



## EVALUATE THE OUTCOME OF NON OPERATIVE MANAGEMENT IN BLUNT TRAUMA ABDOMINAL SOLID ORGAN INJURY

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### ABSTRACT

**Background:** Blunt trauma abdomen most commonly caused by road traffic accidents. Other causes are from fall from height, assault with blunt objects, bomb blast etc. The rapid deceleration cause the shearing force to tear tissues at interfaces between tissues that are relatively fixed compared to surrounding structures or crush the tissues between external force and vertebral column or rapidly raise the intra-abdominal pressure from external compression causing rupture of hollow organs<sup>1</sup>. The advent of newer imaging techniques such as CT has enabled the clinicians to diagnose the extent of injuries. These are generally managed surgically but nowadays shifting to selective NON OPERATIVE MANAGEMENT(NOM) of abdominal solid organ injuries has become the new trend in field of trauma. This NOM approach is based on outcome of retrospective studies that show decreased failure rate<sup>2</sup>.

**Methods:** A total of 50 cases above 18 years of age with blunt trauma abdomen who are hemodynamically stable presenting in MGMCH, Jaipur were included in study. Patients were assessed according to ATLS protocol and CECT of the abdomen was done. Patients were admitted to ICU for monitoring. If any fall in parameters of patient was observed patient was labelled as converted and emergency laparotomy was done.

**Result:** Those patients who responded to resuscitation in ICU were managed by Non operative management whereas remaining underwent laparotomy. Parameters for conversion was Hb <8gm/dl, hypotension, persistent fever.

**Discussion:** According to our study liver was the best preserved organ by Non operative management and had least rate of conversion. Non operative management was better modality of treatment without lesser complications.

**Conclusion:** Blunt trauma patients are best managed by Non operative management with lesser complications due to advanced critical care and higher antibiotics.

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### INTRODUCTION

Blunt trauma abdomen most commonly caused by road traffic accidents. Other causes are from fall from height, assault with blunt objects, industrial mishaps, sport injuries, bomb blast etc. The rapid deceleration cause the shearing force to tear tissues at interfaces between tissues that are relatively fixed compared to surrounding structures or crush the tissues between external force and vertebral column or rapidly raise the intra-abdominal pressure from external compression causing rupture of hollow organs<sup>3</sup>. The advent of newer imaging techniques such as CT has enabled the clinicians to diagnose the extent of injuries.

These are generally managed surgically but nowadays shifting to selective NON OPERATIVE MANAGEMENT(NOM) of abdominal solid organ injuries has become the new trend in field of trauma. This NOM approach is based on outcome of retrospective studies that show decreased failure rate<sup>4</sup>.

Success rate of NOM in spleen preservation is 90-95% in children and 70-80% in adults. NOM of liver has even higher success rate and renal injury has success rate of 90%. Pancreatic injury has mixed review. Velmahos et al supported the NOM of liver injury irrespective of magnitude<sup>5,6</sup>.

NOM is applied to hemodynamically stable patients. This is a prospective study to evaluate the outcome of NOM in blunt trauma abdomen in tertiary care center. Hemodynamically unstable patients with FAST<sup>7</sup> positive undergo emergency laparotomy.

### MATERIAL AND METHODS

#### Aims and Objectives

1. A prospective study to evaluate the outcome of nonoperative management in blunt abdominal solid organ injury.
2. Analyse the criteria for conversion to operative management.
3. Identify the organ with best outcome in non-operative management.
4. To formulate a protocol for NOM of blunt intra-abdominal solid organ injury.

**Source of Study:** Patients with Blunt Trauma Abdomen attending Emergency in Mahatma Gandhi Medical College And Hospital.

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**Inclusion criteria**

Patients above 18 years of age with blunt trauma abdomen who are hemodynamically stable and presented to emergency room with history of trauma

**Exclusion criteria**

- Hemodynamically unstable patients.
- Patients with hollow viscous injury.
- CECT indicative of active bleed.
- Those with other injury requiring explorative laparotomy

This study was a Prospective Observational study. It was carried out in the Mahatma Gandhi Medical College and Hospital, Jaipur, Rajasthan after approval from the ethical committee and obtaining written and informed consent from the patients.

On presentation to ER all the patients will be assessed and resuscitated, if necessary, in accordance with ATLS protocol. Demographic details and history including the mechanism of injury will be recorded.

All the patients will undergo FAST and once stable, they will further be evaluated with CECT abdomen and pelvis for details of solid organ injury and its grade. Patients who will satisfy inclusion criteria will be included in study and admitted to ICU. For all patients blood pressure, heart rate, Glasgow Coma Scale score, hemoglobin, packed cell volume, abdomen girth chart, associated injuries and its influence on patients outcome and hospital stay, length of hospital stay, total blood products transfused, time of conversion and the reasons for conversion, complications in converted group and outcome of each patients and mortality if any will be recorded.

Patients Hb and PCV will be monitored every 4<sup>th</sup> hourly for first 24 hours, 6<sup>th</sup> hourly for next 24 hours and twice daily for third 24 hrs. Similar monitoring will be done for blood pressure, heart rate and abdominal girth. If there will be any fall in Hb or BP, or increase in HR and abdominal girth chart appropriate measures to stabilize including blood transfusion will be given. Despite all this if patient is hemodynamically unstable, emergency laparotomy will be done.

Once operated these patients will be categorized as converted cases. The complications and duration of stay will be recorded. Patients will be closely monitored throughout their stay until final outcome either discharge or death.

**RESULT**

After initial evaluation haemodynamically stable patients of 50 in number were included in the study out of which 36 were male and 14 were female ( Table2) . The youngest patient was 18 years old and the oldest person was 85 years of age with mean age of 36 years. Maximum numbers of patients were between the ages of 29 to 38 years (Table 1).

**Table 1** Age Incidnce

Age Group	No. of cases	Percentage
18-28 Yr	10	20
29-38 Yr	18	36
39-48 Yr	6	12
49-58 Yr	7	14
59-68 Yr	2	4
69-78 Yr	4	8
>78 Yr	3	6

**Table 2** Gender distribution

SEX	Number	Percentage
Male	36	72
Female	14	28

Out of 50 cases most of them presented with soft and non-tender abdomen accounting for 40% of total percentage. Tenderness was present in 8 patients. Whereas guarding was present in 11 patients. Rigidity was seen only in 2 patients. (Table 3.)

**Table 3** Clinical Presentation of Patients

Clinical Features	No. of cases	Percentage
Soft and non-tender	29	58
Tenderness	11	22
Guarding	8	16
Rigidity	2	4

Patients also had associated injuries other than abdominal injuries. Majority of them had long bone injuries accounting for 40% of total injuries. 15 patients also had associated fracture of ribs. (Table 4)

**Table 4** Associated injuries

Associated Injury	No. of cases	Percentage
Head	3	6
Chest	15	30
Extremities	20	40
Pelvis	6	12
No associated injury	6	12

According to our study, Liver is the most commonly injured organ with total 24 patients out of 50 followed by spleen ( 15). Kidney injury was seen in 8 patients. Pancreas is least commonly injured organ (3). (Table 5)

**Table 5** Organ Wise Injury

Organ Injured	No. of cases	Percentage
Spleen	15	30
Liver	24	48
Kidney	8	16
Pancreas	3	6

Road traffic accident (RTA) was the commonest mode of injury. 42 % of total injured patients suffered from RTA. (Table 6.)

**Table 6** Mode of Injury

Cause	No. of cases	Percentage
Road traffic accident	21	42
Fall from height	18	36
assault	11	22

**Table 7** Reason for Conversion

Reason	No. of cases	Percentage
Fall in Hb	7	14
Hypotension	3	6
Persistent fever	2	4
Not converted	38	76

Most of the patients were managed conservatively in our study. 38 patients were treated without surgery with proper intensive care and regular monitoring of vitals. (Table 7).

Out of 38 patients, liver injury was best managed conservatively only 3 required conversion. 7 patients of splenic injury required laparotomy. 2 patients underwent nephrectomy. Out of total 50 patients, 12 patients were converted and underwent laparotomy. The major reason for conversion was fall in haemoglobin which was due to continuous active bleed from the injured organ which could

not be managed conservatively. Hypotension and persistent fever were other reasons for conversion (Table 7)

Out of 12 patients who underwent laparotomy, 3 with liver injury underwent primary repair of liver laceration, 7 underwent splenectomy and only 2 had nephrectomy. (Table 8)

**Table 8** Procedure Done

Procedure	No. of cases	Percentage
Primary repair of liver	3	25
Splenectomy	7	58
Nephrectomy	2	17

4 out of 12 patients who underwent laparotomy developed wound infection post operatively. Wound dehiscence was seen in 3 patients. Other complications included septicaemia (2), respiratory complications (1) (Table 9).

**Table 9** Post Operative Complications

Complications	No. of cases	Percentage
Wound infection	4	33
Wound dehiscence	3	25
Respiratory complications	1	8
Septicaemia	2	17

**Table 10** Organ Wise Conversion and Conservative

Organ Injury	Converted Yes	Converted No	Total
Liver injury	3	21	24
Out of total	6%	42 %	48 %
Spleen injury	7	8	15
Out of total	14%	16 %	30 %
Kidney injury	2	6	8
Out of total	4%	12 %	16 %
Pancreatic injury	0	3	3
Out of total	0 %	6 %	6 %
Total	12	38	50
	24%	76 %	100%

Out of 24 patients of liver injury only 3 (6%) required conversion and 21 (42 %)were managed without surgery. Out of 15 patients of splenic injury 8 were managed conservatively and 7 required conversion. Hence 6% of liver injury patients were converted compared to 14% of splenic injury conversion. 42 % of liver injury was managed conservatively compared to 16 % splenic injury which was managed conservatively. Liver is the organ that is best managed by Non operative management. (Figure 10)

Out of 50 patients 76% patients were managed by Non operative management and only 24 % who did not respond to resuscitation were converted and underwent laparotomy. Hence Non operative management of patient with blunt trauma abdomen solid organ injury is better modality of treatment (Table 10) due to better intensive care modalities and higher antibiotics.

**DISCUSSION**

With increasing popularity of non-operative management, it is important to analyse optimal practical management guidelines for observation in cases of blunt solid organ injury of the abdomen. Selective NOM has served to reduce the rate of negative operative exploration. This poses a new set of challenges with regards to observation of these patients and management of their potential complications<sup>[8,9]</sup>

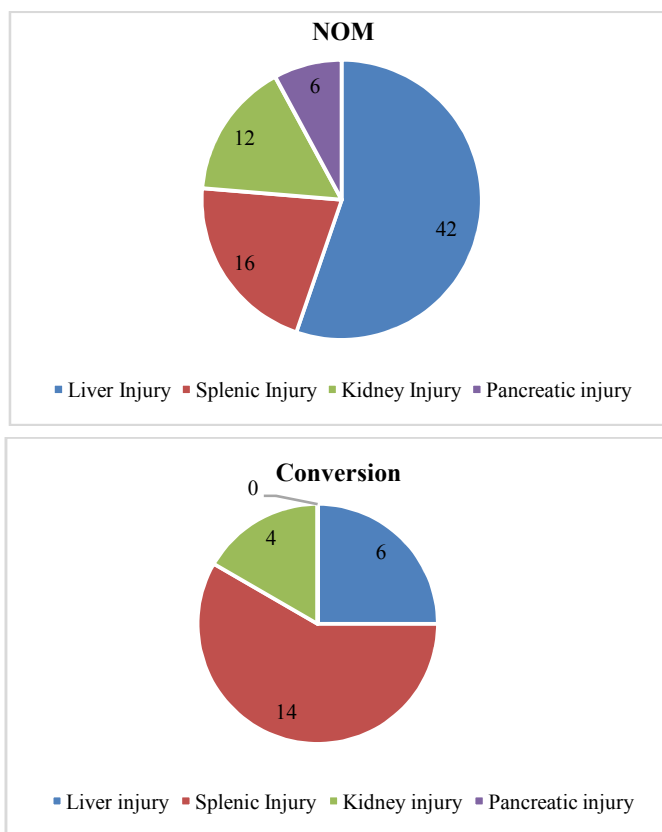
In our study of NOM, age and sex of the patient did not have any influence on the outcome. Majority of our patients were male and maximum number of patients was in the age group of 29 to 38 years. The mean age was 36 years. The most common mode of injury was due to Road Traffic Accident. All the cases who were converted to operative management had free fluid initially in the ultrasound. This analysis is similar to the study done in 2003 by Velhamos. Out of 12 cases who were converted, 6 cases got converted within 48 hours and other 6 cases within 72 hours. The timing of conversion to operative management was similar to other studies.<sup>[10-12]</sup>

In our study the highest percentage of injury was liver accounting for 48 % of total whereas other studies show that the most common organ to be injured is the spleen. There were isolated 24 cases of liver injury and out of this only 3 (6%) got converted. Therefore the success rate of NOM of liver was 94 %. The percentage of isolated splenic injury was 30 % out of which 7 ( 14% ) patients got converted. The study conducted by Velmahos et al shows similar values on splenic trauma, showing the maximum number of failures in splenic injury. The isolated kidney injury was seen in 16 % of patients and pancreas accounted for 6% of total patients. Pancreatic injury was managed without surgery.

In our study, the most common reason for conversion was fall in haemoglobin (14%), followed by hypotension (6%) and also persistent fever with peritonitis(4%).

Out of 50 cases, 38 patients who were managed by Non operative management had no complications. 12 patients who underwent laparotomy 10 developed post operative complications. 4 patients developed wound infection, 3 developed wound dehiscence. Wound infection was most common post operative complication.

Thus in our study we saw non operative management of blunt trauma abdominal solid organ injury is better managed conservatively compared to operative management. Post



**Figure 10** Organ wise conversion and conservative

operative complication rate was more in patients who underwent laparotomy compared to conservative management. According to our study liver is the organ that is best managed by Non operative management and very few patients require conversion.

## CONCLUSION

In our study the Non operative management of blunt injury abdomen is a safe and effective method of the treatment. The most common mode of injury in our study was due to road traffic accidents. FAST showed free fluid in the abdomen in all the patients who failed nonoperative treatment. The most common organ to be injured was the liver, followed by spleen. The CT grade of injury did not influence the decision to convert to operative management.

In our study, non-operative management was successful in 76% of the patients with good outcome. In cases with liver injury, conversion rate was low and therefore, Liver is the best organ to be managed by Non operative management following blunt trauma. The highest rate of failure of non-operative management was seen in splenic injury.

The timing of the decision to convert to operative management was predominantly in the first 48 hours after admission. Criteria for conversion in our study were fall in haemoglobin, hypotension, and persistent fever with signs of peritonitis despite on-going resuscitation. Morbidity was found to be more in converted group than Non operative management group.

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