



# Management and Outcome of Bowel Injury Following Blunt Abdominal Trauma; Our Experience in the Department of Casualty and General Surgery in Dhaka Medical College, Dhaka

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## Key words:

Management, Bowel injury, Blunt abdominal trauma

## Abstract

**Background:** Blunt abdominal injury is common in trauma patients. Evaluation of patients who have sustained blunt abdominal trauma may pose a formidable problem and significant intra-abdominal injury is one of the most difficult problems faced by emergency physician and trauma surgeon in the management of trauma. Traumatic bowel injury is one of the curable traumatic conditions . An accurate and timely diagnosis and treatment give an excellent out come in most of the cases . A delay in diagnosis has been shown to be associated with significant morbidity and mortality.

**Objective:** The purpose of the study was to evaluate the different management options and the outcome of management of bowel injury following blunt abdominal trauma.

**Methodology:** This is a randomized clinical trial conducted over a period between July 2015 to June 2017 carried out in the Department of Casualty and General Surgery in Dhaka Medical College. Consecutive 100 patients with blunt abdominal trauma with irrespective of the age and gender were selected as study population.

**Results:** Among the 100 cases included in the study shows outcome of the management was quite acceptable with 46% of patients having uneventful recovery. The major morbidity was related to abdominal wound and infective complications . 14% of patients had wound infection , 6% had wound dehiscence, 3% had intra-abdominal abscess, 1% had anastomotic leakage and 2 patients developed enterocutaneous fistula.

**Conclusion:** Traumatic bowel injury is one of the commonest traumatic conditions that are encountered in the hospitals, namely in the department of Casualty surgery. It is evident from different studies that certain factors like prolonged transportation time , delay in receiving definitive surgical treatment, failure to receive early resuscitation with consequent poor hemodynamic status etc. have been associated with a poor outcome in the management of such cases.

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## Introduction

Trauma is the leading cause of death and disability in the first four decades of life<sup>1,2,3,4</sup> and is the third most common cause of death overall<sup>2</sup>. It is also a major contributor to health costs.

The abdomen is the third most commonly injured body region, with injuries requiring operation occurring in about 20% of civilian trauma victims<sup>4</sup>. There are many mechanisms that account for abdominal injuries. The recognition of two major groups, penetrating and non-penetrating, is of greatest importance for treatment and has direct implications for the diagnostic work-up and therapy<sup>5</sup>.

The incidence of small bowel injury secondary to blunt trauma ranges from 5% to 15% for and approaches to 50% for all penetrating abdominal injuries<sup>4</sup>. The greatest number of injuries to the colon and rectum are the result of penetrating or perforating trauma. The large gut is relatively refractory to blunt injury that accounts for only 5% of colonic injuries<sup>5</sup>.

An accurate and timely diagnosis and treatment giving an excellent outcome in most of the cases. A delay in diagnosis has been shown to be associated with significant morbidity and mortality.

In this series a study of 100 cases on traumatic bowel injury has been conducted with special reference to its management and outcome. Bowel injury following blunt abdominal trauma is a surgical emergency that is frequently encountered in the accident and emergency department in the hospitals of our country. Traumatic bowel injury is a curable condition with a fairly good outcome, if intervened timely and accurately. This study has been designed to evaluate the patients with traumatic gut injury in regards to their nature of injury, modes of presentation, plan of management and eventual outcome.

## Material and methods

This is a randomized clinical trial conducted over a period between July 2015 to June 2017 carried out in the Department of Casualty and General Surgery in Dhaka Medical College. Consecutive 100 cases of traumatic bowel injury, among the cases of abdominal trauma that were admitted in the hospital in the study period, irrespective of the age and gender, have been included in the study. The suspected cases of traumatic bowel injury that died pre-operatively or no such injury

on laparotomy or traumatic injury of the stomach were excluded from study. Informed written consent were obtained from all the patient.

**Surgical technique:** The patients who were enrolled in this study were explained the whole procedure of the study, about the nature of the disease, possible options of treatment as well as its justification of surgical treatment. They were also explained about the possible complications of the operative procedure in postoperative period. They were evaluated by short history, clinical examination and appropriate investigations. With adequate preoperative preparation they underwent laparotomy. The operation options included simple primary repair or resection or anastomosis, with or without proximal ileostomy, for small bowel injury. The treatment selected for large gut was based on the procedure. The options included simple primary repair and resection and anastomosis, with or without a proximal ileostomy/colostomy or Hartmann's procedure or loop colostomy was done. Postoperative oral feeding was given to all patients after passage of flatus. Patients were allowed clean water to drink; thereafter, semisolid was allowed followed by solid diet. All patients received prophylactic injectable antibiotics. Patients were followed up in the postoperative period till discharge. Certain variables were closely monitored to see the postoperative outcome.

## Statistical analysis:

Data were compiled and statistical analysis was done with  $t$  test and chi-square test ( $\chi^2$ ). Variables and results were presented as median value, range and percentage.

## Results:

A total number of 100 patients with blunt abdominal trauma were recruited in this study. Patients demography and baseline data are presented in Table-I. shows that the ages of the patients in the study ranged from 4 to 65 years. The highest incidence 41 (41%) was in the age group 21-30 years and out of 100 patients 92(92%) were male and 8(8%) female. In this series shows that the transportation time has a direct impact on the outcome of management of traumatic gut injury. Maximum patients (49%) were reached hospital within 6hrs. The patients who arrived 24 hours after the incident had highest rate of morbidity 66.67(66.67%) and mortality 33.33(33.33%) and maximum patients(49%) underwent definitive surgical procedure within 7 to 12 hours of injury

with fairly good outcome, having a morbidity of (48.98%) and a very low mortality (2.04%). On the other hand, another group who were operated after 24 hours of the incident had a poor outcome with the highest morbidity 60(60%) and mortality 40 (40%). In this study shows that more than half of the patients 54 (54%) did not receive any primary resuscitation before coming to hospital. The rest 46 (46%) patients received different degrees of resuscitation in different types of health centers and medical institutes before they arrived in hospital and majority of the patients 65 (65%) reaching hospital were hemodynamically unstable. Out of 65% patients who required resuscitation, only 62( 62%) responded well. In this series, more than half of the patients 58(58%) did not have any associated extra –abdominal injury. Majority of the cases (68%) in this series had only gut injury with no other associated intra-abdominal organ involvement while some patients had more than one associated intra -abdominal injuries.

The commonest complications were related to the abdominal wound, 14(14%) patients of wound infection and 6 cases (6%) of wound dehiscence. Table 3 shows that majority of the patients (55.88%) with only small gut injury had uneventful recovery, and the morbidity was lowest (38.24%). The mortality was highest in patients having both small and large bowel injury, 11.11%.

**Table-I**

<i>Patients Demography and baseline data (n=100)</i>	
Variables	No. of Patients (%)
Gender	M 92, F 08
Age (years) <sup>a</sup>	41(4 to 65)
Time lapsed to reach hospital (within 6 hrs)	49%
Primary resuscitation received (Before admission)	46%
Haemodynamically unstable (on admission)	65%
Means of resuscitation (responded)	62%
Associated extraabdominal injuries	42%
Associated other intraabdominal visceral injuries	32%
Time interval (incident and operation time) (within 7 to 12 hrs)	49%

<sup>a</sup> Median values (range), F, Female; M, Male.

**Table - II**

*Post -operative outcome (n=100)*

Variables	No. of patients (%)
Uneventful	46%
Wound infection	14%
Intra-abdominal abscess	03%
Anastomotic leakage	01%
Enterocutaneous fistula	02%
Intestinal obstruction	01%
Colostomy related Complications	02%
Pulmonary complications	02%
Pyrexia	09%
Others e.g.phlebitis, Jaundice, UTI etc	08%
Wound dehiscence	06%
Death	06%

**Table-III**

*Overall outcome of patients with traumatic bowel injury in relation to the organ involvement (n=100)*

Organ involved	Uneventful recovery	Morbidity	Mortality
Only small bowel (n=68)	38(55.88%)	26(38.24%)	4(5.88%)
Only large bowel (n=23)	07(30.43%)	15(65.22%)	1(4.35%)
Both small and large bowel (n=09)	01(11.11%)	07(77.78%)	1(11.11%)

### Discussion

Trauma is the commonest cause of death among people aged 1- 34 years, a leading cause of disability and a major contributor to health cost <sup>1,2,3,4</sup> the development and adoption of the concepts of injury prevention, trauma care systems and advanced trauma life support have significantly altered the management and outcome of the injured patients.

This study comprises 100 patients of abdominal trauma, having gut injuries, admitted in the department of casualty and general surgery in DMCH, from July 2015 to June 2017.

The ages of the patients in the study ranged from 4 to 65 years. Young patients were the common

victims and incidence decreased with advancing age. The highest incidence (41%) was in the age group 21-30 years, the most active period of life. The above data indicate that the affected people are those who are most involved in outdoor activities and are much active in the working places and so are more subjected to trauma in their daily life. This is quite similar to the findings of studies in South Africa by Thomson et al (1996)<sup>6</sup>, Richardson et al (1995)<sup>7</sup>, where the incidence was highest in the age group 20-29 years (36%). But another study in USA by Dautrive et al showed the peak incidence to be in the 4<sup>th</sup> decade of life. A male preponderance (92%) was noted in the series, male to female ratio was 11.5:1 this reflects the fact that males are more subjected to trauma, especially road traffic and machinery accidents, again because of their more involvement in outdoor activities. In a study by Richardson et al (1995)<sup>7</sup>, the incidence was 72.9% in male and 27.1% in female.

A delay in presentation and diagnosis has been shown to be associated with significant morbidity and mortality. In this series, 49% of the patients reached DMCH within 6 hours of the incident. This is quite different from the result of the study by Biswas, N<sup>11</sup> performed in Barisal in 2004 and by Maniruzzaman, M<sup>12</sup> performed in Rajshahi in 2000, where the percentage of people arriving before 6 hours was 19%. But in the study by Quader, F, and associates<sup>10</sup> performed in DMCH, the average time laps was reported as 5 hours. In our study, 29% patients arrived within 6 to 12 hours while 16% arrived within 12-24 hours. 6% of patients arrived in DMCH after 24 hours of injury, all having non-penetrating injury to the abdomen.

Transportation time has a direct impact on the outcome of management of traumatic bowel injury. The patients who arrived 24 hours after the incidence had highest rate of morbidity (66.67%) and mortality (33.33%) followed those who arrived between 12-24 hours (62.50%, 12.50%) and the lowest in those who arrived within 6 hours of the incident (42.86%, 2.04%).

In this study, only 10% of patients underwent definitive surgical procedure within 6 hours of injury, where morbidity was low (10%) and there was no mortality. 49% received definitive treatment in 7-12 hours period with fairly good

outcome, having a morbidity of (48.98%) and a very low mortality (2.04%), 31% of patients were operated between 12-24 hours, where the mortality was 3.2% and the morbidity was 54.84%. Only 10 patients were operated after 24 hours of the incident, when the morbidity was higher (60%), so was the mortality (40%). This result is close to that of a study by Robbs et al<sup>8</sup>, who reported that mortality was 47.2% in patients who were operated after 24 hours of the incident. The result clearly shows that the time taken to start the definitive treatment adversely influences the outcome of management of traumatic gut injury. So receiving surgical treatment without delay gives better outcome in terms of morbidity and mortality. The US Marine Corps (USMC) formed a forward resuscitative surgical system during the Iraq war for operating near the battle grounds within a mean of one hour of the incident of trauma. Their experience showed that by operating in close proximity to active combat units, small, rapidly mobile trauma surgical teams can decrease the interval between wounding and arrival at surgical intervention with resultant improvement and beneficial effect in outcome<sup>13</sup>.

More than half of the patients (54%) did not receive any primary resuscitation before coming to DMCH. There is no operating "trauma system", as in the developed countries, which operates within a geographical region and provides for rapid transport of victims of major trauma to specified hospitals within that region.

Due to inadequate pre-hospital care and primary resuscitation, majority of the patients (65%) reaching DMCH were haemodynamically unstable. 35% of patients were haemodynamically stable, 43% were hypotensive and 22% were in a state of shock.

The outcome of patients who were haemodynamically unstable was worse than those who were stable. 5 patients of those who were in shock at the time of admission died afterwards. The overall mortality in the series was 6% and Massachusetts general hospital series study by Claude E. W. et al (1950)<sup>14</sup> reported that shock is a grave finding and implies extensive concealed haemorrhage contaminated by gastrointestinal contents.

Simultaneous assessment and resuscitation of the patients were done. 65% patients required resuscitation of which 62% responded well to



resuscitation but the rest 3% failed to respond. 7 patients required only intravenous fluid while 55 patients were resuscitated by both intravenous fluid while 55 patients were resuscitated by both intravenous fluid and blood. Out of the three patients who failed to respond to resuscitation, 1 patient died per-operatively, 1 patient died 2 hours after operation and the other one died in the 2<sup>nd</sup> post-operative day.

In this series, more than half of the patients (58%) did not have any associated extra-abdominal injury. This finding differs from that of the western series. Fitzgerald, Crawford and DeBakey<sup>9</sup> found 97% cases to have associated other injuries. This difference may be explained by the fact that in our country vehicles move at slower speed and accidents involve the isolated vehicles, whereas in the western world multiple vehicles are usually involved in high speed traffic lanes<sup>10</sup>.

Majority of the cases (68%) in this series had only gut injury with no other associated intra-abdominal organ involvement. The most frequent associated injury was involvement of the mesentery and mesenteric vessels (19%). Other associated injuries include involvement of the stomach (3%), spleen (8%), liver (7%), kidney (3%), urinary bladder (2%), pancreas (1%) and retroperitoneal hematoma in 7% of cases. Some patients had multiple associated intra-abdominal injuries. In a study by Hurt in Kentucky in 1980<sup>15</sup>, 73% cases had associated other intra-abdominal injuries.

In this series, 46% of patients had uneventful recovery and 48% developed some kind of complications in the post-operative period. The commonest complications were related to the abdominal wound, 14 patients of wound infection and 6 cases of wound dehiscence. We had 1 case of anastomotic Leakage and 2 cases of enterocutaneous fistula in this series. Poor nutritional and haemodynamic status of the patients, absence of asepsis in the hospital environment, excessive tissue handling during operation and poor surgical technique might have contributed to the poor wound healing and infective complications in these patients. 2 patients developed pulmonary complications, one of whom required ICU management. Lack of proper chest physiotherapy, delayed mobilization of the patients, inadequate analgesia and absence of close nursing

might be responsible for these complications. 9 patients developed pyrexia in the post-operative period and 8 suffered from other complications like phlebitis, UIT, jaundice etc. They were managed conservatively as necessary according to the cause.

The overall mortality in the series was 6% and poor haemodynamic condition of the patient came out as an important responsible factor of mortality. In our study, all the patients who died were haemodynamically unstable on admission in the study of Crawford ES and associates<sup>9</sup>, the survival of the patient was related to the extent of blood loss and varied with the blood pressure on admission. Donovan TB and associates<sup>16</sup> found that increased intestinal permeability leads to irreversible shock and septicemia following abdominal trauma and eventually the patients die.

In our series too, majority of the patients (55.88%) with only small bowel injury had uneventful recovery, and the morbidity was 38.24%. On the other hand, morbidity in the group of patients having only large bowel injury was higher (65.22%). The morbidity in patients having both small and large bowel injury was even higher (77.78%), only 11.11% of patients having uneventful recovery. In this series, mortality was highest in patients having both small and large bowel injury (11.11%), followed by those having only small bowel injury and the group having only large bowel injury had the lowest mortality (4.35%). The unexpectedly higher mortality in the group having only small gut injury may be attributed to the more severe associated injuries.

### Conclusion

Traumatic bowel injury is one of the commonest traumatic conditions that are encountered in the hospital, namely in the department of casualty surgery. It is evident from different studies that certain factors like prolonged transportation time, delay in receiving definitive surgical treatment, failure to receive early resuscitation with consequent poor hemodynamic status etc. have been associated with a poor outcome in the management of such cases.

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