounting (25%), hit by blunt object (8%) and physical assault (7%).[16]

Also, almost similar to the study by Singh M et al stated out of 55 cases of blunt injury abdomen, crushing by heavy motor vehicles (70%) is the most common mode, next were due to direct impact by some blunt object (18%) and fall from height (9%) and others (3%).[6]

***Admission to operation interval***

Out of 60 operative cases, 10 cases (16.7%) were operated within 3 hours of admission. 25 (41.7%) cases were operated within 3-6 hours, 14 (23.3%) cases were operated between 6-12 hours, 4 (6.7%) cases were operated between 12-24 hours, and 7 (11.7%) cases were operated after 24 hours of admission.

Maximum number of cases 35 (58.4%) cases was operated within 6 hours of admission. This time interval was used to resuscitate the patients, doing diagnostic investigations and arranging blood.

Out of 7 (11.7%) cases which were operated after 24 hours, 3 having solid organ injury showed equivocal signs at admission were initially tried to manage conservatively, but on worsening of clinical status, patients were operated and 4 cases of hollow viscus injury initially having no sign of bowel perforation clinically and also radio-graphically, were operated following findings of gas under diaphragm on repeating plain picture abdomen after 8 to 12 hours of admission and worsening of clinical status of patients.

Srihari V et al found in their study on blunt trauma abdomen that only 6 cases were operated within 3 hours after admission.[17] Maximum numbers of cases (50%) were operated between 6-12 hours.

**Table 6: Different organ injured in BTA found in various studies.**

| Author | Yogish et al | Dhaded and Malra | Present study |
|---|---|---|---|
| Spleen | 46.6% | 26.6% | 44% |
| Liver | 28.3% | 23.3% | 24% |
| Small bowel | 13.3% | 30% | 22% |
| Stomach | - | 1.6% | 1% |
| Mesentry | - | 8.3% | 3% |
| Retroperitoneum/kidney | 8.3 | 5% | 2% |
| Bladder | - | 3.3% | 2% |
| IVC | - | - | 1% |
| Pancreas | 3.3% | - | 1% |

***Frequency of organs involved***

In this study spleen was the most common organ involved in 44 cases (44%). Liver was 2nd most common organ injured, it was involved in 24 cases (24%), Small bowel was 3rd most common organ involved 22 cases (22%), of which ileum in 12 cases (12%), jejunum was involved in 8 cases (8%) and duodenum was involved in 2 cases ( 2%). 3 cases (3%) had mesenteric injury, urinary bladder in 2 cases (2%), retroperitoneum in 2 case (2%), IVC in 1cases (1%), stomach in 1 cases (1%) and pancreas in 1 cases (1%).

In this series it was noticed that solid organ is the most common organ involved, where spleen (44%) is most commonly involved followed by liver (24%). This study results are almost similar to the study of Yogish et al where, spleen was involved in 46.6 % cases, liver was involved in 28.3% cases and also, study of Dhaded and Malra where spleen was involved in 26.6% cases and liver was involved in 23.3 % cases.[14,18]

Spleen is most commonly involved organ because of its poor elasticity, thinner capsule which lacerates more easily and its location in the left upper quadrant lends susceptibility to injury from broken ribs.

The large size of the liver, its friable parenchyma, its thin capsule and its relatively fixed position in relation to the spine make the liver particularly prone to blunt injury. The right lobe is injured more commonly than the left because of result of its larger size and proximity to the ribs.

***Management of blunt trauma abdomen***

Out of 100 cases 60 (60%) cases underwent laparotomy (operative) and 40 (40%) cases were managed by non-operatively. This management strategy was almost similar to study of Singh et al where 60% cases were managed operatively and 40% cases were managed conservatively.[16]

***Operative management (OM)***

In this study 23 cases had hollow viscus perforation out of which all were detected by erect x-ray abdomen, so decision to operate was taken immediately. Hollow viscous perforation closure (36.67% of operative management) was the most common procedure performed followed by splenectomy (23.33% of operative management). Small bowel was the third most common organ injured 22 (22%). A study conducted by Dhaded and Malra also had similar findings for small bowel injury (30%).[14]

***Non-operative management (NOM)***

Those patients who were hemodynamically stable at the time of presentation at emergency department with stable

blood pressure, adequate urine output, maintained abdominal girth and insignificant changes in laboratory finding were managed conservatively. Later on these patients were undergone CT scan of abdomen.

Solid organ injured in 71 patients, out of whom spleen was injured in 44 patients, liver was injured in 24 patients, retroperitoneum was involved in 2 patients and pancreas was involved in 1 patient.

Out of 71 patients having solid organs injured 38 patients were managed conservatively. In this study, 53.52% of patient having solid organ injured was managed conservatively (non operative management) where splenic injuries were 63.64% and hepatic injuries were 41.66%.

In the non-operative managed group splenic injury was the commonest injury, 28 (63.64%) cases were managed by non-operative management. A study by Bee et al concluded approximately 60–80% of patients presenting with blunt splenic injury can be managed nonoperatively.[19]

In this study, hepatic injuries, 10 (41.66%) cases were managed by non-operative management. In a study done by Carillo et al on blunt hepatic injury concluded that non-operative management could be considered in up to 50% of blunt liver injuries in adults with a 50-80% success rate.[20]

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