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Original Research Article

Blunt abdomen trauma: a study of 50 cases

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ABSTRACT

Background: Blunt abdominal trauma is a leading cause of morbidity and mortality among all age groups. Identification of serious intra-abdominal pathology is often challenging; many injuries may not manifest during the initial assessment and treatment period.
Methods: This study was conducted on 50 patients of blunt abdominal trauma admitted in a Tertiary Care Hospital, Including All patients with blunt abdominal trauma and Patients of all age groups.
Results: In present study age group affected was 11 to 20 years and 41 to 50 years (20% each). Next group was 21 to 30 years (18%), male: female ratio was 2.8:1, most common mode of injury was road traffic accidents. Incidence of road traffic accidents was 48%. In study 2 patients out of 3 patients expired due to late presentation, liver injured (34%), followed by spleen (16%). Other injuries were small intestine and mesentery (14%), Urethral injury (12%) and muscular hematoma (8%), clinical presentation was abdominal pain (90). Extremity fractures 14% of cases, postoperative complication of respiratory infections (50%). Wound infection was 25% of patients. 2 patients who died suffered postoperative complications. Mortality rate (40%) in hemodynamically unstable patients than in hemodynamically stable patients (3%), Survival rate 94% while mortality rate 6%.
Conclusions: Morbidity and mortality can be prevented by timely initial resuscitation and correct diagnosis as well as management (operative or non-operative) which depend on patient's hemodynamic stability and findings of imaging studies.

Keywords: Blunt trauma abdomen, Non-operative management, Road traffic accident

INTRODUCTION

Trauma or injury has been defined as damage to the body caused by an exchange with environmental energy that is beyond the body's resilience.[1]

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.[1,2]

Globally, injury is the seventh leading cause of death, with 5.8 million deaths attributable to trauma in 2006. In the United States injuries constitute the third leading cause of death over all ages (accounting for 6 % of all deaths) and the leading cause of death among children, adolescent and adults aged 1 to 44 years.[2]

The abdomen is a diagnostic black box. Abdominal injury is a significant cause of morbidity and mortality; expedient diagnosis and treatment of intra-abdominal injuries are essential to prevent morbidity and death.[1]

In this age of speed and consequently the traffic accidents, the incidences of blunt injuries to the abdomen are at its peak due to the evolution of the modern industrial era leading to the development of high speed automobiles and their mass production; and the creation of explosive compounds capable of producing enormous compression forces impacting upon human bodies.[3]

According to WHO by the year 2020, trauma will become the first or second leading cause of "loss of productive years of life" for both developed and developing countries.[4]

Globally, injury is the seventh leading cause of death, with 5.8 million deaths attributable to trauma in 2006. In the United States injuries constitute the third leading cause of death over all ages (accounting for 6% of all deaths) and the leading cause of death among children, adolescent and adults aged 1 to 44 years.[5]

Most common causes of blunt abdominal trauma are automobile accidents, falls, assaults and industrial accidents.[6]

Mortality rates are higher in patients with blunt abdominal trauma than in those with penetrating wounds, because of the lack of early diagnostic facilities and optimal management.[7]

It is rather more difficult to diagnose a patient with intra-abdominal injuries because abdominal examination alone does not reliably categorize and differentiate all patients with intra-abdominal injuries.[8]

Blunt abdominal trauma is the third most common form of injury in road traffic accidents after orthopedic injuries and head injuries and the victims mostly are young, productive adults and hence it has got enormous socioeconomic impact.[9]

Blunt injuries are thought to result from a combination of crushing, deforming, stretching and shearing forces. The magnitude of these forces directly relates to the rate of their acceleration and deceleration as well as the relative direction of impact.[10]

Abdominal injuries can be particularly dangerous, because it is often difficult to assess intra-abdominal pathology in poly-trauma victims. Delay in management of blunt abdominal trauma increases morbidity and mortality due to bleeding from solid organs or vascular injury.[11]

METHODS

This study was conducted on 50 patients of blunt abdominal trauma admitted in a Guru Govindsing Hospital affiliated to a M P Shah Medical College jamnagar during the January 2015- December 2017.

Inclusion criteria

- All patients with blunt abdominal trauma.
- Patients of all age groups.

Exclusion criteria

- Penetrating abdominal injury.
- All deaths on arrival.
- Pregnant females.

Selection of cases was done as above, and study was conducted based on the following points:

Detailed clinical history was recorded including age, sex, symptoms, mode of injury, associated injuries, external bleeding and mental status.

Thorough physical examination was carried out to assess hemodynamic stability, vitals, systemic examination, severity of injury and other associated injuries. Detailed examination of the abdomen along with the neurological status also, was done.

Investigations

Baseline investigations like blood investigations, chest x-ray, x-ray abdomen was carried out.

Special investigations like Ultrasonography, Computed Tomography, Color Doppler, Intravenous Pyelography, Retrograde Urethrography Imaging were done as per the hemodynamic stability of the patient and according to the suspicion of the organ/viscera/vessels involved.

Management of patients

Patients were assessed and resuscitated to achieve and maintain hemodynamic stability according to Advanced Trauma Life Support (ATLS) guidelines.

IV fluids, blood transfusions were given based on monitoring of urine output and blood pressure. Patient's vitals, urine output, abdominal girth was also measured and monitored. Patients were prepared for emergency exploratory laparotomy as per their hemodynamic stability, nature of injury and findings of USG and other investigations.

The surgical procedures were performed according to the intra-operative findings. Total amount of blood in peritoneal cavity, presence of faecal matter and biliary contamination of peritoneal cavity were looked for and recorded. Injury to any organ, extent of injury and status of other visceras was recorded.

Post operatively patients managed were with IV antibiotics, IV fluids, vaccines (in splenectomy), analgesics and blood transfusion as per requirement. Complications, if any were recorded and dealt with accordingly. Discharge was given on complete recovery and follow up was advised in outpatient department.

RESULTS

In this study of 50 cases of blunt abdominal trauma, following observations were recorded.

Table 1 suggest Blunt abdominal injuries were seen in all ages from 1 year to 70 years. Maximum incidence was noted in age group of 11 to 20 years and 41 to 50 years (20 % each).

Table 1: Age wise distribution.

Age group (years)	No. of patients	Percentage
1-10	08	16
11-20	10	20
21-30	09	18
31-40	06	12
41-50	10	20
51-60	06	12
61-70	01	02

In Table 2 The sex distribution has male predominance as shown in the above table. In present study Male: Female ratio was 2.8:1.

Table 2: Sex-wise distribution.

Sex	No. of patients	Percentage
Male	37	74
Female	13	26
Total	50	100

In Table 3 present study, commonest cause of blunt abdominal trauma was road traffic accidents (48%). Next common cause was fall down (36%).

Mortality rate observed was highest in road traffic accidents. Mortality was 3 out of 24 patients (8%). Higher mortality in road traffic accidents is related to the intensity and severity of trauma as well as associated other injuries.

Table 3: Mode of Injury.

Mode of injury	No. of patients	Percentage
Road traffic accidents	24	48
Fall down	18	36
Assault	2	4
Hit by animal	6	12
Total	50	100

In present study Table 4 associated injuries were present in 24 patients (48%). Mortality rate was higher in patients with associated injuries-2 out of 24 patients (8.3%). Mortality in patients without associated injuries was 1 out of 26 patients (3.8%).

Table 4: Associated injuries.

Associated injuries	No. of patients	Percentage	No. of deaths
Present	24	48	02
Absent	26	52	01
Total	50	100	03

Table 5 present study, commonly observed associated injury was head injury (34%), followed by chest injury (22%). Other injuries (28%) included pelvis fracture, extremity fracture, spine fracture and soft tissue injuries.

Table 5: Various associated injuries.

Associated Injury	No. of patients	Percentage
Head injury	08	16
Chest injury	02	04
Other injury	05	10
Head + chest injury	09	18
No associated injury	26	52
Total	50	100

Different chest injuries encountered were rib fracture, pneumothorax, hemothorax and lung contusion. Isolated head injuries were seen in 16% and isolated chest injuries in 4% of blunt abdominal trauma patients.

Table 6: Rib fractures in relation to liver and spleen injury.

Organ injury	Rib fracture present	Rib fracture absent	Total
Spleen	4	4	08
Liver	5	12	17
Total	9	16	25

Table 6 study, 9 patients out of 25 patients having liver and splenic injury had associated rib fractures, which underlines the importance of maintaining a high index of suspicion regarding liver and spleen injury in patients of lower rib fractures.

Table 7: Specific organ injury.

Organ injury	No. of patients	Percentage
Spleen	08	16
Liver	17	34
Kidney	2	4
Stomach and duodenum	0	0
Small intestine and mesentery	7	14
Colon	0	0
Urinary bladder, urethra	6	12
Pancreas	0	0
Muscular hematoma	4	8
No organ injury	6	12

In Table 7 present study we observed, that liver was the most common (34%) organ injured in cases of blunt abdominal trauma.

The next most common organ injured was spleen (16%). Intestinal and mesenteric injuries were observed in 14% of the cases.

In Table 8, Authors observed that liver was the most common (34%, 10 cases) organ injured in road traffic accidents. In road traffic accidents, liver and spleen were commonly injured organs, while small intestine and mesentery were involved in cases of fall down.

Table 8: Relation between mode of injury and organ involved.

Organ injury	RTA	Fall	Assault	Hit by animal	Total
Spleen	05	02	1	1	08
Liver	10	5	1	1	17
Stomach and duodenum	0	0	0	0	0
Small intestine and mesentery	2	4	0	1	7
Colon	0	0	0	0	0
Urethra and urinary bladder	4	2	0	0	6
Muscular hematoma	1	2	0	1	4
Kidney	1	1	0	0	2

In Table 9, it was noted that various clinical presentations associated with blunt abdominal trauma as shown in above table.

Abdominal pain and tenderness was most common (90%) clinical presentation associated with blunt abdominal trauma, abdominal guarding was observed in 46% of cases. 6% patients with blunt abdominal trauma were presented with hypotension.

Table 9: Clinical presentation.

Clinical features	No. of patients	Percentage
Abdominal pain	45	90
Tenderness	45	90
Abdominal Bruise	05	10
Abdominal guarding	26	52
External superficial injury	04	08
Hypotension (systolic blood pressure <90 mm of Hg)	05	10
Extremity fractures	07	14
Rib fractures	08	16
Head injury	16	32
Abdominal Distension	05	10
Vomiting	04	08
Pelvic fracture	04	08
Hematuria	04	08

Among other clinical presentations associated with blunt abdominal trauma, extremity fractures were found in 14% of cases, head injury in 32% of cases and rib fractures in 16%of cases.

Various treatment procedures were employed as per nature and severity of organ injury (Table 10). Splenectomy was performed in 3 patients found to be hemodynamically unstable and in hypovolemic shock. Small intestinal perforation due to blunt abdominal trauma is managed by exploratory laparotomy and primary suturing of perforation (6 cases).

Table 10: Various procedures performed.

Treatment procedures	No. of patients	Mortality
Splenectomy	3	0
Primary closure of gastric and duodenal perforation	0	0
Primary suturing of intestinal perforation, Repair of mesenteric tear	7	2
Suprapubic cystostomy	5	0
Suturing of liver laceration	1	0
Primary closure of wound	3	0
Resuscitation, endotracheal intubation	1	1
Conservative	30	0
Total	50	3

Patients with urethral injuries and unable to pass urine are treated by Suprapubic cystostomy (5 cases).

Patient with liver injury and hemodynamically unstable is treated with primary suturing and repair of injury. Patient having liver, kidney and splenic injuries and hemodynamically stable patients are treated conservatively.

Table 11: Post-operative complications and mortality.

Post operative complication	No. of patients	Percentage	Mortality
Respiratory infection	O6	50	0
Wound infection	03	25	0
Septicemia	2	17	2
Wound Gap	2	17	0
Peritonitis	1	9	1
Anastomotic leak	1	9	1
Bile leak	1	9	1
Total no. of complications	16		

In Table 11 post operative complications were seen in 6 patients out of 12 patients (50%) operated for blunt abdominal trauma. Respiratory infection was most common post operative complication seen in 50% of cases. Next most common postoperative complication recorded was wound infection (25%).

1 of 3 deaths in present study was due to postoperative complication like septicemia, anastomotic leak and bile leak.

In Table 12 depending on pulse rate, blood pressure, patients were classified in two groups as hemodynamically stable (SBP >90 mm of Hg) and unstable group (SBP <90 mm of Hg). Total 5 patients were hemodynamically unstable at the time of presentation. Mortality rate is higher in hemodynamically unstable patients as compared to stable patients.

Table 12: Relation between hemodynamic stability at time of presentation and mortality.

Class	Total	Survived	% of survival	Dead	% of mortality
Stable (Pulse <100/min, BP >90mm of Hg)	45	44	97%	01	3%
Unstable (Pulse>100/min, BP <90 mm of Hg)	05	03	60%	02	40%
Total	50	47		03	

In Table 13 present study of 50 cases of blunt abdominal trauma, mortality rate noted was 6%. Mortality associated with road traffic accidents tends to be high.

Table 13: Outcome of blunt abdominal trauma.

Outcome	No. of patients	Percentage
Survived	47	94
Dead	03	06
Total	50	100

DISCUSSION

Due to rapid development of cities and development and construction of new factories, the incidence of cases of blunt abdominal trauma has increased.[12] If patient is taken to hospital as early as possible (within golden hours) after trauma, it can decrease patient's morbidity and mortality.[13]

Injuries in blunt abdominal trauma have a wide variety of spectrum. It can range from no any organ injury to multiorgan injury. In some cases, there may be associated head or chest or any other injuries, in such circumstances it is difficult to perform abdominal examination.[14] So each polytrauma patient has to be thoroughly investigated in addition to clinical examination.[15]

Table 14 describe that Out of 50 cases in present study 50% of patients were in 11-40 years of age group. This goes in accord with studies of Davis J et al and Mehta N.[16-18]

Table 14: Comparison of different study with age group.

Age group (years)	No. of patients (Present study)	Kumawat JL	Mehta N	Panchal HA	Musau P	Davis J
1-10	08 (16%)	05 (1.8%)	--	02 (04%)	---	81 (18.53%)
11-20	10 (20%)	96 (35.16%)	--	09 (18%)	13 (16.3%)	84 (19.22%)
21-30	09 (18%)		18 (25%)	18 (36%)	43 (53.8%)	104 (23.79%)
31-40	06 (12%)	124 (45.42%)	28 (40%)	12 (24%)	18 (22.5%)	65 (14.87%)
41-50	10 (20%)		21 (30%)	05 (10%)	3 (3.7%)	55 (12.58%)
51-60	06 (12%)	48 (17.58%)	03 (04%)	03 (06%)	3 (3.7%)	25 (5.72%)
61-70	01 (02%)		01 (01%)	01 (02%)	---	23 (5.26)
Total	50	273	71	50	80	437(100%)

Table 15: Comparison of different study with patients sex.

Sex	No. of patient (present study)	Kumawat JL	Mehta N	Aziz A	Panchal HA	Musau P
Male	37 (74%)	222 (81%)	56 (79%)	41 (82%)	44 (88%)	74 (92.5%)
Female	13 (26%)	52 (19%)	15 (21%)	09 (18%)	06 (12%)	06 (7.5%)
Total	50	273	71	50	50	80
M:F	2.8:1	4.2:1	3.7:1	4.5:1	7.3:1	12.3:1

In Table 15 present study, 74% cases were males and 26% were females with an M:F ratio of 2.8:1. Increased incidence of trauma in male is attributed to their work outside house, frequent travelling, more social activities and influence of alcohol sometimes. This goes in accord with study of Kamawat JL, Panchal HA and Aziz A.[19-21] Table 16 comparison present study, blunt abdominal trauma due to road traffic accidents were seen in 48% (most common), fall down in 36%, hit by animals in 12% and by assault in 4%.

Table 16: Comparison of different study with mode of injury.

Mode of injury	No. of patient (present study)	Kumawat JL	Mehta N	Aziz A	Panchal HA
Road traffic accident	24 (48%)	185 (68%)	38 (53%)	29 (58%)	24 (48%)
Fall	18 (36%)	44 (16%)	30 (43%)	10 (20%)	16 (32%)
Assault	2 (04%)	11 (04%)	03 (04%)	08 (16%)	09 (18%)
Hit by animals/ strike by object	6 (12%)	33 (12%)	--	03 (06%)	01 (02%)
Total	50	273	71	50	50

Table 17: Comparison of different study with organ injury.

Organ injury	No. of patients (present study)	Kumawat JL	Smith J (n=1224)	Davis J	Panchal HA	Aziz A	Mehta N
Spleen	08 (16%)	38 (13.91%)	195 (15.93%)	108 (24.71%)	15 (40.54%)	13 (26%)	42 (53%)
Liver	17 (34%)	72 (26.37%)	210 (17.50%)	72 (16.47%)	13 (35.13%)	14 (28%)	25 (35%)
Kidney	2 (4%)	33 (12.06%)	144 (11.76%)	30 (6.86%)	05 (13.51%)	02 (04%)	12 (17%)
Stomach and Duodenum	0	---	23 (1.87%)	06 (1.37%)	0	---	01 (01%)
Small intestine and mesentery	7 (14%)	62 (22.70%)	160 (13.07%)	34 (7.78%)	09 (24.32%)	06 (12%)	20 (28%)
Colon	0	16 (5.86%)	104 (08.74%)	20 (4.57%)	0	--	--
Urinary bladder, Urethra	6 (12%)	6 (2.19%)	48 (03.92%)	----	01(2.70%)	08 (16%)	02 (03%)
Pancreas	0	3 (1.09%)	40 (3.26%)	08 (1.83%)	02 (05.40%)	01 (02%)	---
Muscular/ Vasular Hematoma	4 (8%)	35 (12.82%)	59 (04.82%)	---	11 (29.72%)	05 (10%)	14 (20%)

In Table 17 commonest intra-abdominal injury was liver injury in 34% followed by splenic injury (16%). Commonest hollow organ injury was small bowel perforation. Most common bowel injured was ileum (Smith J).[22]

In blunt trauma surgeon's main concern is control of hemorrhage, but how it can be best done with safety and less morbidity, depends on grade, severity and site of injury. Procedures done for splenic trauma in present study were splenectomy in 3 (6%) cases. Splenectomy was done for most of grade 4 and 5 trauma and hemodynamically unstable patients of lesser grades. Hemodynamically stable patients were followed with serial physical examinations; ultrasonography or CT scans thus avoiding unnecessary laparotomies.

Primary suturing of small bowel perforation was carried out in 6 patients. Out of these 6 patients, 2 patients expired postoperatively, due to late presentation (>24 hours) and post operative complications like septicemia and anastomotic leak (in 1 patient). One patient having hemoperitoneum due to mesenteric tear and injury to ileocolic vessels was treated by repair of tear and ligation of the bleeders. Surgeon should cautiously look for other sites of trauma to rule out extra-abdominal injuries. In present study, abdominal injuries were associated with various extra-abdominal injuries amongst which isolated head injury was present in 16% cases, isolated chest injury was in 4% cases and combined head and chest injuries were present in 18% of cases. In 10% cases, other injuries like extremity fractures, pelvic fractures etc were present. Rib fractures were present in 9 patients out of 25 in liver and spleen trauma patients. The higher amount of rib fractures was probably due to increased number of upper abdominal trauma.

Mortality rate in present study was 6% i.e. 3 patients. The major cause of mortality was delayed presentation of the patients and poor general condition of the patients. The

earliest presentation was at 30 min with one case presenting as late as 4 days after the injury. The early presentation of our patients helped us to start appropriate resuscitation at time and save their lives. So, patients of blunt abdominal trauma presenting to hospital should be resuscitated with the help of IV fluids, blood transfusions, etc.[23]

CONCLUSION

Now trauma is the most common cause of mortality in the younger age group, also causing loss of productive days even more than other notorious diseases like cardiovascular diseases and malignancies. So as well, the incidence of blunt injuries to the abdomen is now at its peak since the whole period of mankind.

No abdominal organ is safe from injury with injuries of solid organs being more in blunt abdominal trauma. Prompt primary resuscitation and timely definitive treatment are the goals of the surgeon for treating blunt abdominal trauma victims with important being the initiation of management within the golden hour. CT scan along with assessment of hemodynamic stability is required to decide surgical intervention or non-operative management. A combined evaluation comprising of physical examination, imaging techniques, hemodynamic assessment and monitoring the patients have decreased the number of non-therapeutic laparotomies and have increased the non-operative management of solid organ injuries.

In short, morbidity and mortality can be prevented by timely initial resuscitation and correct diagnosis as well as management (operative or non-operative) which depend on patient's hemodynamic stability and findings of imaging studies.

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