

## Original Research Article

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# Clinical study of hollow viscus injury in abdominal trauma

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## ABSTRACT

**Background:** Abdominal injury is leading cause of morbidity and mortality at present due to great improvement in man's lifestyle and development of industries.

**Methods:** A total 100 cases of abdominal trauma (both blunt and penetrating) were studied in the present study in our institute for period of 18 Months.

**Results:** Males belonging to young age group of 21-30 were most commonly affected. Road traffic accident is most common mode of injury. Abdominal pain seen in 93% of patients. Abdominal tenderness seen in 86% of patients. Plain x ray abdomen erect was sensitive in detecting hollow viscus injuries. Diagnostic peritoneal lavage is better than four quadrant aspirations. Ultrasound examination gives a clear picture of solid organ injury and free fluid. Most common injured viscera in the present study is small bowel and they were managed by simple suturing and closure of perforation and resection and anastomosis. Postoperative complications like wound infection, wound dehiscence, respiratory complications, pelvic abscess and faecal fistula were seen. The duration of stay for most of the patients in this study was between 11-20 days with mean of 15 days. Mortality in this study was 7%. Conditions such as, female gender, long interval between injury and operation, presence of shock on admission, and small bowel injury worsen the prognosis in penetrating abdominal trauma.

**Conclusions:** Young males are most commonly affected due to road traffic accident. Conditions such as, female gender, long interval between injury and operation, presence of shock on admission, and small bowel injury worsen the prognosis in penetrating abdominal trauma.

**Keywords:** Abdominal injury, Abdominal trauma, Complications of abdominal trauma, Hollow viscus, Road traffic accident

## INTRODUCTION

Trauma is the major cause of mortality and morbidity in day to day life due improvement in industries and human lifestyle. Abdomen is third most common organ injured following extremities and head injury motor vehicle accidents are the commonest cause.<sup>1,2</sup> Most of injuries other than abdominal injuries reveal itself earlier but for blunt abdominal injury, which can be silent initially but causing fatal outcome later as time progresses.<sup>2,3</sup> Physical examination findings are notoriously unreliable. One reason is that mechanisms of injury often result in other

associated injuries that may divert the physician's attention from potentially life-threatening intra-abdominal pathology. Deaths due to abdominal injury can be prevented if diagnosed and managed early. Rapid resuscitation is necessary to save the unstable but salvageable patient with abdominal trauma.<sup>3</sup> In this study we make efforts to study the patients having hollow viscus injury in the cases of abdominal trauma patients.

### **Aims and objectives**

- To study incidence of various modes of injury in abdominal trauma.

- To study different modes of presentation of abdominal trauma.
- To study age and sex distribution in abdominal trauma.
- To evaluate the clinical presentation of intra-abdominal injuries abdominal trauma.
- To study interval between trauma to admission, surgery and its effect on outcome.
- To evaluate the organs affected in abdominal trauma and management of different parts of hollow viscous injuries.
- To study complications, morbidity, mortality, and outcome of abdominal trauma.

## METHODS

This is clinical study of 100 patients who came with history of abdominal trauma either blunt or penetrating and admitted in Hamidia Hospital attached to Gandhi Medical College Bhopal (M.P.) in time duration of 18 months (March 2015 to August 2016). Institutional Ethical Committee approval was also taken before starting the study. Detailed history, time of injury, type of injury, cause of injury, site of injury over the abdomen, and injury to admission interval was noted. Thorough clinical examination was carried out in all patients. Routine blood and urine examinations were done. Special blood investigations, plain X-ray erect abdomen, ultrasonography (USG) of the abdomen, X-Ray chest and abdomen was done as required. Patients in shock were resuscitated initially. Those having rising pulse rate, increasing abdominal distension and tenderness, patients were shifted on the surgical line of treatment. Results were computed as percentages of total participants. Furthermore, data were internally compared for age and gender, and outcomes were also compared accordingly and was tabulated.

## RESULTS

**Table 1: Age and sex distributions.**

Age group (years)	No. of patients	Percentage
13-20	13	13
21-30	40	40
31-40	28	28
41-50	14	14
51-60	05	05

Majority of patients belonged to 21-30 years (40%) age group followed by 31-40 years (28%) age group. Individuals related to extreme of the age group were least affected i.e. 50-60 years and 13-20 years. Among these patients 82% were males and 18% females. Road traffic accidents is most common mode of injury.

Abdominal pain is most common symptom (93%) followed by abdominal distension (76%), and most common sign is abdominal tenderness (92%).

**Table 2: Modes of injury.**

Cause	No of patients	Percentage
RTA	74	74
Assault	18	18
Fall from height	06	06
Others	02	02

**Table 3: Clinical features.**

Symptoms	No of patients	Percentage
Abdominal pain	93	93
Vomiting	26	26
Abdominal distension	76	76
Abdominal tenderness	92	92
Guarding and rigidity	61	61
Tachycardia	88	88

This is time required for patient to reach for clinical management from time of injury. 44% of patients were taken for clinical management between 1 to 6 hrs hours of time of presentation. 26 of patients managed between time of presentation 6-12 hours (26%).

**Table 4: Study of time of presentation.**

Time of presentation	No. of patients	Percentage
< 1 hr	18	18
1 to 6 hr	44	44
6 to 12hr	26	26
>12 hr	12	12

**Table 5: Plain X-ray abdomen with chest.**

Features	No of patients	Percentage
Gas under diaphragm	30	30
Enlarged soft tissue shadow	12	12
Ground glass appearance	12	12
No radiological abnormality	44	44
Multiple air fluid levels	02	2

Gas under diaphragm present in 30% of patients.

*Four quadrant aspirations:* Positive in 73.2% and negative in 26.4%.

**Table 6: Ultrasound examination.**

Organ injured	No of patients	Percentage
Spleen	16	16
Liver	12	12
Bladder	04	4
Free fluid without solid organ injury	68	68

All the 100 patients were subjected to ultrasound examination, out of which 32 patients had scan detected

association of solid organ injuries. Ultrasound detected bladder injuries in 2. Free fluid in peritoneal cavity without solid organ injury is present in 68(68%) patients.

**Table 7: Organ wise injury.**

Hollow organ injured	No of patients	Percentage
Stomach	06	6
Duodenum	03	3
Jejunum	36	36
Ileum	44	44
Large intestine	11	11

Among 100 patients of hollow viscus injury 44% of patients having ileal injury, 36% of patients have jejunal injury, duodenal injury in 3% of patients.

**Table 8: Operative procedures.**

Procedure performed	No of patients	Percentage
Primary repair of perforations	72	72
Resection and anastomosis	11	11
Gastric perforation repair with omentopexy	06	06
Primary repair with Proximal ileostomy	10	10

All 100 patients underwent emergency laparotomy after initial resuscitation and all relevant investigations, following procedures are done. Results shows wound infection in 14%, Wound dehiscence in 7%, anastomotic leak in 5%, respiratory complications in 11%, fecal fistula in 2%.

**Table 9: Post-operative complications.**

Complications	No of patients	Percentage
Wound infection	14	14
Wound dehiscence	07	7
Anastomotic leak	05	5
Respiratory complication	11	11
Fecal fistula	02	02

Average duration of stay was 25 days. Total deaths are 7, septicaemia is cause of death in 4 (71%) patients, ARDS in 1(14.2%) patient and sudden cardiac arrest in 1(14.2%) patient.

**Table 10: Duration of stay in hospital (morbidity).**

No of days in hospital	No of patients (n=100)	Percentage
1 to 10	36	36
11 to 20	54	54
21 to 30	06	6
31 to 40	04	4

**Table 11: Effects on mortality.**

Cause of death	Number of cases	Percentage
Sudden cardiac arrest	01	14.2
septicaemia	05	71.4
ARDS	01	14.2

Out of 7 deaths 3 (42%) of death due to ileal injury, 2 (28%) was due to jejunal injury, 14% was due to injury to stomach and large intestine each. Septicaemia was in 4 patients.

**Table 12: Organ injury and death relation.**

Organ injury	No of patients	percentage	Cause of death
Ileum	3	42	Septicaemia
Jejunum	2	28	a. Septicaemia b. ARDS
Large bowel	1	14	Septicaemia
Stomach	1	14	Sudden cardiac arrest

In this table when patient stayed in hospital for more than 20 days is considered as morbidity. Duration of stay in hospital more than 20 days is equal in male and female that is 3 male and 3 females, but mortality is 3 for male and 4 for female.

**Table 13: Effect of gender on outcome.**

Sex	Morbidity	Mortality
Male	3 (50%)	3(42%)
Female	3 (50%)	4(57%)
Total	6	7

**Table 14: Effect of time of presentation on outcome.**

Time of presentation	No of patients	Morbidity	Mortality
<1 hr	18	0 (0%)	0 (0%)
1 to 6 hr	44	1 (6%)	0 (0%)
6 to 12hr	26	2 (33%)	2 (28%)
>12 hr	12	4 (66%)	5 (71%)
Total	100	6	7

**Table 15: Effect of organ injury on outcome.**

Organ injury	No of patients	Morbidity	Mortality
Stomach	6	0 (0%)	1 (14%)
Duodenum	3	1 (16%)	0 (0%)
Jejunum	36	2 (33%)	2 (28%)
Ileum	44	2 (33%)	3(42%)
Large intestine	11	1 (16%)	1(14%)
Total	100	6	7

Morbidity is 33% and mortality is 42% in ileal injury. 14% mortality in stomach injury. 33% morbidity and 28% mortality in jejunal injury.

## DISCUSSION

### Age wise distribution

The age group in this study is from 13 -60 years. mean age was 36.5 years present study approximately half patients (40%) are from third decade of life (age group 21 to 30 year), indicating that young people are more susceptible to blunt and penetrating injury.

This is the most productive age group. This study is comparable with other studies.<sup>1-3</sup>

### Sex wise distribution

Male to female ratio was 4.5:1. Out of 100 cases studied 82 was male and 18 was female. In our study 82% of cases were male and 18% were female. This is comparable with study by Khadilkar, which also showed blunt abdominal trauma was more common in males.<sup>1</sup>

### Mode of injury

Our study shows that Road traffic accidents (74%) are the most common mode of abdominal injuries. Other studies also reported 62% to 70% cases of blunt injury abdomen were due to RTA.<sup>1-3</sup>

### Symptoms

In the present study most, common symptom was abdominal pain (93%) followed by abdominal distension (76%) and vomiting. Findings are also comparable to study of R.B. Dhaded shows abdominal pain in 85%, distension in 50% and Dr. Vidhuta reported pain in abdomen (96%) and Abdominal distension (50%) was the second most common symptom.<sup>4,5</sup> In the present study abdominal tenderness (92%) is the most common clinical sign followed by tachycardia [pulse >90 (88%)]. Shock (Systolic BP<90mmHg) was considered shock and most patients with tachycardia and shock (pulse >90/min and systolic BP <90mmHg) underwent emergency laparotomy and had significant injuries. Bowel sound was sluggish or absent in 68% of patients.

Findings in our study are comparable to the study by Tripathi who reported Tenderness as most common sign in 80% of their patients and shock in 37.2% of their patients.<sup>5</sup>

### Time of presentation

In our study majority (44%) of patients were taken for surgery between 1 - 6 hours of time of presentation. The second most common time of presentation was between 6 -12 hours (26%). These findings are comparable to others

who reported that maximum number of patients were brought to the hospital within 1-10 hour after injury.<sup>4-6</sup>

### Plain X-ray abdomen

In the present study plain x-ray abdomen was done in all the patients. In which 30% were showing gas under diaphragm indicating frank pneumoperitoneum, 12% were showing enlarged soft tissue shadow and around 56% were showing no significant radiological abnormality.

Another study by Mohapatra reported accuracy of x-ray erect abdomen to be 100% in detecting Hollow viscous injuries.<sup>7</sup> Davis reported that in their series, abdominal x ray was abnormal in 21% of cases; pneumoperitoneum was detected in 6% of cases and dilated bowel loops in 6% of cases.<sup>2</sup>

### Four quadrant aspirations

Four quadrant aspirations were done in 38 patients, among which 28 cases (73.2%) were positive and 10 cases were negative. In the present study sensitivity of Four quadrant aspirations is 88% and specificity is 100%. This is comparable to another study by Mohapatra which showed diagnostic aspiration to be accurate in 95% cases.<sup>7</sup>

### Ultrasound examination

All the 100 patients were subjected to ultrasound examination, out of which 32 patients had scan detected associated solid organ injuries. Ultrasound was not sensitive enough in detecting retroperitoneal and hollow viscous injuries. In our study free fluid without solid organ injury was seen in 68% of cases and free fluid in peritoneal cavity with solid organ injury in 32% patients (spleen in 16% and liver in 12%, bladder 4%). This is comparable to other studies.<sup>1</sup>

### Organ wise injury

In this study small bowel was most commonly involved. All patients have hollow viscous perforation. In small bowel perforations ileal perforation was seen in maximum number of cases in this study followed by jejunal perforation and duodenal perforation. This result is compared to a study done by Allen and Curry which showed small bowel was involved in 35.3% of cases.<sup>8</sup> R. S. Raikwar reported Small intestine (ileal >jejunal) injury 45 cases i.e., 18% was most common hollow viscous injury in abdominal trauma patient.<sup>9</sup>

### Operative procedure

Primary closure of perforations is most commonly performed procedure (72%) This can be comparable with study by Khanna in which closure of bowel perforation was done in 13 patients (64%), colostomy in 2 patients,

repair of mesentery in 9 patients.<sup>10</sup> Results are also comparable to study by Sreenidhi G. who reported closure of bowel perforation was done in 54% patients.<sup>11</sup>

#### **Post-operative complication**

In this study wound infection is the most common complication seen in 14 patients (14%) followed by respiratory complications (11%) followed by wound dehiscence, pelvic abscess, faecal fistula and anastomotic leakage. Davis reported wound infection as a complication in 15% of the cases.<sup>2</sup> Reina Khadilkar showed respiratory complication as the most common complication.<sup>1</sup> Similar results were shown by Sreenidhi G also.<sup>11</sup>

#### **Morbidity**

The duration of stay for most of the patients in this study was between 11-20 days with mean of 15 days for those who underwent operative management and a mean of 8.5 days for conservative management. Reina Khadilkar showed the duration of stay 8.78 days for patients managed conservatively and 16.62 days for patients managed operatively.<sup>1</sup>

#### **Mortality**

A total of 7 patients died in the present study. Mortality in this study was 7%. Similar results by Vidutha where mortality was 13%.<sup>4</sup> Decreased mortality is explained by better health care facilities and availability of broad spectrum antibiotics in present scenario.

#### **Cause of death**

In present study septicaemia (57%) is most common cause of death followed by sudden cardiac arrest. 7 patients died (7%). This can be comparable to study of Vidutha where 88% deaths are due to septicaemia.<sup>4</sup> Results can also be comparable with study by Ashish who observed septicaemia as most common cause of death.<sup>6</sup> This can be compared to study of Sreenidhi G concluded that septicaemia is most common cause of mortality.<sup>11</sup> This finding can be explained by heavy contamination of peritoneal cavity after bowel perforation due to fecal matter.

#### **Effect of gender on outcome**

Morbidity is equal in male and female, but mortality is slightly more in female as compared with male. This is comparable to study of Kulkarni who states that mortality is more in females.<sup>12</sup>

This result can also be compared with study of Aldemir M.<sup>13</sup> Higher mortality in females can be explained by poor nutrition, and ignorance by family members.

#### **Effect of time of presentation on outcome**

When patient present late to hospital had poor prognosis, there is increased morbidity and mortality when presentation is late. This result can be comparable with study of Swaid F which states that a delay of more than 24 hours intervention is associated with higher mortality than those with immediate repair.<sup>14</sup> Increased mortality and morbidity when patient present late to hospital is due to increased contamination, shock and setting in of sepsis.

#### **Effect of organ injury on outcome**

Out of 7 deaths 3 deaths are due to ileal injury leading to septicaemia that is 42%. Injury to jejunum leads to 2 deaths one from septicaemia and other ARDS, and two deaths due to sudden cardiac arrest. This can be compared to study of Sreenidhi G who concluded that septicaemia is most common cause of mortality.<sup>11</sup> This result can be compared with study of Christos which states that small bowel injury has higher morbidity and mortality.<sup>15</sup> Higher mortality and morbidity in small bowel injury can be explained by heavy bacterial load leading to contamination of peritoneal cavity and thus septicaemia, and majority of patients died due to septicaemia in present study.

#### **CONCLUSION**

In present study males are most commonly affected. People belonging to young age group i.e. 21-30 were most commonly affected. Road traffic accident forms the most common mode of injury. Abdominal pain is the most common symptom and tenderness is the most common presenting sign.

X-Ray chest was sensitive in detecting hollow viscous injuries but absent gas under diaphragm does not rule out possibility of hollow viscous perforations. Four quadrant aspirations are a simple and an important tool for diagnosis, but better results are given by diagnostic peritoneal lavage. Ultrasound examination gives a clear picture of solid organ injury and free fluid rather than hollow viscous. The most common injured viscera in the present study is small bowel and they were managed by simple suturing and closure of perforation and resection and anastomosis. Postoperative complications like wound infection, wound dehiscence, respiratory complications, pelvic abscess and faecal fistula were seen. The duration of stay for most of the patients in this study was between 11-20 days with mean of 15 days. Mortality in this study was 7%. Conditions such as, female gender, long interval between injury and operation, presence of shock on admission, and small bowel injury worsen the prognosis in penetrating abdominal trauma. Measures should be taken to prevent these accidents and care of the victims at the accident site. Well established trauma care centers should be established at least at every district hospital. Measures for early transport of the patients from the accident site to the trauma center should be undertaken.

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