

Original research article

**TO DETERMINE THE ROLE OF NON-OPERATIVE
MANAGEMENT IN BLUNT TRAUMA ABDOMEN WITH
SOLID ORGAN INJURY: COHORT STUDY**

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Abstract

Blunt trauma to the abdomen usually results from road traffic accidents, assaults and accidental falls. Management of the blunt trauma abdomen has evolved from operative to non-operative management in hemodynamically stable patients. A retrospective study was carried out on patients who were admitted in Victoria Hospital Bangalore from September 2022 to September 2023 with radiological evidence of solid organ injury post blunt trauma to abdomen, the case sheets of the respective patients were then analyzed for subsequent management given and prognosis achieved. We could easily manage the patients with severe isolated liver, spleen, and renal injuries in hemodynamically stable patients using the non-operative method. The operative group had longer hospital stays (20 days average) when compared with non-operative group (10 days average). Non-operative management failed in 8 patients who had delayed bleeding presenting between 20-72 hours and underwent splenectomy. In this 52 patients had isolated liver injuries (28%), 1 patient had isolated pancreatic injury (0.005%), 6 patients had isolated renal injury (0.32%), and 63 patients had isolated splenic injury (34.05%).

Keywords: Non operative management, blunt trauma abdomen, solid organ injury

Introduction

Trauma is one of the leading causes of preventable death in developing countries ^[1]. Blunt trauma to the abdomen is one of the leading causes of morbidity and mortality in all age groups ^[2]. Blunt trauma to the abdomen usually results from road traffic accidents, assaults and accidental falls. Management of the blunt trauma abdomen has

evolved from operative to non-operative management in hemodynamically stable patients [3, 4].

Non-operative management can be safely practiced in trauma care centers with 24-hour OT facilities, ICU newer imaging modalities, trauma surgeons and other supporting facilities [5].

Liver has a higher success rate of non-operative management, exceeding 90% [6, 7]. Hemodynamically stable liver and spleen injuries can be managed conservatively irrespective of the injury grades [8-10].

Non-operative management is highly successful in cases of renal trauma with a success rate of 90% [11]. Non-operative management of abdominal solid organ injuries is now established for hemodynamically stable patients [12].

This is a retrospective study to analyze the outcome of blunt trauma abdomen managed non-operative and operative methods.

Methodology

A retrospective study was carried out on patients who were admitted in Victoria Hospital Bangalore from September 2022 to September 2023z with radiological evidence of solid organ injury post blunt trauma to abdomen, the case sheets of the respective patients were then analyzed for subsequent management given and prognosis achieved.

Inclusion criteria

1. All hemodynamically stable patients with solid organ injuries.
2. Patients with solid organ injury with polytrauma due to blunt trauma abdomen who do not require any urgent operative management for other organ systems involvement.

Exclusion criteria

Patients with solid organ injury due to blunt trauma abdomen with hemodynamic instability defined by tachycardia >130b/min, hypotension after initial fluid resuscitation.

Radiological evidence of ongoing bleeding with hemodynamic instability.

All patients with solid organ injury associated with hollow viscus injury due to blunt trauma to the abdomen.

Pediatric and pregnant patients.

- On arrival all the patients were assessed and resuscitated if necessary, per ATLS protocol. History including the mechanism of injury formed an important part of the evaluation. All the patients underwent FAST/Abdominal sonography.
- Stable patients with positive FAST were further evaluated with chest, abdomen and pelvic CT scans. Patients with other associated injuries were examined by the respective specialists with close coordination.
- Patients with a heart rate of <110/min, and systolic BP of >90 mm Hg on arrival or following initial resuscitation were considered stable.
- The severity of the head injury, associated orthopaedic injuries, a high injury severity score or a higher radiological grading of the visceral injuries or multiple solid organ trauma were not considered as exclusion criteria in haemodynamically

stable patients.

- Non-operative management patients were admitted to emergency wards and close monitoring was done with repeated clinical examinations. The protocol included evaluation of pulse rate, blood pressure, temperature, urine output and temperature.
- Initially for the first 36 hours estimation of haemoglobin and hematocrit was done every 8th hour and then every 12th hour for the next 36 hours.
- Follow-up ultrasound abdomen was done only if haemoglobin dropped despite 3 units of blood transfusion, progressive distension of the abdomen, signs of infection, hematuria, vomiting, tachypnea or decrease in oxygen saturation. If the patient becomes hemodynamically unstable then the patient underwent exploratory laparotomy.
- Shapiro-Wilk test was used to determine the normality of the data.
- Continuous variables are expressed in terms of Mean, standard deviation (SD)
- Categorical variables are expressed in frequency (n) and percentage (%)
- Chi-square or Fisher's exact test was used to assess the significance between categorical variables.
- Independent t test was used to compare continuous variables
- $p < 0.05$ was considered as statistically significant*
- There are totally 185 samples in this study.

Results

A total of 185 patients with blunt trauma to abdomen during September 2022 to September 2023. Various types of blunt trauma injuries were found in 185 patients.

After initial evaluation and resuscitation, 22 patients who were hemodynamically unstable and patients with hollow viscus injuries were operated.

While 163 patients were initially selected for non-operative management but non-operative management failed in 8 patients who became hemodynamically unstable.

FAST scan was 100% positive in the operated group.

Males dominated in both groups with no significant difference in age.

Road traffic accident is the main mode of the mechanism of injury noted to cause blunt trauma to the abdomen (155 cases, 88%) followed by fall from height (30 cases, 12%).

We could easily manage the patients with severe isolated liver, spleen, and renal injuries in hemodynamically stable patients using the non-operative method.

The operative group had longer hospital stays (20 days average) when compared with non-operative group (10 days average).

Non-operative management failed in 8 patients who had delayed bleeding presenting between 20-72 hours and underwent splenectomy.

In this 52 patients had isolated liver injuries (28%), 1 patient had isolated pancreatic injury (0.005%), 6 patients had isolated renal injury (0.32%), and 63 patients had isolated splenic injury (34.05%).

Multiple organ injuries involving:

1. Liver and Kidney: 12 patients (0.64%)
2. Liver and Spleen: 12 patients (0.64%)
3. Spleen and Kidney: 5 patients (0.027%)
4. Liver and Pancreas/ spleen, Pancreas and Kidney/Liver, Pancreas, Spleen, Kidney: 1 patient each (0.0054%)

- 5. Pancreas and Kidney: 2 patients (0.01%)
- 6. Spleen and Pancreas: 4 patients (0.0216%)

Table 1: Gender distribution

	Frequency	Percent
Male	157	84.9
Female	28	15.1
Total	185	100.0

Table 2: Frequency distribution of operative and non-operative patients

	Frequency	Percent
Non-operative	155	83.8
Operative	30	16.2
Total	185	100.0

Table 3: Comparison of mean age between two groups

	N	Mean	Std. Deviation	p-value
Non-operative	155	35.98	14.159	0.09
Operative	30	40.93	16.592	

Table 4: Gender distribution between two groups

Sex		Group		Total
		Non-operative	Operative	
Male	N	131	26	157
	%	84.5%	86.7%	84.9%
Female	N	24	4	28
	%	15.5%	13.3%	15.1%
Total	N	155	30	185
	%	100.0%	100.0%	100.0%
p-value = 0.764				

Table 5: Liver

			Group		Total
			Non-operative	Operative	
Liver	0	N	71	29	100
		%	45.8%	96.7%	54.1%
	1	N	6	1	7
		%	3.9%	3.3%	3.8%

	2	N	28	0	28
		%	18.1%	0.0%	15.1%
	3	N	25	0	25
		%	16.1%	0.0%	13.5%
	4	N	25	0	25
		%	16.1%	0.0%	13.5%
Total		N	155	30	185
		%	100.0%	100.0%	100.0%
p-value = < 0.0001*					

Table 6: Renal

		Group				
		Non-operative	Operative	Total		
Renal	0	N	143	30	173	
		%	92.3%	100.0%	93.5%	
	2	N	2	0	2	
		%	1.3%	0.0%	1.1%	
	3	N	4	0	4	
		%	2.6%	0.0%	2.2%	
	4	N	5	0	5	
		%	3.2%	0.0%	2.7%	
	5	N	1	0	1	
		%	.6%	0.0%	0.5%	
	Total		N	155	30	185
			%	100.0%	100.0%	100.0%
	p-value = 0.648					

Table 7: Spleen

		Group				
		Non-operative	Operative	Total		
Spleen	0	N	77	24	101	
		%	49.7%	80.0%	54.6%	
	1	N	8	0	8	
		%	5.2%	0.0%	4.3%	
	2	N	16	0	16	
		%	10.3%	0.0%	8.6%	
	3	N	34	1	35	
		%	21.9%	3.3%	18.9%	
	4	N	20	5	25	
		%	12.9%	16.7%	13.5%	
	Total		N	155	30	185

	%	100.0%	100.0%	100.0%
p-value = 0.008*				

Table 8: Renal Right side

			Group		Total
			Non-operative	Operative	
Renal Right side	0	N	135	29	164
		%	87.1%	96.7%	88.6%
	1	N	2	0	2
		%	1.3%	0.0%	1.1%
	2	N	6	0	6
		%	3.9%	0.0%	3.2%
	3	N	5	0	5
		%	3.2%	0.0%	2.7%
	4	N	5	1	6
		%	3.2%	3.3%	3.2%
	5	N	2	0	2
		%	1.3%	0.0%	1.1%
	Total	N	155	30	185
		%	100.0%	100.0%	100.0%
p-value = 0.675					

Table 9: Renal Left side

			Group		Total	
			Non-operative	Operative		
Renal Left side	0	N	143	30	173	
		%	92.3%	100.0%	93.5%	
	2	N	2	0	2	
		%	1.3%	0.0%	1.1%	
	3	N	4	0	4	
		%	2.6%	0.0%	2.2%	
	4	N	5	0	5	
		%	3.2%	0.0%	2.7%	
	5	N	1	0	1	
		%	0.6%	0.0%	0.5%	
	Total	N	155	30	185	
		%	100.0%	100.0%	100.0%	
	p-value = 0.648					

Table 10: Pancreas

		Group		Total	
		Non-operative	Operative		
Pancreas	0	N	145	30	175
		%	93.5%	100.0%	94.6%
	1	N	3	0	3
		%	1.9%	0.0%	1.6%
	2	N	4	0	4
		%	2.6%	0.0%	2.2%
	3	N	3	0	3
		%	1.9%	0.0%	1.6%
Total	N	155	30	185	
	%	100.0%	100.0%	100.0%	
p-value = 0.563					

Table 11: Types of surgery among operative patients (n=30)

	Frequency	Percent
Exploratory laparotomy	24	12.9
Exploratory laparotomy with splenectomy	3	1.6
Splenectomy	3	1.6
Total	30	100

Discussion

Blunt trauma to the abdomen is one of the leading causes of mortality among trauma victims.

Li *et al* reported that 70 out of 72 patients with blunt liver trauma were managed successfully without operation, including 5 patients with grade V, 17 with grade IV and 48 with grade I-III liver trauma ^[13]. The overall success rate of non-operative management was 97.2%. The success rates of non-operative management in the patients with grade I-III, IV and V liver trauma were 100%, 94.4% and 83.3%, respectively.

Maarouf *et al* studied 206 patients with renal injuries on non-operative management with successful outcomes in 189 cases (92.75%) ^[14]. Eight cases out of these 189 required angioembolisation while 181 cases were managed without any intervention. In 2005, the European Association of Urology drew up guidelines for the optimum evaluation of patients with urological trauma ^[11].

Cuenca and Islam reported 79 cases of pancreatic trauma of which operations were performed in 32 patients, whereas non-operative management was noted in 47 cases. 19 they noted no differences in length of stay, age, injury severity score (ISS) and initial blood pressure in operative versus non-operatively managed cases. They concluded that non-operative management appeared to be safe for pancreatic injuries and was more commonly successful in the treatment of low-grade injuries.

Delayed splenic bleeds occurred in 8 patients associated with other injuries. Most splenic injuries did not require close observation beyond 3 days^[16].

Conclusion

- Based on our observation, the most common organ injured in blunt trauma abdomen is the liver (males 43.75% and females 10%) followed by the spleen. A road traffic accident is the most common mode of injury.
- Multiple solid organ injuries might be present sometimes. In our study, there was male preponderance to blunt trauma abdomen.
- A patient under non-operative management should be closely monitored for at least 72 hours by repeated clinical examination and hematocrit and Hemoglobin monitoring.
- Follow-up radiological investigation to be done as indicated.
- The success rate for non-operative management in hemodynamically stable patients in our study was 94-95%, indicating that a significant proportion of patients can be effectively managed without surgical intervention.
- This approach has demonstrated its effectiveness and safety in appropriately selected patients, reducing the need for surgical procedures and associated complications.

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