



AN OBSERVATIONAL STUDY TO DETERMINE FEASIBILITY AND SAFETY OF NON-OPERATIVE MANAGEMENT IN PATIENTS OF BLUNT TRAUMA ABDOMEN WITH SOLID ORGAN INJURY

General Surgery

Dr Manjeet Sonwal* General Surgery, Sms Medical College Jaipur *Corresponding Author

Dr Yogendra Dadhich

Professor General Surgery Sms Medical College Jaipur

Dr Parnita Raj

Forensic Medicine SMS Medical College Jaipur

Dr Praveen Bairwa

General Surgery Sms Medical College Jaipur

ABSTRACT

Background: Trauma is a major health problem and cause of morbidity as well as mortality these days. Due to urbanization, motorization, industrialization and alteration in the socioeconomic values cases of trauma and resultant injury are increasing day by day across the world. Abdominal trauma holds the third rank in prevalence after head and chest traumas, with majority of cases being Blunt Abdominal Trauma. **Methods:** Observation study was conducted on 90 Patients admitted with blunt abdominal trauma with solid organ injury with Age >16 yrs. in S.M.S. Medical College and Associated Group of Hospitals, Jaipur. **Results:** 8(8.8%) of the patients underwent emergency laparotomy because of hemodynamic instability. 82(91.1%) patients were managed non operatively initially but later because of hemodynamically instability 5 patients were converted from conservative to operative management. **Conclusion:** Blunt trauma abdomen is a challenging entity for every surgeon due to its vague presentation, subtle clinical findings in early cases and rapid deterioration in the condition of the patient. In hemodynamically stable patients with low-grade injuries, conservative management can be tried with careful monitoring. The present trend is towards conservative management and avoidance of negative laparotomies.

KEYWORDS

observational study, feasibility, blunt trauma abdomen, non-operative, solid organ injury, conservative management, Glasgow coma scale, injury severity score

INTRODUCTION

Trauma is defined as cellular disruption caused by an exchange with environmental energy that is beyond the body's resilience which is compounded by cell death due to ischemia/reperfusion. Trauma remains the most common cause of death for all individuals between the ages of 1 and 44 years and is the third most common cause of death regardless of age. It is also the leading cause of years of productive life lost¹. Trauma is a major health problem and cause of morbidity as well as mortality these days. Due to urbanization, motorization, industrialization and alteration in the socioeconomic values cases of trauma and resultant injury are increasing day by day across the world. Abdominal trauma holds the third rank in prevalence after head and chest traumas, with majority of cases being Blunt Abdominal Trauma². Blunt trauma abdomen is a frequent emergency and is associated with significant morbidity and mortality in spite of improved recognition, diagnosis and management. Trauma is the second largest cause of disease accounting for 16% of global burden. The World Health Organization estimates that, by 2020, trauma will be the first or second leading cause of years of productive life lost for the entire world population. Over the past few decades, the standard treatment for hemodynamically stable patients with blunt trauma abdomen evolved from operative to non-operative management. This transition was accompanied by a decrease in mortality due to continual improvement in non-operative management expertise and development of superior diagnostic and interventional radiology tools³. Common causes of trauma are majorly road traffic accident, fall from height, direct impact with a heavy object while working or playing. Trauma causes significant damage to younger generation particularly of male sex. Injury to abdomen after trauma can be either penetrating or blunt caused by impact with respective type of object. Blunt abdominal trauma is comparatively more common than penetrating abdominal injury. After blunt abdominal trauma intra-abdominal organ get injured which may include solid organ injury i.e., liver, spleen, kidney or pancreas etc. as well as hollow viscus injury i.e., GIT, gall bladder, urinary bladder etc. Solid organ injury is more frequent diagnosis after blunt abdominal trauma⁴. The incidence of solid organs injuries following blunt abdominal trauma varies from 50 to 80%. The purpose of this study is to evaluate the outcome of patients with blunt trauma abdomen and non-operative management of solid organ injury. It has become standard in hemodynamically stable or stabilized patients who do not have signs of peritonitis or other indications for exploratory laparotomy, with a reported success rate > 90%. Non-operative management is associated with decreased overall mortality, abdominal complications, and transfusion requirements compared to surgical management. One of the vital aspects related to the non-operative

management of Blunt trauma abdomen with solid organ injury is continuous and intense monitoring⁵. However, there is no clear evidence regarding the duration and components to be used in monitoring. The monitoring most commonly includes vital parameters like blood pressure, heart rate, pulse oximetry and respiratory rate to determine the reasons for failure of non-operative management⁶. Blunt trauma can affect any intra-abdominal organ, and the injuries may not always be apparent clinically. Prompt and accurate diagnosis is essential in such patients. Non-operative management has been widely used in solid organs injury⁷.

MATERIALS AND METHODS

Source Data

The source of data will be from pretested Proforma which takes into account clinical history, general physical examination, relevant investigations, imaging modalities and follow up of patients which will be spread over the study period from July 2023 to March 2024. The study will be performed on 90 patients selected from inpatients in trauma ward Department of general surgery, S.M.S. Medical College and Associated Group of Hospitals, Jaipur. They will be diagnosed clinically after satisfying inclusion and exclusion criteria in this study. Consent will be taken from each patient after informing them the objectives of the study, the risks and benefits, confidential handling of personal information, the voluntary nature of participation and the rights to withdrawal from study.

Detailed study related information will read out and explained in printed hand.

Study Type And Design

Hospital based observational prospective study.

Inclusion Criterion

All the patients admitted in SMS hospital for blunt trauma abdomen with solid organ injury in general surgery who is hemodynamically stable and explained about this study and willing to give informed consent.

Exclusion Criterion

Patients with blunt trauma abdomen with solid organ injury with hemodynamic instability defined as tachycardia >130/min, Hypotension systolic BP <90 mm of hg [after initial fluid loading (> 2 litre)].

Patients With Severe Pre-existing Co Morbidities: cardiovascular,

respiratory and haematological disorders.

Patients with blunt trauma abdomen with solid organ injury with associated hollow viscus injury.

Radiological evidence of ongoing bleed with combined hemodynamic instability.

Age ≥ 18 years and ≤ 70 years groups.

Patient not willing to give consent.

Pregnant females.

Malignancy.

OBSERVATIONS AND RESULT

Statistical analysis: The questionnaires were initially checked for completeness, and data cleaning was done for errors and missing values. The corrected data was then entered into Microsoft Excel after preparing a Master-chart. After data entry of every ten questionnaires, one random form was picked and data entry was re-checked.

Statistical analyses were done using computer software (SPSS Vs 26 and primer). The qualitative data were expressed in proportion and percentages and the quantitative data expressed as mean and standard deviations. The difference in proportion was analysed by using chi square test and the difference in means were analysed by using student T Test. Significance level for tests were determined as 95% ($P < 0.05$).

Observations: This hospital based observational study was conducted under the department of surgery. The observation of the study are as follows:

Table 1. Age Wise Distributions Of Cases

Gender	N	Mean	SD	Level of Significance
Male	74	33.45	11.45	P value-0.055
Female	16	40.93	19.65	

The mean age of female patients was higher than that of male patients. This is evident from the t-test performed, where the p-value (< 0.055) indicates a non-significant difference between the mean ages.

Table 2. Distributions of cases as per Mode of injury

Mode of Injury	No. of patients	Percentage
Assault	12	13.33%
Bull horn injury	2	2.2%
Fall from height	17	17.9%
RTA	58	63.3%
Train accident	1	1.1%
Grand Total	90	100%

Most of cases had history of RTA (63.3%) followed by FFH (17.9%).

Table 3. Latent Period (incidence to presentation at hospital) of the patients.

Latent period (hours)	No. of patients	Percentage
0-8	65	72.2%
9-16	17	18.75%
17-24	5	5.5%
>24	3	3.3%

Latent period is the time interval between injury and presentation to the hospital. 72.22% patients presented in the first 8 hours of injury and only 3.3% presented after 24 hours.

Table 4. Average hospital stays of the patients:

Hospital stays	Mean	SD	Level of significance
Male	4.63	2.35	P value-0.566
Female	4.26	2.22	
Total	4.5 day	2.28	

The difference of average hospital between genders was not statistically significant (p value > 0.0566). This is evident from where the p-value (> 0.0566) indicates a non-significant difference between the mean Hospital stay.

Table 5. Clinical severity of the patients

Grade	Injury Grade (Liver, Spleen, Kidney)	Percentage
GRADE 1	40	44.4%
GRADE 2	40	44.4%

GRADE 3	10	11.1%
Grand Total	90	100%

Majority pf cases present with Grade 1 and grade 2 (44.4%) injury followed by Grade 3 (11.1%).

Table 6. Organ involved in abdominal Injury.

Organ involved	No. of patients	%
Liver	38	42.2
Liver, Spleen	16	17.77
Pancreas, Spleen	2	2.22
Spleen	34	37.77
Spleen, Kidney	5	5.55
Total	90	100.0

Above table depicts that the liver and spleen were the most common organ involve in the abdomen injury.

Table 7. Clinical presentation of patients at the time of admission

Clinical features	No. of patients	Percentage
Abdominal pain	61	67.78%
Abdominal distention	10	11.11%
Vomiting	30	33.33%
Tenderness	54	60.00%
Guarding	26	28.89%
Rigidity	8	8.89%
Absent bowel sounds	20	22.22%
Urinary symptoms	10	11.1%

Abdominal pain (67.78%) and tenderness (60%) were the most common clinical presentation associated with blunt abdominal trauma; abdominal guarding was observed in 28.89% of cases.

Table 8. Distribution of patients as per severity on Glasgow coma scale:

GCS score	No. of patients	Percentage
GCS-11	5	5.6%
GCS-12	5	5.6%
GCS-13	9	10.0%
GCS-14	15	16.7%
GCS-15	56	62.2%
Mean GCS score	Mean	14.24
	SD	1.18

The majority of patients who had blunt abdomen injury had a GCS score of 15, followed by 14.

Table 9. Distribution of patients as per severity on Injury severity score.

ISS score	No. of patients	Percentage
<20	48	53.33%
21-30	25	27.78%
31-40	8	8.89%
>40	9	10.00%
Mean ISS score	Mean	20.5
	SD	11.5

The ISS score of the majority (53.33%) of cases was < 20 , followed by 21-30 (27.78%), 31-40 (8.89%), and > 40 (10.00%).

Table 10. Hemodynamic Parameter at time of Admission

Parameters	Values	No. of Cases	Percentage
Pulse rate/min	< 100	58	64.5%
	≥ 100	32	35.5 %
BP (mm Hg)	Hypotension ($< 90/60$)	33	36.6%
	Normotensive	50	55.57%
	Hypertensive ($> 140/90$)	7	7.28%
Pulse mean & SD = 103.88 ± 16.79			
BP mean & SD = 100 ± 16.5			

Out of total 35.5% of the patients were have tachycardia at the time of admission while hypotension is reported in 36.6% patients.

Table 11. Distribution of patients as per need of Blood transfusion

Row Labels	Count of BT number	Percentage
No need	26	28.89%
1	32	35.56%

2	24	26.66%
3 or more	8	8.88%
Grand Total	90	100%

Out of total 3 or more transfusion is only 8.88% patients and 28.89% patients there is no need of transfusion.

Table 12. FAST USG finding of abdomen:

Organ	No of patients	Percentage
Liver	28	31.11%
Spleen	23	25.55%
Kidney	5	5.56%
Hemoperitoneum	13	14.44%
Not done	21	23.33%

In FAST ultrasound, the most common organ involved in blunt abdomen injury was the liver (31.11%), followed by spleen (25.55%), hemoperitoneum (14.44%), and kidney (5.56%).

Table 13. CECT Scan findings of patients

Organ injured	No of Cases	Percentage
Liver	27	30.00%
Spleen	24	26.66%
Renal	5	5.56%
Pancreas + Renal	2	2.22%
Liver + Spleen	11	12.22%
Not done	21	23.33%

In CECT finding, Liver and spleen damage were the most common organ injury. Overall single organ injury was reported in more than 60 % of patients.

Table 14. Management of the patients

Management	No. of patients	Percentage
Conservative	77	85.56%
Operative	8	8.89%
Conservative Change to operative	5	5.56%

8.89% of the patients underwent emergency laparotomy due to hemodynamic instability. Out of the total, 77 patients (83.75%) managed non-operatively, however, 5 of them ultimately required operative management.

Table 15. Type of surgery done

Procedure	No. of patients	Percentage
Splenectomy	4	30.77%
Spleenorrhaphy	2	15.38%
PL+ Packing + Surgicel application	2	15.38%
PL+ Packing	3	23.08%
PL	2	15.38%

Splenectomy was the most common procedure, undertaken by 4 patients (30.77% of the total). Spleenorrhaphy was conducted on 2 patients (15.38%), while Peritoneal lavage+ Packing + Surgicel application and peritoneal lavage+ Packing were each performed on 2 patients (15.38% each). Peritoneal lavage alone was performed on 2 patients (15.38%).

Table 16. Complication following surgeries:

Complications	No. of patients	Percentage
Surgical site infection	3	23.07%
Respiratory complication	2	15.38%
Acute kidney injury	1	7.56%
No significant complication	9	69.2%

Table 17. Outcome of admitted patients

Outcome	No. of patients	Percentage
Died	2	2.25%
Discharge	88	97.75%

The table presents the outcomes of patients following treatment. Among the patient cohort, 2 individuals (2.25%) died, while the vast majority, comprising 78 patients (97.75%), were successfully discharged.

DISCUSSION

In our study majority of patients belonged to 21 -30(38.8%) age group which is similar to the results obtained in study by Rajesh et al⁸ and

Panchal et al⁹. The mean age in our study was 33.45 for male and 40.93 for female. Rajesh et al observed mean age in our study was 29.24 years. Verma S et al¹² observed mean age of 29.3 years. Panchal et al observed mean age of 31.48 years. Involvement of young age group in various studies including the present study is possibility due to more outdoor activity in this group. It can be said that most of the victims belonged to the students and working community.

Age Group	Percentage (our study)	Rajesh et al	Verma S et al	Panchal et al
16-20	11.1	24	22	18
21-30	38.8	40	43	36
31-40	18.8	22	16	12
41-50	14.4	10	14	5
51-60	11.1	2	4	3
61-70	3.3	2	1	1
71-80	2.2	0	0	0

Organ Injury

In present study, single organ injury was found in 75.5% patients whereas multiple organ injury was seen in just 24.4% patients. In present study liver (42.22%) is commonly then spleen (37.77%) was found then, kidney (2.22%) and pancreas (1.1%). Rajesh et al⁸ liver (44.8%) followed by spleen (36.2%), kidney (15.5%) and pancreas (3.5%). In study of Panchal et al⁹ liver (35.13%), spleen (40.54%), kidney (13.51%), pancreas (5.40%). Similarly, in Aziz et al¹⁴ found liver (30%), spleen (26%), kidney (6%), pancreas (4%) In study of Solanki HJ et al¹¹ liver (34%), spleen (16%), kidney (4%), pancreas (0%). The reason for the variation is the difference in inclusion and exclusion criteria in different study. In our study we excluded all head, chest and orthopaedic injuries that require immediate intervention as they would affect the morbidity and mortality, hollow viscus organ injury and penetrating injury.

Organ	Percent age (our study)	Rajesh et al	Verma S et al.	Agarwal VK et al	Panchal et al	Aziz et al	Solank i HJ et al.
Liver	42.2%	44.8%	48.2%	44.5%	35.13%	30%	34%
Spleen	37.77%	36.2%	36.7%	25.5%	40.54%	26%	16%
Kidney	2.22%	15.5%	12.3%	6.7%	13.51%	6%	4%
Pancreas	1.1%	3.5%	2.8%	2.2%	5.40%	4%	0%
Other	-	-	-	21.1%	5.42%	44%	46%

Liver is commonly involved due to its anatomical location and relative immobility. Its sub diaphragmatic and sub costal location makes it more liable to injury due to compression or puncture by thoracic cage or broken ribs during blunt trauma.

Ratio Of Operative To Conservative Treatment

Treatment strategy mainly depends on grade of injury, hemodynamic stability of patient, clinical and radiological findings. In present study 85.56% patients were managed conservatively whereas only 14.45% patients needed surgical intervention. Rajesh et al⁸, Agarwal VK et al¹⁰, Bhanwar Lal et al¹³, Verma S et al¹² in study 80%, 74.5%, 72%, 84% patients were managed conservatively whereas only 20%, 25.5%, 28%, 16% patients needed surgical intervention.

Treatment	Percentage (Our study)	Rajesh et al	Agarwal VK et al	Bhanwar Lal et al.	Verma S et al.
Conservative	85.56%	80%	74.5%	72%	84%
Operative	8.89%	14%	11.1%	6%	16%
Conservative change to Operative	5.56%	6%	14.4%	22%	0%

Treatment strategy mainly depends on hemodynamic stability of patient, clinical and radiological findings. In present study maximum patients were managed conservatively because of proper patient monitoring, availability of experienced surgeon, radiologist and good infrastructure. It was observed that most of the patients who came to causality with blunt trauma abdomen to solid organs were managed conservatively because majority of the patients were hemodynamically stable at presentation and during the course in casualty due to dynamic control resuscitation. Because of good infrastructure and availability of advanced monitoring, we succeeded to manage them conservatively. Whereas, whoever we managed operatively were hemodynamically unstable with all deranged parameters and severe grade of injury.

Assessment of GCS scoring and ISS

GCS SCORE	Our study(percentage)	Moorat singh et al	Surender Verma et al
GCS-11	5.6%	6.7%	5.2%
GCS-12	5.6%	7.1%	6.6%
GCS-13	10.0%	11%	9.8%
GCS-14	16.7%	18%	17%
GCS-15	62.2%	57.2%	61.4

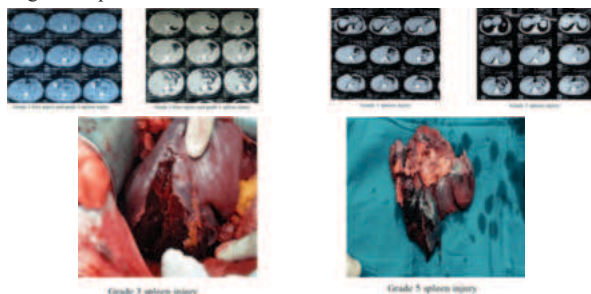
The majority of patients who had blunt abdomen injury had a GCS score of the majority (62.2%) of 15, followed by 14(16.7%), 13(10%), 12(5.6%), 11(5.6%) in our study. Moorat et al and Surendra et al GCS 15 is 57.2%, 61.4% GCS14 was 18%, 17% GCS 13 was 11%, 9.8% GCS 12 was 7.1%, 6.6% GCS 11 was 6.7%, 5.2%.

ISS score	Our study(percentage)	Moorat singh et al	Youngjin Jang et al
<20	53.33%	50%	53.3%
21-30	27.78%	28.4%	26.8%
31-40	8.89%	10.5%	9.4%
>40	10.00%	11.1%	10.5%

The ISS score of the majority (53.33%) of cases was <20, followed by 21-30 (27.78%), 31-40 (8.89%), and >40 (10.00%). Moorat et al and Youngjin Jang et al ISS <20 is 50%, 53.3% ISS 21-30 was 28.4%, 26.8% ISS 31-40 was 10.5%, 9.4% ISS >40 was 11.1%, 10.5%.

CONCLUSION

Road traffic accident forms the most common mode of injury in age group 21-30 years. Measures for early transport of the patients from the accident site to the trauma centres should be undertaken and repeated examination by multispecialty personnel is required. CECT forms the core investigation of choice and becomes more important in deciding operative versus conservative management. Early diagnosis and repeated clinical examination and use of appropriate investigations forms the key in managing Blunt abdominal injuries. In hemodynamically stable patients with low-grade injuries, conservative management can be tried with careful monitoring. The present trend is towards conservative management and avoidance of negative laparotomies.

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