Original Research Article

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A retrospective study of blunt trauma abdomen in a tertiary center in central India: evaluation, management and outcome

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ABSTRACT

Background: Blunt abdominal trauma is fairly common emergency and it is one of the important components of polytrauma. It requires high degree of suspicion, investigation and management. Inspite of improved imaging techniques leading to early recognition it is still associated with high morbidity and mortality. Trauma is the leading cause of blunt abdominal injury. This aim of the study was to find etiology, early diagnosis and management of patients with blunt abdominal trauma.

Methods: This an retrospective study conducted in Gandhi medical college, Bhopal in which 90 cases of blunt abdominal trauma presented to emergency and outpatient department were included in the study duration of January 2019 to December 2019.

Results: Motor vehicle accident was the most common mode of injury. Liver being the most common visceral organ injured while the most common surgery performed was the repair or resection and anastomosis of hollow viscous perforation. Rib fracture was the most common extra abdominal injury seen in 17.7% cases. Mortality rate was 5.5%. Most of the liver, spleen and renal injuries can be managed non-operatively whereas hollow viscous injury needs laparotomy.

Conclusions: The result of present study is similar to other studies. Rapid diagnosis, early and timely referral, adequate and trained staff, close and careful monitoring, early wise and skilled decision to go for operative or nonoperative management can help save many lives.

Keywords: Blunt abdominal trauma, Motor vehicle accident, Nonoperatively

INTRODUCTION

Despite of the advances in healthcare, trauma remains to be neglected disease of modern society. Trauma is the leading cause of death and disability in developing countries and the most common cause of death under 45 years of age.1 World over injury is the 7th cause of mortality and abdomen is the third most common injured organ. Abdominal injuries require surgery in 25% cases. 85% of abdominal trauma are of blunt in character.² The blunt abdominal trauma is the result of an impact affecting the abdominal cavity, whatever its location, without any dissolution of the continuity of the

abdominal wall.3 The spleen and liver are the most commonly injured organs as a result of blunt trauma. More traffic density in urban areas makes it more vulnerable for road traffic accidents. Males are more prone for injuries. Clinical examination alone is sometimes inadequate because patients may have altered mental status and distracting injuries. Initial resuscitation along with focused assessment with sonography in trauma (FAST) and computed tomography (CT) abdomen are ideal in patients with minimal and clinically detectable signs of abdominal injury and are part of accepted guidelines. Many cases of blunt abdominal trauma are missed intra-abdominal injuries and concealed hemorrhage which causes increase morbidity and mortality, especially in patients who survive the initial phase after an injury.

In spite of the best techniques and advances in diagnostic and supportive care, the morbidity and mortality remains high. The reason for this could be due to the interval between trauma and hospitalization especially when patient is being referred from primary health centers, delay in diagnosis, inadequate and lack of appropriate surgical treatment, lack of high dependency units and ICU care, postoperative complications and associated trauma especially to head, thorax and extremities. The relatively fixed position of the liver and its large size makes it more prone for injury in blunt trauma of the abdomen followed by spleen. Liver and spleen together contributes 75% of injuries in blunt abdominal trauma. Liver is also most common cause of death following abdominal injury. The small and large intestine are the next most frequently injured organs. The multiple injuries suffered makes management of blunt trauma abdomen (BTA) challenging. There has been increasing trend towards non-operative management (NOM) of blunt trauma amounting to 80% of the cases with failure rates of 2-3%.4 Currently conservative treatment is the gold standard for solid organ injuries in hemodynamic stable patients. The suspected or confirmed hollow organs injury requires laparotomy. Management can be nonoperative or operative. Thus the study aimed to identify risk factors and study them systematically in order to minimize mortality and morbidity.

METHODS

A hospital based retrospective study of 90 cases of blunt abdominal trauma patients presenting to Gandhi medical college and associated Hamidia hospital, Bhopal from January 2019 to December 2019 was done. Patients admitted with history of blunt trauma abdomen due to road traffic accidents, accidental falls, and trauma by blunt objects and assault, above 14 years of age and both sexes were included in the study. All other patients not satisfying above criteria were excluded from the study.

After initial resuscitation of trauma patient detailed physical examination. clinical history. biochemical and hematological tests like blood grouping and cross matching, complete blood count, hemoglobin, renal function test, liver function test, serum electrolytes, serum amylase, serum lipase, X-rays, ultrasonography (FAST), CT scan was done to arrive at diagnosis. Patients categorized into unstable or stable ones. The patients were closely monitored in an intensive care unit. Patients who did not respond to conservative management and were hemodynamically unstable and continued to deteriorate despite adequate resuscitation or who had evidence of bowel involvement were taken for immediate laparotomy. data collection for various parameters like age, sex, cause of blunt abdominal trauma, time of presentation of patient, signs and symptoms, operative findings, various procedure employed, associated extrabdominal injuries, postoperative complications and mortality was done in prevalidated proforma. Data was entered and analyzed in Microsoft Excel. Relevant statistical analysis was done using SPSS v.16.

RESULTS

A total 90 cases of BTA were reported and admitted during study period of one year from January 2019 to December 2019 in the department of general surgery, Gandhi medical college, Bhopal. Most frequent mode of injury was found to be road traffic accident (81.1%) followed by fall from height (9.9%) and assault (8.8%). Males contributed 74 (82.2%) of the cases while females contributed 16 (17.7%). The most vulnerable and predominant age group affected was 14-30 years contributing 51 % of the cases. Majority of the patients presented with pain in abdomen 85 (94.4%) while 62 (69%) presented pain abdomen along with vomiting. 61% cases were managed non-operatively or conservatively and 32 % had to undergo operative intervention.

Most common solid organ injured was liver in 39 (43.3%) cases followed by spleen in 26 (29%) cases. Hollow viscous perforation seen in 15 (16.6%) cases and were managed by laparotomy, either primary repair or resection and anastomosis.

Most common extrabdominal injury was head injury seen in 18 (20%) followed by rib fracture in 16 (17.7%) and hemothorax 12 (13.3%). Renal injury was seen in only 3 cases while diaphragmatic injury was seen in 1 case due to assault.

Table 1: Age wise distribution.

A co (rivo)	Male	Female	Total
Age (yrs)	N (%)	N (%)	N (%)
14-30	46 (51.1)	9 (10.1)	55 (1.2)
31-45	21 (23.3)	4 (4.4)	25 (27.2)
>45	7 (7.7)	3 (3.3)	10 (11.1)

Table 2: Sex wise distribution.

Corr	Cases
Sex	N (%)
Male	74 (82.2)
Female	16 (17.7)

Table 3: Distribution of mode of injury.

Mode of	Male	Female	Total
injury	N (%)	N (%)	N (%)
Road traffic accident	63 (70.1)	10 (11.1)	73 (81.1)
Assault	6 (6.6)	3 (3.3)	9 (9.9)
Fall from hight	5 (5.5)	3 (3.3)	8 (8.8)

Overall mortality was 5 (5.5%) with 85 (94.5%) discharged successfully from hospital. Most common cause death was shock with sepsis followed by cardiopulmonary arrest. Hepatic injury, splenic injury and bowel perforation contributed to this. Wound dehiscence was seen in 6 (6.6%) cases while wound infection was seen in 11 (12.2%) cases.

Table 4: Distribution of organ involved in injury.

Organ affected	Non operative	Operative	Total
	N (%)	N (%)	N (%)
Liver	36 (40)	3 (3.3)	39 (43.3)
Spleen	20 (22.2)	6 (6.6)	26 (28.8)
Pancreas	3 (3.3)	1 (1.1)	4 (4.4)
Kidney	2 (2.2)	1 (1.1)	3 (3.3)
GIT	0	15 (16.6)	15 (16.6)
Mesentry	0	2 (2.2)	2 (2.2)
Diaphragm	0	1 (1.1)	1 (1.1)
Urinary bladder	0	0	0

Table 5: Distribution of organs of GIT injured.

Organs	Cases N (%)
Stomach	2 (13.3)
Duodenum	1 (6.6)
Jejunum	8 (53.3)
Ileum	3 (20)
Sigmoid colon	1 (6.6)

Table 6: Distribution according to management done.

Managamana	Male	Female	Total
Management	N (%)	N (%)	N (%)
Non operative	54 (60)	7 (7.7)	61 (67.7)
Operative	21 (23.3)	8 (8.8)	29 (32.2)

Table 7: Distribution according to outcome.

Outcome	Male N (%)	Female N (%)	Total N (%)
Discharged	71 (78.8)	14 (15.5)	85 (94.4)
Died	3 (3.3)	2 (2.2)	5 (5.6)

Table 8: Distribution of extra-abdominal injuries.

Associated injury	N	%
Head injury	18	20
Hemothorax	12	13.3
Pneumothorax	5	5.5
Rib fracture	16	17.7
Femur fracture	3	3.3
Spine fracture	2	2.2
Pelvis fracture	3	3.3

Table 9: Distribution of organ injured.

Organ involved	N	%
Spleen	26	28.8
Liver	39	43.3
Small intestine	12	3.3
Stomach	2	2.2
Mesenteric tear	2	2.2
Retroperitoneum hematoma	0	0
Kidney	3	3.3
Bladder	0	0
Large intestine	1	1.1
Diaphragm	1	1.1

Table 10: Distribution of operative procedure done.

Operative procedures	N	%
Splenectomy	4	4.4
Splenorraphy	2	2.2
Hepatectomy	0	0
Resection anastomosis	3	3.3
Mesenteric repair	2	2.2
Primary bowel repair	8	9
Gastric rupture repair	1	1.1
Nephrectomy	1	1.1
Diversion stoma	4	4.4
Bladder repair	0	0

DISCUSSION

Most of study showed young and previously healthy and economically productive population is usually victims of BTA. Injuries in blunt strauma range from single organ to multiple organ and mutilating in nature. 40% patients have no clinical abdominal findings and thus can be missed. Proper and timely use of imaging modalities with physical examinations has reduced the incidence of negative or nontherapeutic laparotomies. Sometimes, clinical evaluation of blunt abdominal injuries may be masked by other more obvious external injuries. Unrecognized abdominal injury is a frequent cause of preventable death after trauma. Most vulnerable and commonly affected group in our study was 14-30 years (61%). In 16,17

Our study showed male predominance of cases 82.2% with male to female ratio of 4.6:1. 12,13,17-19 The male preponderance is due to the fact adult male are the earning active member of family and more involved in activities like fast driving vehicles, mechanics, automobile drivers, recreational activities, aggressive behavior and may be under influence of alcohol in contrast to females. 18,19 The most common mode of injury was road traffic accident followed by fall from height and assault. 13,14,20-22 Easy availability of vehicles, increase number of vehicles and increase number of population, unaccustomed to traffic, traffic sense and ignorance of

safety measure leading to increased congestion on roads can directly related to the number of traffic accident.^{23,24} Most of road traffic accidents occurred in urban areas because of increased number of vehicles and population leading to increase traffic and congestion of roads. This also includes lack of sense about road traffic rules, movement of the population toward urban area for earning livelihood.

Significant forces are usually required to injure solid and hollow viscera in abdomen. Three basic mechanism explains the injury to abdominal organs i.e. deceleration, external compression and crushing injuries.²⁵ Assessment of hemodynamic stability is most important initial concern in the evaluation of patient with blunt abdominal injury. In our study out of 90 cases 60 (66%) cases arrive in stable condition and 30 (33%) cases arrive at hospital with instability. The stability was decided on the basis of vital parameters rate, blood pressure, temperature, pulse monitoring of abdominal girth. In the hemodynamically unstable patient, a rapid evaluation is done by diagnostic peritoneal lavage or the focused assessment with sonography for trauma (FAST). Radiographic studies of the abdomen are indicated in stable patient when physical examination is inconclusive. Plain abdominal radiograph in erect position is helpful in hollow visceral injury. Hollow visceral injury shows free air under domes of diaphragm. This was seen in our all 15 bowel injury cases.²⁶

The golden period of trauma so called initial hours after injury are extremely important for survival of the patients. Timely referral and management can surely decrease morbidity and mortality The most frequently injured organs in blunt abdominal trauma are liver, spleen, intestine, retro peritoneal organs like kidney, pancreas, urinary bladder etc.

In our study, liver was the most common injured organ because liver is largest of all organs and more anteriorly splaced, thus more susceptible to injury in blunt trauma. 11,13,27 39 (43%) cases while the second common injured organ in our study was spleen 26 (29%) cases. 11-13 In blunt trauma abdomen most important concern is control of hemorrhage which depends upon grade, site and severity of injury. In our study splenectomy was done in 6 cases for grade 4 and grade 5 injuries while splenorraphy using prolene suture and mesh was done in 2 cases of grade 3 injuries. 3 cases of liver injury were managed operatively by packing with gel foam and surgicell. In present study 15 cases of bowel injury were seen and managed by laparotomy. In our study small bowel was most common injured hollow viscus organ (12 cases) in which jejunum was most frequently involved followed by ileum and duodenum. 1 case of large bowel injury was reported which had Sigmoid colon involvement. These results were consistent with other studies of Davis and Morton et al.^{7,8} Mesenteric tear were seen in 2 (2.2%) cases which were associated with small bowel injuries and they were treated operatively.

Low grade solid organ injury is managed conservatively with closed monitoring of clinical vitals, based on USG and plain radiography. Those patients with stable blood pressure, adequate urine output, maintained abdominal girth and insignificant changes in laboratory investigations were managed conservatively. Conservative management has is an established and accepted management protocol for most BTA injuries. Liver due to its firm texture is more confidently treated by conservative management. Conservative management has a significant decrease in length of hospital stay and morbidity compared to the patient who undergoes surgery. In our study out of 90 cases, 61 (67.7%) cases were managed conservatively and 29 (33.3%) were operated. 10,28 Patients of renal trauma who were managed conservatively were followed with regular CT scan and other routine investigation. Only one case of extensive lacerated grade V renal injury was found which was managed by nephrectomy through transperitoneal route. All 15 cases of hollow viscus injury were managed by exploratory laparotomy. Primary repair, resection and anastomosis, ileostomy/colostomy were done as per requirement.³⁰ 2 cases of mesenteric tear associated with small bowel injury were treated as operation. One case of diaphragm injury due to assault was operated. Management of diaphragmatic injury was done by abdominal approach by repair with non-absorbable suture.²⁹ Most common extrabdominal injury was head injury which was managed conservatively in all cases followed by rib fracture in 16 (17.7%) cases. This incidence was consistent with study conducted by Fazili et al.⁹ Duration of stay in hospital depends on type of care patients like operative or conservative, condition of patient on arrival or after assessment and associated injuries. Some unstable patients required longer time to take hemodynamic stability. ICU care, blood transfusion, other deranged blood investigations are responsible for longer duration of stay in hospital. Wound complications can be seroma, hematoma, surgical site infection, wound dehiscence or hernia and leads to significant postoperative morbidity and mortality.

In our study wound complications occurred in 11 cases out of 29 operated cases. Wound infection was the most common complications after undergoing surgery followed by wound dehiscence in one case. Wound infections were managed conservatively. The causes of sepsis/infection in these patients were necrotic tissue, mutilating injuries and late presentation in some patients. A primary cause of wound dehiscence is inadequate or imperfect aseptic technique. 5 (5.5%) death occurred out of 90 patients and only three were operated. The overall mortality rate in our study was 5.5% which correlate with many other studies. The major cause of death was delayed presentation of the patient and poor general

condition of the patient at admission, due to postoperative chest and wound infection.

CONCLUSION

The result of present study is similar to other studies. The most common cause of Blunt Trauma Abdomen was road traffic accident followed by fall from height and assault. Males were predominantly involved in RTA. Urban areas were mainly involved in RTA. Strict adherence to traffic rules, better road infrastructure, following traffic rules sincerely with special focus on youth and active strata of population will surely help to decrease incidence of blunt trauma.

Liver was the most commonly injured organ after BTA followed by spleen and gastrointestinal tract. In hollow viscus organs, jejunum was the most common injured organ in contrast to other studies was ileum was the most affected organs. Wide availability, low cost and better sensitivity makes ultrasonography an important in assessment along with physical examination and monitoring of clinical parameters. Rapid diagnosis, early and timely referral, adequate and trained staff, close and careful monitoring, early wise and skilled decision to go for operative or nonoperative management can help save many lives. Following above measures and a holistic approach to polytrauma can help us reduce morbidity and mortality associated with blunt trauma abdomen.

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