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## Management and outcome of blunt abdominal trauma injuries at a tertiary care hospital

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### Abstract

Abdominal trauma is an important cause of internal bleeding and sepsis in Trauma patients. The mechanism involved are Blunt, Penetrating or Blast trauma. Abdomen is the third most commonly injured region. The greatest difficulty in blunt trauma is the diagnosis because of masking of symptoms by other injuries like head injury, chest injury and fractures. Purposes of this study, conservative management includes the management of patients with partial bowel obstruction or recurrent adhesive obstruction; it also includes the management of patients during the early postoperative period with naso-gastric tube NGT suction, intravenous (IV) fluids and frequent clinical reassessment. Of the total 89 patients who were considered for non-operative management, one patient of Pancreatic injury with duct disruption underwent Endoscopic retrograde cholangiopancreatography (ERCP) and pancreatic duct stenting was done. The patient had an uneventful recovery.

**Keywords:** Management, outcome, blunt abdominal trauma injuries

### Introduction

Trauma is essentially a man made health problem of the modern era, which has assumed epidemic proportions. It is the leading cause of death and disability in the first four decades of life and is the third most common cause of death overall in our country. It is the neglected disease of modern society<sup>[1]</sup>.

Trauma literally means wound or injury, whether physical or psychic. Here the term "trauma" is used to denote physical injury. Trauma is characterised by a structural alteration or physiological imbalance that results when energy is imparted during interaction with physical or chemical agents.

Injuries are observed in civilian settings or military settings. In civilian settings injuries are classified as homicidal, suicidal and accidental, considering the medicolegal aspects. Homicidal injuries result from assault which can be blunt force by fists, low velocity penetrating objects like pistol bullets and knife, High velocity penetrating objects like machine gun bullets or blast injuries following terroristic attacks. In the civilian settings, negligence or lack of safety culture is the most important cause of manmade injuries. The Accidental injuries commonly result from Road or Railway traffic accident, fall from height or industrial accidents. Human error and machine error resulting out of negligence or lack of safety culture are important contributing factors to preventable accidental injuries<sup>[2, 3]</sup>.

Abdominal trauma is an important cause of internal bleeding and sepsis in Trauma patients. The mechanism involved are Blunt, Penetrating or Blast trauma. Abdomen is the third most commonly injured region.

The greatest difficulty in blunt trauma is the diagnosis because of masking of symptoms by other injuries like head injury, chest injury and fractures. Blunt abdominal injuries can be missed unless specifically looked for.

In comparison to Blunt abdominal trauma, Penetrating trauma, can be easily diagnosed because of the presence of the entry wound and/or exit wound. In Blunt abdominal trauma, the number of solid organ injuries are more as compared to hollow viscus injuries. It has been observed that number of solid organs stop bleeding spontaneously without any intervention. Thus for last two decades management of blunt abdominal trauma has changed from early surgical intervention to nonoperative management<sup>[4]</sup>.

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## Methodology

Emergency surgery department register were screened for diagnosis of blunt abdominal trauma written in the column of diagnosis. Accordingly the data was collected from the medical records of the hospital diagnosed to have 'Blunt abdominal trauma with solid organ or hollow viscus injury'.

The data of the patients so enrolled was collected in the prescribed proforma and was tabulated. Identity of patients enrolled in the study was not be revealed.

Cases of Blunt abdominal trauma with solid organ or hollow viscus organ injuries were identified as evident by the clinical presentation (pain in abdomen, vomiting, hematuria, abdominal distension) and imaging (X-ray/Ultrasound/CT scan). After thorough screening on the basis of inclusion and exclusion criteria proper informed consent was obtained. The data of patients willing to be the part of study was collected in prescribed proforma. Identity of patients enrolled in the study was not revealed.

Purposes of this study, conservative management includes the management of patients with partial bowel obstruction or recurrent adhesive obstruction; it also includes the management of patients during the early postoperative period with naso-gastric tube NGT suction, intravenous (IV) fluids and frequent clinical reassessment. (The purpose of frequent clinical assessment is to rule out bowel strangulation, which may need operative management.) Operative management includes surgical exploration or operations performed on the abdomen to relieve the causes of obstruction.

A favorable outcome was achieved if patients did not develop either postoperative complication or death after conservative or operative management of IO. If the patient developed one or more postoperative complications (including wound infection, facial dehiscence, anastomotic leakage, developed septic shock, pelvic collection and pneumonia) and/or death this was considered an unfavorable outcome of IO purposes of this study, conservative management includes the management of patients with partial bowel obstruction or recurrent adhesive obstruction; it also includes the management of patients during the early postoperative period with naso-gastric tube NGT suction, intravenous (IV) fluids and frequent clinical reassessment.

The data was recorded in Microsoft Excel sheet. Qualitative data studies like gender, organs injured in blunt abdominal trauma, surgical procedures, complications of blunt abdominal trauma were represented in the form of frequency and percentages. Nominal and ordinal were tabulated and non parametric tests like chi square were applied for computing associations wherever appropriate. Description of the various surgical outcomes with respect to above mentioned criterion were given and presented in the form of tables and diagrams whichever are appropriate.

## Results

**Table 1:** Revised Trauma Score

Revised Trauma score	Frequency	Percent
8 or less	8	8.0
9 to 10	29	29.0
more than 10	63	63.0
Total	100	100.0

Of the total 100 patients, 63 patients (63%) had a revised trauma score of 10 or more.

**Table 2:** Relative frequency of organs injured in blunt trauma abdomen

Organ involved in injury	Frequency	Percent
Spleen Injury	67	67.0
Liver Injury	23	23.0
Kidney injury	5	5.0
GI Injury	3	3.0
Pancreatic Injury	2	2.0
Urinary bladder Injury	3	3.0

Spleen is the most common organ injured followed by Liver, Kidney, GI injury, Urinary bladder injury and Pancreatic injury.

**Table 3:** Number of Organs Injured

Number of organs involved	Frequency	Percent
Single	90	90.0
Two	9	9.0
Two or more	1	1.0
Total	100	100.0

90% of the patients had single organ injury, 9% had two organs injured, 1% had three or more organ involvement. The only case having 3 organ injured died due to Hypovolumic shock.

**Table 4:** Multiple Organs Injured

Multiple involved Organs	No. of patients
Spleen + Liver	5
Spleen + Kidney	1
Spleen + small bowel	1
Liver + Small bowel	1
Liver + Kidney	1
Spleen + Liver + Kidney	1

Splenic trauma with liver trauma are most common cause of hemoperitoneum in patients with more than one organ involvement.

Of the total 100 cases, only 11 were operated while others had non operative management.

**Table 5:** Operative Treatment Given

Operated	Frequency	Percent
Yes	11	11.0
No	89	89.0
Total	100	100.0

Out of all the operative procedures, Splenectomy was most commonly performed.

**Table 6:** Operative procedure

Operative procedure	No of patients	Percentage of patients
Liver tear suturing	0	0
Liver packing	0	0
Splenectomy	4	4
Pancreatectomy with Splenectomy	1	1
Primary repair of urinary bladder	3	3
Primary closure of bowel perforation	3	3
Resection anastomosis of bowel	0	0
Nephrectomy	0	0

Of the total 89 patients who were considered for non operative management, one patient of Pancreatic injury with duct disruption underwent Endoscopic retrograde cholangiopancreatography (ERCP) and pancreatic duct stenting was done. The patient had an uneventful recovery.

**Table 7:** Non Operative procedure

Minimally invasive procedures	Frequency
Arterial embolisation	0
Percutaneous Pigtailing	0
Stent placement	0
ERCP with duct stenting	1
Laparoscopy	0

**Table 8:** Organ Injury Scale (AAST)

Grade as per AAST OIS	Frequency	Percent
1	16	16.0
2	28	28.0
3	37	37.0
4	13	13.0
5	6	6.0
Total	100	100.0

Of the total 100 patients, 37% had a AAST Organ injury score grade 3 followed by grade 2 (28%), grade 1 (16%).

**Table 9:** Injury Severity Score

Injury Severity Score	Frequency	Percent
<15	92	92.0
>15	8	8.0
Total	100	100.0

Of the total 100 patients studied, 8 patients had Injury severity score >15 while remaining 92 had <15.

**Table 10:** Shock

Shock	Frequency	Percent
Present	15	15.0
Absent	85	85.0
Total	100	100.0

Out of the total 100 patients, 15 patients (15%) presented with Shock (Blood pressure <90/60 mmhg & Pulse >90/min).

Out of total 100 cases, there were no complications in 82%, in the remaining patients, 8% had chest infection, 3% had septicaemia, 3% had cardiovascular complication, 2 had urinary complications and 1% each in wound infection and infected hematoma.

**Table 11:** Complications

Complications	Frequency	Percent
Respiratory infection	8	8.0
Septicemia	3	3.0
Cardiovascular	3	3.0
Urinary tract	2	2.0
Wound Infection	1	1.0
Infected hematoma	1	1.0
Burst abdomen	0	0

**Table 12:** Mortality Data

Outcome	Frequency	Percent
Survived	92	92.0
Death	8	8.0
Total	100	100.0

The overall mortality observed in this study was 8%. All the Mortalities had associated injuries like head injury, long bone injuries. There were no deaths in isolated blunt abdominal injuries

## Discussion

With reference to the frequency of organs injured, spleen is the most common organ injured 67 (67%), followed by Liver in 23 patients, Kidney and bladder in 3% each

In this present study our findings are in agreement with Haan *et al.* [5], Armstrong *et al.* [6], Khanna *et al.* 2008 [7].

In the present study, 89 patients (89%) were conserved while exploratory laparotomy was done in remaining 11 patients (11%) Splenectomy was done in 4 patients with grade 5 injury and the remaining 63 patients of splenic injuries (grade 1 to 4) were conserved. All 23 patients with liver injuries were conserved. Of the 89 conserved patients 2 required minimally invasive procedure like ERCP.

There is an increasing trend towards conservative management, the present study shows that 89% of patients were subjected for non operative management. Armstrong *et al.* [6] showed 75%, Pietzman *et al.* [8] showed 69% and M. Makranga *et al.* Showed that 62% of patients were subjected for conservative management.

Non operative management is gaining increasing acceptance mainly because of the easy availability of CT scan. With the aid of CT scan it is possible to accurately grade the extent of injury to solid organs like liver and spleen. Minor lacerations and capsular tears, difficult to diagnose clinically can be easily demonstrated by CT scan and selected for non operative management. The disadvantages of non operative management are those of missed injuries and delayed treatment resulting in excessive morbidity and even mortality.

Of all the patients who had non operative management, one patient with pancreatic injury with duct disruption underwent ERCP with pancreatic duct stenting. He had an uneventful recovery.

In this study, one of the contributing factors in deciding the type of management was clinical presentation of shock. It was observed that of the total 11 patients operated, 8 patients (72%) had presented with shock. (P value: 0.001) This is in concordance with the study of Armstrong *et al.* Where of 25 patients operated 15 patients (60%) had presented with shock [6].

It was also observed that all the 11 patients operated had Organ injury scale- Grade 4 or more, thus indicating a significant association between the Organ injury scale and type of management, which has been proven statistically (P value: 0.033). This can be related to the study done by Frandon *et al.* [9], where of the total patients operated, 82% had an Organ injury scale of 3 or more, thus indicating a significant association.

Another factor observed to have influence on the management was the type of organ injury, all the hollow viscus injuries (100%) had to be given an operative management. This has been statistically proven (P value: 0.00001). This finding is in agreement with the study of Frandon *et al.* 2010 where 94% of hollow viscus injuries were operated, in this study two patients of extra peritoneal bladder rupture were given conservative management.

Out of 100 patients, 18 patients (18%) developed complications, of which 8% had respiratory complications.

Of the total 18 patients having complications, 12 (70.6%) had associated injuries, thus inferring that other associated injuries have a significant effect on morbidity which has been proven statistically (P value- 0.0001). This is in concordance with the Armstrong *et al.* 2018 [6] study where associated injuries were a major contributing factor (68%) for complications in Blunt abdominal injuries [10].

In this study it was observed, that of the total 15 patients presenting with shock, 10 patients (66.67%) developed

complications later on thus indicating a statistically significant association of presenting shock with complications. (P value – 0.0001)

There was a statistically significant association of Revised trauma score (P value 0.000076) and Injury severity score (P value 0.0002) with complication. Of the total patients with RTS <10, 77% patients developed complications while all the patients (100%) with ISS >15 developed complications. This indicates that Blunt abdominal trauma with other severe associated injuries are more likely to develop complications than isolated blunt abdominal trauma.

It was also observed that Hollow viscus injuries were likely to develop more complications (66.4%) than those with solid organ injuries which has been proven statistically significant. (P value: 0.00131) The most common complication in patients with hollow viscus injuries was Septicemia.

### Conclusion

Minimally invasive procedure like ERCP with stenting was done in one patient with pancreatic duct injury who had an uneventful recovery. A minimally invasive, multi disciplinary approach to traumatic pancreatic and biliary injuries as an alternative to open surgery, is practical and safe.

The present study showed a mortality of 8%. The presence of shock, severe associated injuries with RTS <10, ISS >15 were associated with more mortalities.

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