International Surgery Journal
Trehan V et al. Int Surg J. 2018 Mar;5(3):975-978
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20180814

Original Research Article

Blunt abdominal trauma: a tertiary care experience

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Received: 23 December 2017
Accepted: 30 January 2018

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ABSTRACT

Background: Blunt abdominal trauma (BAT) is one of the common causes of admission in surgical ward in any hospital. It requires high level of suspicion, urgent evaluation and timely management to decrease morbidity and mortality. Aim of present study was to find out demographic details, causes of injury, management options and treatment outcomes of BAT.
Methods: Retrospective study of cases of BAT was carried out at a tertiary care hospital of India spanning five years, between June 2012 to June 2017. Authors analyzed the demographic profile of the trauma victims, etiological factors of BAT, the abdominal organs involved, the treatment modalities adopted and the final outcome.
Results: There were 231 cases of BAT. Most common age group was 11 to 30 years which accounted for 42.42% of the total. The study had 181 (78.35%) males and 50 (21.64%) females. Road traffic accident was the most common cause of BAT and it accounted for 67.97%. Liver (34.20%) was the most commonly involved organ followed by spleen (22.51%), bowel (15.58%), mesentery (8.23%), kidney (7.36%), pancreaticoduodenal injuries (3.46%) and diaphragm (3.46%). 56.71% underwent non-operative management (NOM), 3.90% underwent angio-embolization and 39.39% eventually required operative treatment. Mortality occurred in 31 patients (13.41%) because of septicemia, renal failure, shock, acute coronary event or respiratory complications.
Conclusions: NOM for BAT was found to be successful in haemodynamically stable patient with solid organ injury. Along with sophisticated infrastructure like ultrasound or CT Scan, close supervision with repeated examination by a treating surgeon were the sheet anchors of NOM. Angio-embolization is a feasible modality of treatment in solid organ injury and can avoid surgery in an appropriate patient. Definitive indications for laparotomy were hemodynamic instability and perforation-peritonitis. Initial hemodynamic instability, haemorrhagic shock, and associated injuries influenced morbidity and mortality in BAT.

Keywords: Abdominal injuries, Liver injury, NOM, Road traffic accident, Splenic rupture, Therapeutic embolization

INTRODUCTION

Trauma is a global pandemic that kills more than 5 million people every year and accounts for 9% of the world's deaths, which is nearly 1.7 times the number of fatalities that result from HIV/AIDS, tuberculosis and malaria combined.[1] 90% of the global trauma mortality occur in low and middle-income countries. India's 30-day trauma related mortality rate is twice that of high-income countries and the in-hospital mortality trend hasn't shown any improvement over the last decade despite improvements in imaging and medical equipment.[2] Abdomen is the third most injured region of the body and is affected in 7-10% of trauma victims, and 85% of abdominal trauma is blunt in nature.[3] Blunt abdominal trauma (BAT) can be isolated or can be associated with other injuries. BAT can be missed if not suspected and

looked for, significantly increasing the morbidity and mortality of trauma victims.[3] Clinical evaluation alone is usually inadequate as there may be associated alteration of mental status due to shock or head injury; or other obvious injuries may engage the attention of the examining doctor. The commoner causes of BAT include road traffic accidents, falls and assaults.[3] Though blunt force to the abdomen can injure any internal organ, liver and spleen are injured the most.[4] Management of BAT victims include prompt resuscitation, assessment of all injuries and their severity by using various diagnostic modalities and deciding on whether surgical management is required or not; and their outcome would depend on all these factors. Hence, authors decided to study their experience with the different facets of BAT management.

METHODS

All cases of BAT who were managed at a tertiary care teaching hospital from June 2012 to June 2017 were included in the study. Hospital records were reviewed, and data was collected retrospectively which included demographic information like age and gender; mode of injury; diagnostic modalities and their findings; organs injured; therapeutic options adopted, and the outcomes recorded. Documents revealed that all victims were initially managed in the Trauma Centre of the hospital as per ATLS protocol with IV resuscitation/ Blood transfusion, urgent haematocrit, coagulation profile, blood grouping and cross-matching and other laboratory investigations. Tetanus prophylaxis and appropriate antibiotics were administered.

Plain radiograph of chest, abdomen, pelvis and any other part of the body as required was done. Focused assessment with sonography in trauma (FAST) was done in all patients at the Trauma Centre by the surgeon/radiology resident and if required a detailed secondary ultrasound of abdomen and chest was carried out in the radiology department. Computed tomography (CT) of abdomen was done in most of the FAST-positive cases after ensuring the hemodynamic stability. Patients with features of exsanguination, persistent hemodynamic instability or no response to initial resuscitation or features of bowel injury were operated upon.

Remaining patients were managed expectantly in ICU initially with close monitoring of vitals, repeated clinical assessment, urine output monitoring, and serial hematocrit measurement. Repeat ultrasonography or CT was done as when required and those patients who deteriorated were taken up for laparotomy. Angio-embolization was used in few patients. All the studied variables were tabulated and computed as percentages of total participants.

RESULTS

A total 231 victims of BAT were managed at the hospital over a period of five years. The maximum victims were seen in the age group of 11-30 years (42.42%) while the next common age group was 31-50 years (Table 1). The youngest victim the authors treated was a girl of five years with splenic trauma while the oldest was an octogenarian with polytrauma. 181 (78.35%) victims were male.

Table 1: Age and gender distribution.

Age group (years)	Male	Female	Total	Percentage
0-10	4	3	7	3.03
11-30	77	21	98	42.42
31-50	55	15	70	30.30
51-70	28	7	35	15.15
>70	17	4	21	9.09
Total	181 (78.35%)	50 (21.65%)	231	100

Table 2: Etiological factors of BAT.

Cause of BTA	No. of patients	Percentage
Road traffic accident	157	67.97
Fall from height	35	15.15
Assault	31	13.42
Strike by heavy object	8	3.46
Total	231	100

Road traffic accidents was the prime cause of blunt trauma constituting 67.97% of all BAT cases (Table 2).

Other causes included fall from height (15.15%) and assault (13.42%). Liver and spleen were the most commonly injured organs, 34.20% and 22.51% respectively (Table 3). Associated injuries were seen in 92 (39.82%) patients, which included head injury, chest injury, pelvic fracture and other orthopedic injuries.

Table 3: Organs involved in BAT.

Organ involved	No. of patients	Percentage (%)
Liver	79	34.20
Spleen	52	22.51
Small bowel	21	9.09
Large bowel	15	6.49
Mesentry	19	8.23
Kidney	17	7.36
Pancreas	8	3.46
Diaphragm	8	3.46
Retroperitoneum haematoma	6	2.60
Urinary bladder	6	2.60

Ninety-one (39.39%) patients underwent surgery that included splenectomy, liver repair and packing, bowel resection/repair, enterostomy formation, bladder repair (Table 4).

One hundred thirty-one (56.71%) had successful non-operative management (NOM) while 9 (3.9%) required angio-embolization as treatment. Thirty-one (13.41%) patients died following BAT due to various causes as listed (Table 5).

Table 4: Treatment modalities used in BAT.

Organ	No. of cases	Surgery	Angioembolization	Conservative
Liver	79	7	3	69
Spleen	52	19	2	31
Small and large bowel	36	36	-	-
Mesentery	19	7	-	12
Kidney	17	5	1	11
Pancreas	8	3	2	3
Diaphragm	8	8	-	-
Retroperitoneum haematoma	6	-	1	5
Urinary bladder	6	6	-	-
Total (%)	231	91(39.39%)	9(3.90%)	131(56.71%)

Table 5: Mortality figures.

Causes of death	Number
Septicaemia	9
Renal failure	7
Acute coronary event	6
Shock	5
Respiratory complications	4
Total	31

DISCUSSION

WHO reported that trauma affects all age groups but have a particular impact on youth in their prime working years and that road traffic injuries are the leading cause of death worldwide in the age group of 15-29 years.[1] In the present study, 42.42% cases of BAT were seen among 11-30 years old. Davis et al also reported 43% of BAT in this age group while Kulkarni et al reported 47.1%.[4,5] Author found a male preponderance (78.35%) as has been reported by Mehta et al (79%), David et al (70%) and Kulkarni et al (94%).[4-6] Authors found road traffic accidents as the etiological factor in 68% of BAT. Other studies have also reported it to be the prime cause of BAT, e.g. Davis et al (70%), Kulkarni et al (59%), Mehta et al (53%) and Karamercan et al (87.5%).[3-6] Increasing urbanization and motor vehicles combined with poor road conditions and bad traffic discipline is adversely affecting the young males who are usually the bread earners in any family.

Though authors performed FAST as a routine in all BAT cases, all stable cases underwent CT scan of whole abdomen. Though studies have found FAST to be a fast and reliable bedside tool in diagnosing BAT, a negative FAST without CT can miss intra-abdominal injuries.[7-9] Secondary or a repeat detailed ultrasound has been added to FAST in a stable patient to increase the sensitivity of FAST but a review by Stengel et al did not find evidence to support emergency ultrasound based algorithms for diagnosing BAT.[10,11] CT scan is now essential in the evaluation of BAT if the patient condition is stable enough and forms the baseline in NOM. CT is also being done in hemodynamically unstable patients by maintaining aggressive resuscitation schemes and Ordonez et al reported that CT scan was attainable in 47% of these patients and avoided surgery in 54% with no added mortality.[12]

Solid organs are injured the most in BAT. Liver was injured in 34.2% cases while spleen in 22.51% of the present BAT series. Ravikanth, et al found liver injury in 26% while splenic injury was reported in 20%.[13] Other studies have reported spleen to be the most injured organ in BAT followed by liver, as has been shown by Parreira et al (45.3% and 44%) and Mehta et al (53% and 35%).[14,6] Other solid organ injuries authors observed were kidney (7.36%) and pancreas (3.46%). Authors found hollow viscus injuries in 15.58% of BAT. Parreira et al reported small intestine/colon injuries in 5.3%.[14]

Ninety-one (39.39%) of the series underwent surgery. Indications for surgery included persistent hemodynamic instability and features of peritonitis. All bowel injuries were operated upon as were urinary bladder injuries. Diaphragmatic injuries were diagnosed radiologically or on laparoscopy. Authors did laparoscopic evaluation in nine patients who had uncertain picture on clinico-radiological assessment. Laparoscopic evaluation is being accepted as an effective way to reduce non-therapeutic laparotomies and improve perioperative outcomes in hemodynamically stable patients.[15] Overall NOM was successful in 56.71% of cases; of which liver trauma could be managed conservatively in 87.3%, in present study. Raza et al has reported complete success rate in stable isolated liver injuries.[16] Gaspar et al had 50% success rate with NOM and it was independent of the liver injury grade.[17] NOM was successful in 59.61% cases of splenic trauma in the current series, while Gaspar et al has reported 57.9% success rate.[17] Mesenteric

injuries were either diagnosed on CT scan or was suspected when free intraperitoneal fluid was noticed in the absence of any obvious solid or hollow viscus injury.[18] Seven patients underwent surgery of which three had delayed presentation with bowel perforation. NOM was successful in 64.7% of renal injuries.

Authors used angio-embolization as a non-operative therapeutic strategy in nine patients and found it to be effective in select patients. Cherian et al found trans-arterial embolization to be very effective in treatment of bleeding related to BAT even in hemodynamically unstable patients with minimal complications.[19] Author had an overall mortality of 13.41% which is comparable to studies by Karamercan (15.2%) and Kulkarni et al (14.7%).[3,5]

CONCLUSION

In conclusion, BAT is a common surgical emergency but can pose serious challenge even to an experienced surgeon. Prompt resuscitation and correct diagnosis is vital. As clinical examination may be misleading, diagnostic tests especially CT scan has to be done in these patients after resuscitation. Timely surgery may be life-saving, but NOM has a definite role in management of BAT.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Trehan V, Kumar SS. Blunt abdominal trauma: a tertiary care experience. Int Surg J 2018;5:975-8.