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Original Research Article

Blunt Abdominal Trauma: Evaluation, Management and Outcome

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Abstract

Even though there has been improvement in the recognition, diagnosis, and therapy of blunt abdominal trauma (BAT), it is still a common emergency that is associated with high morbidity and death. With a 16% worldwide burden, trauma is the second-leading cause of disease. The World Health Organisation predicts that by 2020, trauma would rank first or second globally in terms of the number of years of productive life lost. In this study, 100 instances of BAT will be evaluated, with an emphasis on early identification and treatment, increased use of non-operative care, and patient presentation time. The mechanism of trauma, treatment options, and outcomes were some of the study's topics. Male: female ratio of our study participants was 3.7:1, with the bulk of them between the ages of 21 and 30. Injury from a car accident is the most common cause (39%) of injury. Spleen and liver damage were the two organs most frequently impacted (33 and 30 percent, respectively), and splenectomy was the most frequently done treatment. Rib fractures represented 15% of other abdominal injuries. 2% of persons passed away. Sepsis of the wound occurred most frequently (10%). Initial resuscitation techniques, thorough clinical evaluation, and accurate diagnosis are the three most crucial management components. 83 (83.1%) of the overall patients were addressed surgically, whereas 17 (17.0%) were managed using conservation techniques. An important factor affecting the outcome is when a patient presents. A prompt diagnosis and effective treatment can save many lives.

Keywords: Blaunt Abdominal Trauma, Liver Injury, Spleen, Operative Management.

Introduction

The most common cause of death for people under the age of 45 and the main cause of death and disability in emerging nations is trauma.[1] Injury is the seventh leading cause of death worldwide, and the third most frequently injured organ is the abdomen. Surgery is necessary for about 25% of abdominal injuries. The nature of 85% of abdominal injuries is blunt.[2] The liver and spleen are the organs that are injured by blunt trauma the most frequently.[3] A clinical examination by itself is insufficient since patients may have distracting injuries and disturbed mental states.

Current therapeutic recommendations call for the use of initial resuscitation, focused assessment with sonography in trauma (FAST), and computed tomography (CT) abdomen to identify patients who have only minor or clinically undetectable indications of abdominal injury. [4] Systematic and prioritised trauma treatment is required. According to prolonged hypovolemic shock brought on by continuous blood loss and aggressive fluid resuscitation, about 10% of patients require an urgent laparotomy. Patients with severe injuries can be saved by a damage control laparotomy, which also helps control sepsis and bleeding. The opposite end of the spectrum has seen an increase in non-operative management (NOM), which accounts for 80% of cases of blunt trauma and has a failure rate of 2-3%.[3]

Material & Methodology

Subjects & Selection Method: The study population was drawn from patients who presented to department of Emergency and department of Surgery, PIMS, Udaipur. 100 patients were selected with BAT. The research procedure followed was in accordance with the approved ethical standards of PIMS, Udaipur, Ethics Committee (Human).

Inclusion Criteria

- All patients of acute abdominal trauma
- Patients undergoing surgery

Exclusion Criteria:

- Non-traumatic cases (blunt and penetrating)
- Acute abdomen in pregnancy gynaecological causes of acute abdomen

- Conservatively managed cases

Study Tool:

- Predesigned proforma for data collection (Annex I)
- Informed consent form (Annex 2)
- Ultrasonic equipment for sonography
- Blood pressure measurement equipment (Mercury Sphygmomanometer)

Analysis of patients demographics information, clinical characteristics, mechanism of injury, vital signs, Glasgow Coma Score, associated injuries, laboratory investigations (hemoglobin levels), CT scan findings, splenic injury grades, management (conservative, or surgical), intra-operative findings, length of hospital and ICU stay and mortality. We compared management and outcomes according to splenic injury grades, management approach.

It was decided to either do a laparotomy or continue with conservative therapy after closely monitoring the patients' development. Patients who did not improve with conservative treatment, who had hemodynamic instability, continued to lose blood despite

appropriate resuscitation, or who had signs of intestinal involvement were taken for an urgent laparotomy.

Results for continuous variables are presented as mean ± standard deviation, whereas results for categorical variables are presented as number (percentage).The level $P < 0.05$ was considered as the cutoff value or significance.

Results

We had 100 patients the average age was 28.22±16.01 years.The majority 69 (69.0%) of patients were male with a mean age of 26.56±16.55 years and 31 (31.0%) were female with a mean age of 31.90±14.27 years. The majority 39 (39.0%) of patients were injured in road traffic accidents (RTA) followed by 36 (36.0%) of patients who were injured due to fall from height, 17 (17.0%) of patients were reported pedestrian accident and 8 (8.0%) of patients reported other reasons for BAT. (Table 1).

Table 1: Mode of abdominal injury

Mode of abdominal injury	Frequency (n=100)	Percentage
Road Traffic Accident	39	39.0
Fall from Height	36	36.0
Pedestrian accident	17	17.0
Others	8	8.0

Table 2: Distribution of sign and symptoms of patients

Sign and symptoms	Present	Percentage
Abdominal pain	84	84.0
Abdominal distension	74	74.0
H/O LOC	58	58.0
Signs of peritonitis	48	48.0
Vomiting	33	33.0
Pallor	32	32.0

Table 3: USG findings shows organs affected.

Affected Organs in USG	Number	Percentage
Liver injury	30	30.0
Spleen injury	33	33.0
Pancreas injury	12	12.0
Kidney injury	10	10.0
Urinary Bladder injury	8	8.0
Bowel injury	4	4.0
Mesentry injury	2	2.0
Diaphragm injury	1	1.0

Correlation of USG and CT findings

In the USG findings, 12 patients were found as normal and solid organ injuries were found in 88 patients whereas in CT findings 8 patients were found as normal and in 92 patients solid organ injuries were found in 88 patients. The association between USG and CT findings was found to be statistically insignificant (p>0.05).(Table 4)

Table 4: USG and CT findings among patients

	USG Findings (n=100)	CT Findings (n=100)	P value
Normal	12	8	0.345
Hemoperitoneum with Solid organ injuries	88	92	

A total of 86 patients were common in USG and CT findings in diagnosing organ injury among patients and 6 patients. (Table 5)

Table 5: Correlation between USG Findings and CT Findings

USG Finding (Organ affected)	CT Findings (Organ affected)		Total
	Present	Absent	
Present	86	2	88
Absent	6	6	12
Total	92	8	100

P=0.001; Chi-square test

Table 6: Sensitivity, Specificity, Positive Predictive Value, Negative Predictive Value and Accuracy in USG Findings with CT findings

	Value
Sensitivity	93.48%
Specificity	75.0%
Positive Predictive Value	97.73%
Negative Predictive Value	50.0%
Accuracy	92.0%

Abdominal pain and abdominal distension were the most common sign and symptoms among patients. Liver injury (30.0%) and spleen injury (33.0%) were the most common organ affected among patients in USG findings. (Table 2) Mesentry injury and diaphragm injury was the least commonly affected organs. Liver injury (28.0%) and spleen injury (33.0%) were the most common organ affected among patients in CT findings. Bowel injury and diaphragm injury were the least commonly affected organs. In the USG findings, 12 patients were found as normal and solid organ injuries were found in 88 patients whereas in CT findings 8 patients were found as normal and out of 92 patients solid organ injuries were found in 88 patients. (Table 3) The association between USG and CT findings was found to be statistically insignificant ($p>0.05$). Out of the total patients, 17 (17.0%) patients were managed by conservation methods and 83 (83.0%) patients were managed by surgical procedure.In our investigation, the mortality rate was seen in 3 (4%) instances, one of which was an intraoperative case. The most frequent cause was cardiac arrest in 1 (1%), followed by irreversible shock in 2 (2%) cases. The aforementioned conditions were caused by small intestinal rupture, splenic laceration, and liver damage. The two most common post-operative problems in our study were wound infection in 10 (10%) cases and wound dehiscence in 5 (5%) cases.(Table 6)

Discussion

Blunt abdominal trauma is challenging to treat for traumatologists of any level of expertise. Injury types from single organ to mutilating multi-organ trauma can result from blunt abdominal trauma.Abdominal symptoms could be absent in up to 40% of hemoperitoneum patients. It is occasionally possible for other, more obvious outside injuries to mask clinical evaluations of blunt abdominal injuries.

Non-therapeutic laparotomies have been significantly decreased with the appropriate and early deployment of imaging techniques in BAT patients along with physical examination. A common reason for trauma-related death that could have been prevented is unrecognised abdominal damage.

It is also important to look for head, chest, and extremities injuries in patients who have had acute abdominal trauma since these patients might also have sustained injuries to other systems at the same time. Any injury to one of these systems may take precedence over abdominal damage, necessitating more care and attention.

30 (30%) of the patients in the current study were between the ages of 31 and 40, while 22 (22%) were between the ages of 21 and 30. The average age of the patients was 31.9014.27 years for women and 26.5616.55 years for men. 69 (69.0%) of the patients were male. Overall, patients' ages ranged from 28.22 to 16.01 years on average.

The results of Singh S etal's study from 2021 [4] revealed that the patient's mean age was 38 13.6 years and that the M:F ratio was 1:3.5. With the aforementioned investigations, these findings are

consistent. The reason for this group's high frequency of splenic injuries reflects their high activity levels and engagement in high-risk activities, which displays an economic loss to the family and the country as well as the economically active age group. Men may be more susceptible to the risk of traffic injuries due to their increased mobility for either job (as drivers and car mechanics) or recreational activities, as evidenced by the fact that there were more men than women in our study. Car crashes were at blame for 53% of events. Comparing this to Perry, Morton, et al.'s prior investigations, it was unclear. [5] The majority of investigations, including the one in this article, have indicated that automobile accidents are the most common source of blunt splenic injuries. According to our study, a high frequency of traffic accidents can be linked to drivers' carelessness and recklessness, poor vehicle maintenance, operating a vehicle while intoxicated or high, and full contempt for traffic regulations. The frequency and severity of these incidents will decrease with better road conditions, the prevention of commuter car overload, regular vehicle maintenance, and urging strict adherence to traffic laws.

Only 18 (18%) of the patients in the current study had a systolic blood pressure that was lower than 90 mmHg, whereas 73 (73%) of the patients had a pulse rate more than 100 beats per minute. In a recent study, Gaby Jabbour et al. [6] reported S. Blood Pressure 90mmHg in 20 (10.7%) patients, whereas Pinjala N. et al. (2016) [7] reported the same finding in 26 (65%) patients and pulse rates >100/min in 20 (50%) patients.

The two most prevalent patient signs and symptoms in the current investigation were abdominal discomfort (84.0%) and abdominal distension (74.0%). Abdominal pain (90%) and abdominal tenderness (85%) were the most prevalent symptoms and signs reported by patients in the study Pinjala N et al (2016) [7].

Patients may also have mild pallor that friends and family have noticed, which is consistent with the results of the study by John L. Kendall et al[8]. Abdominal pain in the right upper quadrant is a common symptom among individuals with small splenic focal damage. If the subdiaphragmatic nerve root is irritated and referred pain is present, there may also be left shoulder soreness.

Associated organ or body component injuries were also reported in the study by Gaby Jabbour et al. [6]. In his study, the most common injury was rib fracture, which affected 80 (48.32%) of the patients, followed by lung confusion in 57 (34.3%), head injuries in 43 (25.9%), hepatic injuries in 36 (21.7%), kidney injuries in 30 (18.1%), and pancreatic injuries in 8 (4.8%). Bowel/mesenteric injuries and pancreatic injuries each affected a similar number of adult patients. Organs of related harm were also documented in the study by Pinjala N et al. (2016), which was [7].

In his study, the majority of the 40 patients suffered spleen injuries, compared to 8 rib injuries, 4 intestine injuries, 3 liver injuries, and 1 bone fracture.

The most frequently damaged organs in the participants of the current study according to USG results were the liver and spleen. The organs most seldom damaged by mesentery and diaphragm injuries were both. Due to our study's inclusion criteria, our results differ from earlier studies in this regard.

When there are additional injuries in addition to splenic lesions, the overall mortality ranges from 6% to 7%. 6% overall mortality was found in a prior study of people who had suffered splenic damage. According to some research, the related injuries and post-traumatic consequences were mostly to blame for the greater likelihood of mortality.

According to these results, Gaby Jabbour et al.'s study [6] found that the total mortality rate was 7.9%; the majority of deaths were brought on by exsanguination from various causes or severe traumatic brain injury. A recent study by Frandon et al. (2015) [9] found a decreased mortality (3%) in the surgical group, which is proportionate to the severity of the total injury.

It is noteworthy that Lippert et al. (2013)[10] found that longer hospital stays were associated with more severe injuries in adults, which suggests that concomitant injuries rather than NOM may have contributed to this association. Adults with serious injuries required more blood transfusions and spent longer in the intensive care unit (ICU). Out of 190 patients, only 20 patients required more than 10 days of hospitalisation, according to a different study by Gaby Jabbour et al. Only 26 (26%) patients were kept for less than 10 days in the current study, while 74 (74%) patients spent more than 10 days there overall.

In the study by Gaby Jabbour et al.[6], they utilised both conservative and operational or surgical care to treat patients who had sustained splenic injuries. Of the 146 patients treated with conservative management, 146 (76.4%) underwent surgical procedures, whereas only 45 (23.6%) did so. Only 17 (17%) of the 83 individuals in our study underwent a surgical procedure, while the remaining 83 (83%) patients did. Due to the bulk of seriously injured patients who had spinal cord or splenic injuries, our study's management contradicted itself in this area.

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Declarations

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