

**PROSPECTIVE STUDY ON TRAUMATIC HOLLOW VISCUS INJURIES***William Premalatha Sharon Rose<sup>1</sup>, Ravikumar Sumath<sup>2</sup>, Dhanasekaran Uma<sup>3</sup>*<sup>1</sup>Associate Professor, Department of General Surgery, KAPV Government Medical College, Tiruchirapalli.<sup>2</sup>Assistant Professor, Department of General Surgery, KAPV Government Medical College, Tiruchirapalli.<sup>3</sup>Assistant Professor, Department of General Surgery, KAPV Government Medical College, Tiruchirapalli.**ABSTRACT****BACKGROUND**

Trauma is a major health problem in all countries and it unfortunately forms 60-70% of all emergency admissions to any hospital. Trauma patients need the most important care since these are the patients who can be salvaged to the maximum. Traumatic injuries remain the leading cause of death among patients aged 12–45 years and continue to account for substantial morbidity in this population. Hollow viscus injury following blunt abdominal trauma is an infrequent diagnosis. The incidence of hollow viscus injuries following abdominal trauma varies from 2 to 15%. Thus, we performed the present study to review our experience with hollow viscus injury following abdominal trauma in a tertiary care centre. Mahatma Gandhi Memorial Government Hospital, Trichy, attached to KAPV Government Medical College is one of the tertiary centre for trauma in Tamilnadu in which majority of patients admitted to surgical triage ward are due to trauma.

**Objectives-**

Complete systemic examination of all trauma patients admitted to triage ward.

Identifying patients having or suspected to have abdominal injury.

Appropriate investigations for those patients.

To analyse mechanism of injury, organs involved and accompanying injuries in traumatic hollow viscus injuries.

To analyse the different surgical procedures and finally the post-operative outcome.

**MATERIALS AND METHODS**

The study population are those patients admitted in surgical triage ward in MGMGH attached to KAPV Medical College, Tiruchirapalli with hollow viscus injuries. It is a prospective non-randomised descriptive study. Duration of study – January 2016 to December 2016.

**RESULTS**

There is a wide range in presentation of patients- the youngest patient being 16 years and oldest patient being 65 years of age. The commonest mode of injury in our study is the blunt abdominal trauma as compared to penetrating abdominal trauma (77.08% Vs. 22.92%). The major cause of both blunt and penetrating trauma (>90%) is Road traffic accident (RTA) followed by accidental fall. The most common site of hollow viscus perforation in our study was ileum (35.41%) followed by combined injury of ileum and mesentery (18.75%). Respiratory infection (16.67%) is the most common complication followed by wound infection (12.5%) and the leak rate was the least complication in our study (2.08%). Mortality is less in patients who were referred early to our hospital i.e. within two days as compared to those patients referred late (21.05% Vs. 50%).

**CONCLUSION**

The commonest cause of death is associated polytrauma, followed by septicaemia owing to delayed referral to our hospital due to the subtle clinical signs seen in these patients or due to misdiagnosis, severe unstable haemodynamic status at the time of presentation leading to delay in surgery for correcting the haemodynamic status. To reduce the mortality, the recent concept of damage control surgery has to be stressed strongly whose feasibility and the effectiveness in our setup has to be studied further. So, we conclude that with early diagnosis, timely reference, early surgical intervention and intensive post-operative care we can definitely save the life of these trauma patients with these relatively rare injuries.

**KEYWORDS**

Hollow Viscus, Ileum, Laparotomy, Perforation.

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**BACKGROUND**

Trauma is a major health problem in all countries and it unfortunately forms 60-70% of all emergency admissions to any hospital. Trauma patients need the most important care since these are the patients who can be salvaged to the maximum. Traumatic injuries remain the leading cause of death among patients aged 12-45 years and continue to

account for substantial morbidity in this population.<sup>1</sup> Hollow viscus injury following blunt abdominal trauma is an infrequent diagnosis.<sup>2</sup> The incidence of hollow viscus injuries following abdominal trauma varies from 2 to 15%.<sup>3</sup> Patients with penetrating abdominal trauma have mostly hollow viscus injury; however, this diagnosis is infrequent in blunt abdominal trauma because the trauma should be very

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severe. Solid organ injury and resultant haemodynamic instability present a higher priority in the management of the patient with blunt abdominal trauma, and hollow viscus injury is not usually suspected unless the clinical picture is highly suggestive.<sup>4-7</sup> It is well known that delay in diagnosis and treatment of the hollow viscus injury results in early peritonitis, haemodynamic instability and increased mortality and morbidity.<sup>8</sup> The decrease in the rate of penetrating abdominal trauma and the increase in the rate of blunt abdominal trauma have resulted in increased rate of hollow viscus injury. Thus, the early diagnosis and treatment remains the most important part of the management.<sup>9</sup> Management of blunt abdominal trauma leading to hollow viscus injury is a major challenge for both surgeons and anaesthesiologists.<sup>10</sup> In contradiction to non-operative management of maximum solid visceral injury, early surgical intervention is of paramount importance in case of hollow viscus injury. A delay in diagnosis and hence treatment increases morbidity and mortality.<sup>5-7</sup> In the same way few centres have extensive experience in this field and there is lack of large data sets and epidemiological data about the incidence, prevalence, diagnosis, and outcomes of these injuries are limited. Thus, we performed the present study to review our experience with hollow viscus injury following abdominal trauma in a tertiary care centre. Mahatma Gandhi Memorial Government Hospital, Trichy, attached to KAPV Government Medical College is one of the tertiary centre for trauma in Tamilnadu in which majority of patients admitted to surgical triage ward are due to trauma. Systemic evaluation of these patients revealed orthopaedic and neurological injuries to be the most commonly encountered followed by abdominal trauma forming the third rank next to these injuries. In our hospital, hollow viscus injuries are the most commonly encountered abdominal injuries followed by the injuries to solid organs (liver, spleen, kidney). Solid organ injuries can be managed by both conservative and surgical management whereas hollow viscus injuries need emergency surgical intervention since delayed interventions carry a worst prognosis. Hence, early diagnosis and intervention in these patients will bring a significant change in the final outcome.

#### **Aim of the Study**

- Complete systemic examination of all trauma patients admitted to triage ward.
- Identifying patients having or suspected to have abdominal injury.
- Appropriate investigations for those patients.

- To analyse mechanism of injury, organs involved and accompanying injuries in traumatic hollow viscus injuries.
- To analyse the different surgical procedures and finally the postoperative outcome.

#### **MATERIALS AND METHODS**

##### **Case Selection**

The study population are those patients admitted in surgical triage ward in MGMGH attached to KAPV Medical College, Tiruchirapalli with hollow viscus injuries.

##### **Inclusion Criteria**

- All trauma patients with abdomen injury greater than 13 yrs. of age.
- Both Blunt and Penetrating injuries to abdomen included.

##### **Exclusion Criteria**

- Patients with isolated solid organ injuries.
- Paediatric age group patients (<12 yrs.)

##### **Mode of Evaluation**

- Detailed history and complete physical examination of all the trauma patients.
- Blood investigations. (Complete blood count, Renal function tests).
- Blood grouping and typing.
- Chest X-ray PA view.
- X-ray abdomen erect.
- USG abdomen & pelvis.
- CT scan abdomen and pelvis.
- Paracentesis.

##### **Study Design**

- It is a prospective nonrandomised descriptive study.
- Duration of study – January 2016 to December 2016.
- An informed written consent obtained either from the patient or from their reliable attenders.
- Collected data were analysed using statistical methods.

#### **OBSERVATION AND RESULTS**

- Total number of trauma patients admitted to surgical triage ward during the study period – 9660.
- Patients suspected of having abdominal injury – 2070.
- Patients who were completely evaluated and found to have abdominal injury – 74.
- Patients with solid organ injury alone – 26.
- Patients with hollow viscus injuries – 48.

**Age-** There is a wide range in presentation of patients-the youngest patient being 16 years and oldest patient being 65 years of age.

The mean age of presentation of patients is 40 years with a standard deviation of 13.76 years.

Traumatic hollow viscus injuries are distributed age wise as follows-

Age Distribution	Total No. of Patients	Percentage
11-20	3	6.25%
21-30	13	27.08%
31-40	11	22.91%
41-50	11	22.91%
51-60	5	10.41%
61-70	5	10.41%

**Table 1. Age Distribution**

Sex	Total Number of Patients	Percentage
Male	41	85.42%
Female	7	14.58%

**Table 2. Sex Distribution**

Mode of Injury	Number of Patients	Percentage
Blunt injury	37	77.08%
Penetrating injury	11	22.92%

**Table 3. Mode of Injury**

Time of Reference	Number of Patients	Percentage
< two days	38	79.16%
>two days	10	20.84%

**Table 4. Time of Reference**

Signs	No. of Patients	Percentage
Pulse Rate >90/min.	27	56.25%
Blood Pressure <90 mmHg	24	50%
Respiratory Rate>20/min.	24	50%
Temperature>100°F	16	33.33%

**Table 5. Associated Signs**

On the basis of surgery being performed within or more than five hours after presentation to the hospital, these patients are divided into two groups-

Timing of Surgery	Number of Patients	Percentage
Less than 5 hrs.	32	66.68%
Greater than 5 hrs.	16	33.33%

**Table 6. Timing of Surgery**

Site of Injury	Number of Patients	Percentage
Ileum	17	35.41%
Ileum with mesentery	9	18.75%
Jejunum	7	14.58%
Stomach	6	12.50%
Jejunum with mesentery	5	10.41%
Ascending colon	2	4.16%
Descending colon	2	4.16%

**Table 7. Site of Injury**

Type of Injury	Number of Patients	Percentage
Single perforation	31	64.58%
Multiple perforations with mesenteric tear	11	22.91%
Multiple perforations	6	12.50%

**Table 8. Type of Injury**

Associated Injuries	Number of Patients	Percentage
Orthopaedic	10	30.30%
Neurosurgery	8	24.24%
Solid organ	6	18.18%
Chest	4	12.12%
Urology	3	9.09%
Plastic	2	6.06%

**Table 9. Associated Injuries**

Surgical Procedure	Number of Patients	Percentage
Primary closure	37	77.08%
Resection and anastomosis	9	18.75%
Ostomies	2	4.16%

**Table 10. Surgical Procedure Underwent**

Ventilatory Support	Number of Patients	Percentage
<2 days	13	27.08%
>2 days	6	12.50%

**Table 11. Need for Ventilatory Support**

Total number of postoperative patients who had complications-20 (41.66%).

Complications	Number of Patients	Percentage
Respiratory infections	8	16.67%
Wound infections	6	12.50%
Urinary tract infections	2	4.16%
Abscess	2	4.16%
Leak	1	2.08%
Ostomy site complications	1	2.08%

**Table 12. Postoperative Complications**

Morbidity	Number of Patients	Percentage
Prolonged stay >14 days	10	20.83%
Incisional Hernia	5	10.41%
Re-surgeries	3	6.25%

**Table 13. Morbidity**

Sl. No.	Groups	Death	Alive	Chi-Square Test $\chi^2 = \frac{(O-E)^2}{E}$	P Value
1	<2 days	8	30	3.36	<0.05
2	>2 days	5	5		

**Table 14. Mortality in Relation to referral Time Interval**

**Mortality**

Overall mortality -13 (27.08%).  
 Mortality in isolated injuries -4 (8.33%).  
 Mortality in poly trauma patients -9 (18.75%).

Hence from the above reference table we can infer that increased mortality is associated with delayed referral (>2 days), which is significant statistically.  
 Mortality in relation to time of surgery.

Time of Surgery	Number of Patients	Mortality	Percentage
<5 hours	32	4	8.33%
>5 hours	16	9	18.75%

**Table 15. Mortality in Relation to time of Surgery**

Sl. No.	Groups	Death	Alive	Chi-Square Test $\chi^2 = \frac{(O-E)^2}{E}$	P Value
1	<5 hours	4	28	10.62	<0.001
2	>5 hours	9	7		

**Table 16. The p value Calculation in Relation to Delayed Surgery**

Hence, we infer from the above table that increased mortality associated with delayed surgery is significant, statistically.

**DISCUSSION**

We infer that the majority of patients belonged to 21-30 years of age group (Table 1). In other studies, the majority of patients belonged to 21-30 years age group. Therefore, it can be concluded that the young and the productive age group people are the usual victims of traumatic hollow viscus injuries. In our study, there is a clear male sex preponderance (85.42% Vs. 14.58%) (Table 2). The male to female ratio is 5.8:1 which is slightly higher than those seen in the western references, as in India males are the chief bread earners for the family and are involved in outdoor activities most of the times. In our study, the common signs were tachycardia (56.25%), followed by hypotension (50%), tachypnoea (50%) and elevated body temperature (33.34%) (Table 5). The commonest mode of injury causing injuries in our study is the blunt abdominal trauma as compared to penetrating abdominal trauma (77.08% Vs. 22.92%). The major cause of both blunt and penetrating trauma (>90%) is Road traffic accident (RTA)

followed by accidental fall (Table 3). This is due to the rapid development in technology, in all fields including automobile industry where the first priority has been given to speed rather than safety. Patients with penetrating injury with peritoneal breach were taken up for exploratory laparotomy but in case of blunt injury abdomen suspected cases were subjected to chest x-ray and x-ray abdomen erect to look for air under diaphragm. Suspected hollow viscus injury patients will clinically present with abdominal tenderness, distension, localised guarding and rigidity, absent bowel sounds and obliteration of liver dullness. Most of patients showed air under diaphragm, but in some cases when clinical and x- ray findings were doubtful they were subjected to ultrasonogram/computed tomography abdomen to look for free air depending on availability and taken up for surgery. The most common site of hollow viscus perforation in our study was ileum (35.41%) followed by combined injury of ileum and mesentery (18.75%) as compared to several studies which also observed small intestine to be the most common site. The descending colon was the least site to be affected (4.16%) (Table 7). Isolated perforation is the most common type of injury encountered in our study (64.58%) and hence a simple debridement of the wound edges followed by primary wound closure of the wound was done in 77.08% of cases (Table 9, 10). This is in accordance with concept of damage control surgery thereby considerably reducing the duration of the surgery comparing to resection and anastomosis of bowel and has shown an increase in the survival rate and decreased incidence of leak in these patients. The most common associated injuries in our study are the orthopaedic injuries (30.30%) followed by neurosurgical injuries (24.24%) as compared to western literature where it is said that thoracic injuries are the most common of the associated injuries. In our study, the overall complication rate is 41.66% (Table 12). Respiratory infection (16.67%) is the most common complication followed by wound infection (12.5%) and the leak rate was the least complication in our study (2.08%). Our study is comparable to a study by Jolly et al which showed wound infection in 14% of cases. Another study by Davis et al showed wound infection as a complication in 15% of the cases. The commonest morbidity was the prolonged stay in hospital (>14 days) which accounted for 20.83% followed by incisional hernias (10.41%) (Table 13). Longterm morbidity could not be exactly studied in our study. But the effects of morbidity on the life style of patients and longterm prognosis needs further followup. Overall mortality rate was 27.08%. Of this, 70% of deaths occurred in polytrauma cases. Mortality is less in patients who were referred early to our hospital i.e. within two days as compared to those patients referred late (21.05% Vs. 50%). This was proved statistically significant with a p value of <0.05. It was also shown that mortality is less in patients who were taken up for surgery

early i.e. within five hours of admission triage ward (8.33% Vs. 18.75%) which was also proved statistically significant with a p value of <0.001. In our study, it was found that mortality is high in patients who are on prolonged ventilatory support for more than two days (50%), as compared to those patients who were on ventilatory support or weaned from ventilatory support within two days (15.38%). This is due to the development of septicaemia as evidenced by persistent hypotension, tachycardia, tachypnoea and hyperthermia leading to ARDS, SIRS (Systemic Inflammatory Response Syndrome), MODS (Multiorgan Dysfunction Syndrome) and eventually death.

### CONCLUSION

From the study conducted on traumatic hollow viscus injuries in Mahatma Gandhi Memorial Government Hospital (MGMGH) Trichy, a tertiary trauma care centre, we have come to the following conclusions. Traumatic hollow viscus injuries are quite common when compared to solid organ injuries. The most commonly affected group are the economically productive age group people. There is a definite male preponderance in our study. The most common aetiology for the hollow viscus injuries in our setup is the Road traffic accident (RTA). Since pre-operative diagnosis is infrequently done in our study hollow viscus injuries are generally recognised late and hence have a poor prognosis compared to solid organ injuries. Most of cases were diagnosed clinically and for confirmation chest x-ray with erect abdominal x-ray taken in few doubtful cases, ultrasonogram/CT abdomen taken to confirm pneumoperitoneum according to the availability. Small intestine particularly the ileum is the most common hollow viscus to be affected. Since isolated ileal perforation is the most common encountered lesion, simple debridement of wound edges followed primary closure of the wound carries a good prognosis in both recovery as well as mortality. Mortality was more or less equal to other studies. The commonest cause of death is associated polytrauma, followed by septicaemia owing to delayed referral to our hospital due to the subtle clinical signs seen in these patients or due to misdiagnosis, severe unstable haemodynamic status at the time of presentation leading to delay in surgery for correcting the haemodynamic status, respiratory infections in ventilator supported patients, SIRS (Systemic Inflammatory Response Syndrome) leading to MODS (Multiorgan Dysfunction Syndrome) and eventually death. To reduce the mortality, the recent concept of damage control surgery has to be stressed strongly whose feasibility and the effectiveness in our setup has to be studied further.

So, we conclude that with early diagnosis, timely reference, early surgical intervention and intensive postoperative care, we can definitely save the life of these trauma patients with these relatively rare injuries. Adequate knowledge regarding suspecting intra-abdominal injuries and timely reference to a tertiary trauma care centre can definitely bring a marked difference in the prognosis of these patients.

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