

# Clinico – Epidemiological Profile, Pattern and Outcome of Abdominal Trauma in A Level 1 Trauma Centre in South India

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## ABSTRACT

**Introduction:** Abdomen is the third most common region to be affected in trauma in the form of penetrating or blunt injury in which the latter is often overlooked. The profile and pattern of abdominal trauma is changing with time with significant increase in urban population, faster vehicle on roads, industrialization and a change in the socioeconomic values.

**Aims and Objectives:** To study the proportion, cause, pattern, management and outcome of patients presenting with abdominal trauma to the emergency department.

**Material and methods:** The study was conducted as a Hospital based descriptive cross-sectional study in Jawaharlal Institute of Postgraduate Medical Education & Research (JIPMER) Hospital, Puducherry which is a level 1 trauma centre. The study period was from August 2016 to May 2018. All patients who presented to JIPMER Emergency Medical Services (EMS) with clinical evidence of abdomen trauma were included. Details on pre-hospital care, mode of injury, clinical presentation, management and outcome were recorded.

**Results:** Among total patients, 49% patients were between 21 to 40 years age group. Road traffic accident was the commonest cause of abdominal trauma with 68% cases followed by trauma due to fall from height in 13% cases. Among 153 subjects, blunt injury was found in 87% while penetrating injury was found in 13% of patients. Solid organ injury was found in 86 cases and hollow viscus injury was observed in 29 cases. Among the study group, 100 patients were managed conservatively and 53 patients were managed surgically. In this study, shortest duration of hospital stay was one day and longest duration was 60 days.

**Conclusion:** RTA forms the most common mode of injury in abdominal trauma. FAST is a reliable and quick investigation to diagnose abdominal trauma. Majority of the Blunt injury abdomen cases can be managed conservatively.

**Keywords:** Blunt Injury Abdomen, Penetrating Injury Abdomen, FAST, Solid Organ Injury.

be as high as 36%.<sup>3</sup> Commonly people of most productive and active age group are involved in BAT. Delay in diagnosis can be dangerous to the patient and can affect the overall morbidity and mortality. Proper understanding of aetiology and pattern of blunt abdominal trauma can help in improving the final outcome. In order to decrease mortality in cases of abdominal injury, risk factors for mortality need to be systematically pointed out and studied.

The profile and pattern of abdominal trauma is changing with time as Countries are passing through significant increase in urban population, faster vehicle on roads, industrialization and a change in the socioeconomic values. India is changing similar to other countries. Due to these changes, road traffic accidents (RTAs) have become one of the most common problems in the world, which is resulting in loss of large number of untimely human lives.<sup>1</sup> The use of motor vehicles is increasing globally; a particular concern is in developing economies like India, where increasing urbanization, narrow roads, over-crowding on roads and poor follow up of traffic rules is prevalent. We are lacking epidemiological data regarding this problem from this part of the country. The study was designed to study the proportion, cause, pattern, management and outcome of abdomen trauma in a tertiary care centre in South India.

## MATERIAL AND METHODS

The study was conducted as a Hospital based descriptive cross-sectional study in Jawaharlal Institute of Postgraduate Medical Education & Research (JIPMER) Hospital, Puducherry which is a level 1 trauma centre. The study period was from August 2016 to May 2018. All patients who presented to JIPMER Emergency Medical Services (EMS) with clinical evidence of abdomen trauma were included. A

## INTRODUCTION

Trauma kills more than 4.8 million people every year and accounts for 10.1% of the global burden of diseases.<sup>1</sup> It is the commonest cause of mortality in the first forty years of life and is the third most common cause of death overall.<sup>1</sup> Abdomen is the third most common injured region.<sup>2</sup> Abdominal trauma is traditionally classified as either blunt abdominal or penetrating abdominal trauma (PAT). PAT is mostly diagnosed reliably and easily, whereas blunt abdominal trauma (BAT) is often missed because clinical signs are less obvious. Mortality in major BAT reported to

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structured proforma was used for collecting information for the study. A systemic clinical evaluation of each case was done and the findings were recorded in a proforma along with the investigations, treatment and complications. Patients and/or their attendants/care-givers were interviewed regarding circumstances, mode, mechanism of trauma and treatment given in the pre-hospital phase. Patients who underwent surgery management were followed up for determining the duration of hospital stay, complications and outcome.

## RESULTS

During the study period a total of 153 patients were admitted as case of abdominal trauma based on clinical or radiological evidence. 75 (49%) patients were between 21 to 40 years age group. The mean age (SD) of the patients was 35.3 (15.5). Out of 153 subjects with abdominal trauma, 128 (83.7%) were males and 25 (16.3%) were females. 80 (55%) patients were occupied as either laborer or farmer. Most of the subjects in the study group were from Villupuram (48.3%) and Cuddalore (31.3%) districts. There were 22 (14.4%) subjects from Urban area and 131 (85.6%) from rural area. Road traffic accident was the commonest cause of abdominal trauma with 104 (68%) cases followed by trauma due to fall from height in 20 (13%) cases (Table 1). Among RTA, 56 (36.6%) victims had injury due to two-wheeler borne, 10 (6.5%) had injury due to three-wheeler, 20 (13.1%) had injury due to four-wheeler and 18 (11.8%) had injury as pedestrians.

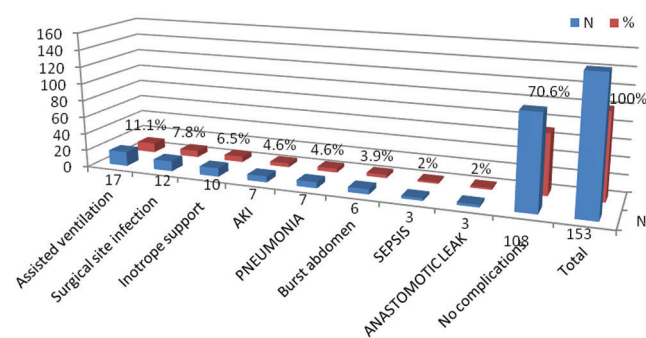
The commonest presenting complaint in these patients with abdomen trauma was abdomen pain 139 (90.84%) and vomiting 50 (32.7%). Urinary retention 33 (21.6%), abdominal distention 27 (17.6%) and hematuria 11(7.2%) were other common abdomen complaints. Abdomen tenderness was the commonest finding at presentation in 124 (81%) patients followed by abdominal guarding in 71 (46.4%). Shock or hypotension was present in 43 patients. The mean (SD) GCS was 14.3 (2.0) and RTS was 7.5 (0.8) among the 153 subjects. The Mean number of packed cells transfused was 1.5±2.1 in the study population. Isolated abdomen trauma was present in 94 (61.4%) cases out of 153 cases. Commonest associated body region involved were chest 44 (28.8%) followed by extremities 35 (22.9%), pelvic 24 (15.7%) and head 17 (11.1%) cases.

Among 153 subjects, BAT was found in 133 (86.9%) while PAT was found in 20 (13.1%). The commonest mechanism of injury in BAT (n=133) were RTA 97 (72.9%) followed by fall 20 (15%) and assault 5 (3.8%). Whilst commonest mechanism of injury in PAT (n=20) were assault 11 (55%) followed by RTA 7 (35%). 131 subjects underwent FAST (Focussed Assessment of Sonology for Trauma) examination based on clinical findings out of which 126 (96.2%) patients had positive finding (free fluid abdomen). 92 patients underwent evaluation by CT scan. Among 92 patients in whom CECT was done 87 (94.6%) patients had documented intra-abdominal injury.

Solid organ injury (SOI) was found in 86 (56.1%) cases and hollow viscus (HWI) injury was observed in 29 (18.2%)

cases. Most common solid organ injured was spleen 46 (30.1%) followed by liver 43 (28.1%) and kidney 13 (8.5%) (Table 2). Most common hollow viscous injured in the present study was small bowel 28 (18.3%) followed by large bowel 11 (7.2%). Among BAT patients, out of 133 cases solid organ injury was present in 111 (83.45%) while in PAT out of 20 cases hollow viscera injury was present in 16 (80%) subjects. Table.2 also shows that in BAT out of 133 cases most common injured organ was spleen 45 (33.8%), followed by liver 43 (32.3%), small bowel 16 (12%) and kidney 13 (9.8%). In PAT out of 20 cases most common injured organ was small bowel 12 (60%) followed by large bowel 3 (15%).

Among the study group, 100 (65.4) patients were managed conservatively and 53 (34.6) patients were managed surgically. Among 133 patients with blunt injury abdomen, 99 (74.4%) patients were managed conservatively. Among 20 patients with penetrating trauma 19 (95%), patients were managed surgically. Out of 53 patients who were managed surgically 21 (39.6%) patients had small bowel resection and 10 (18.9%) patients large bowel resection. Among 46 patients with splenic injury splenectomy was done in 6 patients. In the present study large bowel resection was done in 18.9% cases and small bowel resection/stoma was done in 39.6% cases. In the study group 45 (29%) were having complications (Graph 1). Most common non-operative complication was the requirement of use of assisted ventilation 17 (11.1%) followed by inotrope use 10 (6.5%). Commonest operative complications was surgical site infection 12 (7.8%) followed by burst abdomen 6 (3.9%) and anastomotic leak 3 (2%). In this study shortest duration of hospital stay was one day and longest duration was 60 days. In this study mean duration of hospital stay is 12.8 days. 91(59.5%) patients were discharged within 10 days. 5 patients among the study population expired leading to overall mortality of 3.27% (Table 5). Overall mortality of abdomen trauma (n=153) due



**Graph-1:** Distribution of subjects as per complications

Mode	N	%
RTA	104	68.0
Falls	20	13.1
Assault	16	10.5
Bullock cart	5	3.3
Others	8	5.2
Total	153	100.0

**Table-1:** Distribution of subjects as per Mechanism of injury

Organ	Blunt		Penetrating		Total	
	N	%	N	%	N	%
Spleen	45	33.8%	1	5.0%	46	30.1%
Liver	43	32.3%	0	.0%	43	28.1%
Small bowel	16	12.0%	12	60.0%	28	18.3%
Kidney	13	9.8%	0	.0%	13	8.5%
Mesenteric tear	10	7.5%	4	20.0%	14	9.2%
Large bowel	8	6.0%	3	15.0%	11	7.2%
Pancreas	7	5.3%	0	.0%	7	4.6%
Retroperitoneal hematoma	4	3.0%	1	5.0%	5	3.3%
Adrenal	3	2.3%	0	.0%	3	2.0%
Vascular	3	2.3%	1	5.0%	4	2.6%
Diaphragm	2	1.5%	0	.0%	2	1.3%
Rectum	2	1.5%	0	.0%	2	1.3%
Stomach	1	.8%	1	5.0%	2	1.3%
Rectus sheath	0	.0%	1	5.0%	1	.7%
Omentum	0	.0%	2	10.0%	2	1.3%

**Table-2:** Distribution as per intra abdominal organs injured

Management	Blunt (n=133)		Penetrating (n=20)		Total (n=153)	
	N	%	N	%	N	%
Conservative	99	74.4	1	5.0	100	65.4
Surgical	34	25.6	19	95.0	53	34.6
Total	133	100.0	20	100.0	153	100.0

**Table-3:** Distribution of subjects as per management followed and type of injury

Surgical procedure	N	%
Small bowel resection/stomy	21	39.6
Large bowel resection	10	18.9
Splenectomy	06	11.3
Omental resection	02	1.9
Nephrectomy	01	1.9
Pancreatic excision	01	1.9
Antrectomy&gastrojejunostomy	01	1.9
Diaphragmatic repair	01	1.9

**Table-4:** Distribution of patients according to the type of surgical procedure performed N (53)

Abdomen injury	Death		Discharge (Alive)	
	N	%	N	%
Blunt	4	80.0	129	87.2
Penetrating	1	20.0	19	12.8
Total	5	100.0	148	100.0

**Table-5:** Comparison of outcome (death/discharge) with type of injury.

to PAT 1 (5%) was more than BAT 4 (3.8%). Sepsis/septic shock 2 (40%) and hemorrhagic shock 2 (40%) was the common cause of death. Metabolic acidosis/coagulopathy was present in 1 (20%) patient.

## DISCUSSION

In our study, most of the patients presented with abdominal trauma belonged to the young age group of 21 to 30 years 40 (26.1%). 75 (49%) patients were in the age group of 20 to 40. This is comparable to other studies who have also reported similar findings. A study by Panchal HA et al had 36% of patients in 21 to 30 years age group.<sup>4</sup> Another study from

Tanzania by Chalya et al showed most common age group 21-30 years (46.5%).<sup>5</sup> Another study from south India by Reddy N B et al showed similar results in which 21- 40 age group was involved in 50% cases.<sup>6</sup> The reason for occurrence of abdominal trauma in this age group may be because this age group is socioeconomically most active globally in all societies.

In the present study daily wage labourers or people from low socioeconomic status like farmers were found to be predominantly involved in trauma. Most common occupation in this study was (38.6%) farming. Similarly a study from India by Kulkarni S et al found that 30.88% of abdominal trauma cases were farmers.<sup>7</sup> Study by Saleem et al from Egypt showed daily workers as most common (20%) working class of people involved in abdominal trauma.<sup>8</sup> This observation can be explained by the fact that India is a developing country with predominance of low socioeconomic class of people. Also, rural patients were more commonly involved in this study (131 cases vs. urban 22 cases). This result is comparable to a study from Egypt in which 53% patients were from rural area, whereas 47% were from urban area.<sup>8</sup> This result is also consistent with a study by Maske AN et al in which 56% cases were from rural area (percentage).<sup>9</sup> The higher percentage of rural population in this study is due to our institute is a tertiary care centre in this part of the country and majority of patients coming to the hospital are from rural areas. Lack of awareness about road safety measures, damaged roads, poor lights and illiteracy were quoted as the reason for the predominance of abdominal trauma in rural areas.

In this study most common mode of injury was RTA



(68%) which is consistent with the findings in similar studies by Chalya et al (69.5%), Kulkarni S et al (75%)<sup>5,7</sup> and Balamurugan et al (68%).<sup>10</sup> This seems to be because economy is growing, buying capacity of common man is increasing and even a low socioeconomic status person can buy a two wheeler resulting in increased two wheelers on roads. The second most common mode of abdominal trauma in our study was fall followed by assault. This is consistent with a study by Balamurugan et al from South Indian in which second most common cause was fall from height 17% followed by assault 8%.<sup>10</sup> Study by Kulkarni S et al from India had injury from fall in 26% followed by assault in 9%. Chalya et al found fall in 17.2% followed by assault in (5.1%) patients.<sup>5</sup>

In this study BAT was present in 133 Cases (87%) and PAT was present in 20 Cases (13%). Studies in the past have also documented similar findings. A study by Saleem et al from Egypt observed BAT and PAT in 77.5% and 22.5% respectively.<sup>8</sup> Panchal HA et al in their study observed BAT and PAT in 74% and 26% respectively.<sup>4</sup> Gad et al had also observed similar findings.<sup>11</sup>

Solid organ injury was found to be more common 86 (56%) in our study especially in cases of blunt trauma abdomen 111 (83.5%). Studies by Panchal HA et al and Balamurugan et al have also shown similar results.<sup>4,10</sup> A study by Maske A N et al showed both SOI and HWI were present in 50% cases each.<sup>9</sup> Most common organ injured in our study was spleen 46 (30.1%). Similar studies have shown liver to be the commonest organ injured (studies by Lima et al and Panchal HA et al).<sup>4,12</sup> Most common HWI in our study was small intestine 28 (18.3%). Studies have also shown that small bowel is the commonest hollow viscous injury in abdominal trauma patients.<sup>4</sup> Hollow viscous injury was the commonest injury in penetration trauma patients in our study and is comparable with similar studies in the past.<sup>4</sup>

In our study, among 131 patients who underwent FAST, 96.2% of patients had positive finding. Among 92 patients in whom CECT was done 87 (94.6%) patients had documented intra-abdominal injury. In a study by Parreira et al FAST was performed in 69 patients and intra-abdominal injuries were found in 21(30.8%) cases while CECT abdomen was done in 66 patients and intra-abdominal injuries were present in 64 (89.5%) cases.<sup>13</sup> In our study we looked for FAST positivity by seeing free fluid only in abdomen, while in a study by Parreira FAST positivity was taken when intra-abdominal organ injury was present. This may be the reason for low FAST positivity in Parreira et al study. In a study by Pimentel et al, out of 85 BAT who underwent CECT abdomen, 48 (56.5%) were having positive findings and this result is comparatively showing less positivity.<sup>3</sup> This was because in Pimentel et al study instead of FAST only CECT abdomen was done to evaluate abdominal injury while in our study CECT abdomen was done only when FAST was positive.

In our study majority of the BAT 99 (74.4%) were managed conservatively. Since solid organ injury was the commonest injury in our study, conservative approach with close monitoring of the patient was followed in majority of the

patients. Few other studies have also reported the same line of management. However, the percentage of cases managed conservatively varied in other studies. In a study by T.Rudra Prasad Reddy et al conservative approach was undertaken in 66% patients while surgical approach was undertaken in 34% cases.<sup>14</sup> In a study by Malhotra et al 63% of BAT patients were managed conservatively while 37% patients were managed operatively.<sup>15</sup> A study by Chalya et al from Tanzania showed 49% of BAT cases were managed surgically.<sup>5</sup> This difference in management may be influenced by the presence of an intensive care unit and CT scan. Percentage of cases managed conservatively will be more in developed countries with fully setup intensive care monitoring. Our institute is a tertiary care centre in this part of the country with adequate intensive care setup, hence more percentage of cases were managed conservatively compared to other studies. In a study by Raza et al 75% of BAT were managed conservatively while 25% were managed operatively and it concluded that Non operative management (NOM) is better and safe approach if patients are monitored and repeatedly examined clinically in ICU.<sup>16</sup> In penetrating abdominal trauma, irrespective of the clinical finding the wound was explored to look for injury, hence most 19 (95%) of the patients with penetrating trauma underwent surgical exploration. A study from Nepal by Thapa et al cites 100% of the cases with PAT were managed surgically.<sup>17</sup> In a study by Chalya et al 92% of the PAT cases were treated surgically.<sup>5</sup>

In this study most common non-operative complication was the requirement of use of assisted ventilation 17 (11.1%) followed by inotrope use 10 (6.5%). Results of Maske A N et al study is consistent with this.<sup>9</sup> Study by Jain et al and Dodia et al have reported respiratory complications in 11% and 16% cases respectively.<sup>18,19</sup> Ramya et al have showed respiratory complication to be present in 28% subjects.<sup>20</sup> In a study by Bala et al lung complications like pneumonia, acute respiratory distress syndrome was present in 22% cases.<sup>21</sup> Most common operative complications in our study were surgical site infection (7.8%), followed by burst abdomen (3.9%), and anastomotic leak (2%). This is consistent with study by Jain et al study in which surgical site infection was present in 14% patients and burst abdomen was present in 7% patients.<sup>18</sup> A study by Walia et al also showed similar results with 14% surgical site infection and burst abdomen 4%.<sup>22</sup> Similar results were shown by Maske A N et al study in which surgical site infection was 22% and burst abdomen 6% cases.<sup>9</sup> Chalya et al study also showed similar results with surgical site infection 27% and wound dehiscence 6%.<sup>5</sup> Ramya et al study showed surgical site infection in 30% and burst abdomen in 10% subjects.<sup>20</sup> Dodia et al study, showed surgical site infection in 24% subjects and burst abdomen in 4% cases.<sup>19</sup> In Bala et al study, surgical site infection was present in 10% cases.<sup>21</sup>

In the present study, the cases stayed in hospital for up to 10 days was 91 (59.5%) which is comparable to studies by Ramya et al (48%), Dodia et al (80%), and Vashistha et al (45%).<sup>19,20,23</sup> But Jain et al study in contrast shows most of the cases were staying between 11 to 20 days (54%).<sup>18</sup> This

is because Jain et al study involved 100 cases of abdomen trauma either blunt or penetrating having hollow viscus injury only and all patients were managed surgically which need longer duration of hospital stay.

Our study had reported 3.3% mortality (5 deaths out of 153 subjects) among patients with abdominal trauma. In Thapa et al study mortality rate is 9.3%.<sup>17</sup> This overall mortality rate is higher because in Thapa et al study PAT is 35% compared to 13% in our study and GI injuries were 51% as compared to 17% in our study. In Walia et al study mortality rate is 8%, it is higher than our study as in that study associated chest injuries are only 4% while in our study it is 19.4%.<sup>22</sup> In Jain et al study mortality is 7%.<sup>18</sup> In Chalya et al study mortality rate was 18%.<sup>5</sup> This decreased mortality in our study is explained by the fact that most cases reached our hospital after getting first aid at other healthcare facilities and patients who were badly injured might have died before reaching JIPMER. In the present study most of the patients 89 (58.2%) took more than four hours (time since injury) to reach JIPMER.

## CONCLUSION

From the present study we conclude that RTA forms the most common mode of injury in abdominal trauma. BAT is more common than Penetrating injury abdomen. FAST is a reliable and quick investigation to diagnose abdominal trauma. Spleen and liver are the commonly injured organ in abdominal trauma. Majority of the Blunt injury abdomen cases can be managed conservatively.

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