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Original Research Article

A prospective study of injury pattern and outcome of blunt trauma abdomen patients in a tertiary care hospital in eastern part of India

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ABSTRACT

Background: Abdominal trauma continues to account for a large number of trauma-related injuries and deaths. The evaluation and treatment of abdominal injuries are critical components in the management of severely injured trauma patients. The study was done to study pattern and outcome of BTA patients in a tertiary care hospital in eastern part of India as few studies exist in this part of the country.
Methods: Prospective descriptive study conducted in in SRN Hospital, Prayagraj over a period of one year with all cases of blunt injury abdomen included with respect to inclusion criteria.
Results: In our study mean age was 23.2±17.6 years. 92% were male and 8% were female RTA are responsible for most number of cases (78%). Conservative management done in 34 (68.0%) and Operative Intervention done in 16 (32.0%) cases. In our study, X-ray erect had 75% accuracy total subsets of 336 organ scans were performed on ultrasound specific injury was seen in total 50 cases and total 210 CT scans performed was able to pick up 59 injuries (p=0.0002). CECT forms the core investigation of choice in dealing with blunt injury abdomen cases. In our present study, paralytic ileus (prolonged) (31%) and pelvic intraabdominal abscess (31%) as postoperative complications.
Conclusions: CECT abdomen is the investigation of the choice with RTA being the most common mode of BTA. So effort should be made to implement traffic rules. Hemodynamic instability with radiological findings useful in deciding operative versus conservative management of blunt trauma patients.

Keywords: BTA, Non operative management, RTA

INTRODUCTION

Blunt trauma or injury may be defined as cellular disruption caused by an exchange with environmental energy that is beyond the body's resilience. The abdomen is frequently injured after both blunt and penetrating trauma. The evaluation and treatment of abdominal injuries are critical components in the management of severely injured trauma patients. Because missed intra-abdominal injuries are a frequent cause of preventable trauma related deaths, a high index of suspicion is warranted.[1]

Abdominal injuries occur in approximately 1% of all trauma patients.[2] Usually, abdominal organ injuries alone are responsible for 10% of total trauma caused mortality.[3] Blunt abdominal trauma is often missed because clinical signs are less obvious.[4] It may present as an isolated problem or as a part of poly trauma.[5]

Abdominal trauma continues to account for a large number of trauma-related injuries and deaths. Blunt injury to the abdomen can also occur as a result of fall from height, assault with blunt objects and sports injuries.[7,6] Unnecessary deaths and complications can be

minimized by improved resuscitation, evaluation, and treatment. Rapid resuscitation is necessary to save the unstable but salvageable patient with abdominal trauma.[7,8]

The spleen was found to be the most commonly injured organ in blunt abdominal trauma occurring in more than 50% of cases.[8-14] But on the contrary to this some studies reported that liver is the most frequently injured organ followed by the spleen in blunt abdominal injuries.[9,10,15,16]

Non-operative management for blunt abdominal trauma was found to be highly successful and safe in selected cases. Management by non-operative management depends on clinical and hemodynamic stability of the patient, after definitive indications for laparotomy are excluded. A patient under non-operative management should be admitted to ICU for at least 48-72 hours for close monitoring of vital signs and repeated clinical examinations. Non-operative management to be terminated if patient develops hemodynamic instability and appearance of new peritoneal signs due to delayed hollow viscus or missed injuries.

This study was done to study etiology, organs affected after blunt abdominal trauma and to study rates of morbidity and mortality and other factors like associated injuries (example head, spine, limb), co-morbidities influencing outcome in abdominal trauma.

Aims and objectives

To study pattern of injury in blunt trauma abdomen; to study the importance of investigation to detect different organ injuries; to study organ affected in blunt trauma abdomen and management of different organ injuries on laparotomy and to study rate of morbidity, mortality and outcome of operative and conservative management of blunt trauma patients.

METHODS

Study area and design

Prospective descriptive study conducted in Department of General Surgery, SRN Hospital, MLN Medical College, Prayagraj over a period of one year from September 2018 to August 2019.

Study population and selection criteria

During the period of study, all cases with clinical diagnosis of blunt injury abdomen were consecutively enrolled into the study after a written informed consent to participate in study.

The decision for non-operative on operative management was dependent on the outcome of the clinical examination, hemodynamic stability, finding of ultrasonography (USG) abdomen and or CECT scan abdomen and other relevant investigations.

Inclusion criteria

Cases of any age or sex presenting with the significant abdominal injury, requiring admission to the emergency surgical ward and cases granting informed consent.

Exclusion criteria

Cases presenting with penetrating injury of abdomen; any cases who declined to participate in the study; cases who died in resuscitation room before a definitive diagnosis could be achieved and all the cases included in the study were analyzed statistically by using chi square test, chi square with Yates correction, and Fisher exact test .

RESULTS

A total of 50 cases admitted with blunt injury abdomen in Department of Surgery, SRN, Hospital, MLN, Prayagraj during the study period were included in our study.

Age-distribution

In this study the age of cases varied between 8 to 68 years and above. Mean age in the present study is 23.2±17.6 years. Most of the cases were in 2nd decade of life contributing (n=17) 34% of the total. Figure 1 shows the age distribution in the present study.

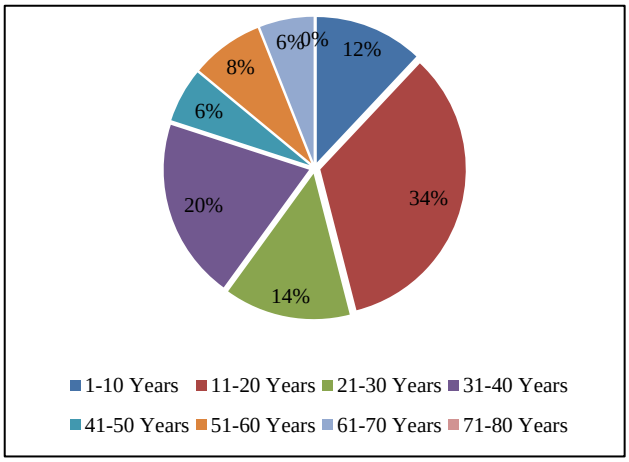

Figure 1: Age distribution of study population.

Sex distribution

In our study of 50 cases, 92% were male (46) and 8% were female (4). Male:female ratio was 11.5:1 that is there was more preponderance of male in blunt injury abdomen.

The most common mode of injury among the study group was road traffic accidents which was found in 39 cases

(78%) followed by fall from height (n=9) (18%) followed by trauma from blunt object (n=2) (4%).

Table 1: Mode of injury.

Mode of injury	No. of cases	%
Trauma with blunt object	2	4.0
Fall from height	9	18.0
Road traffic accident	39	78.0
Total	50	100.0

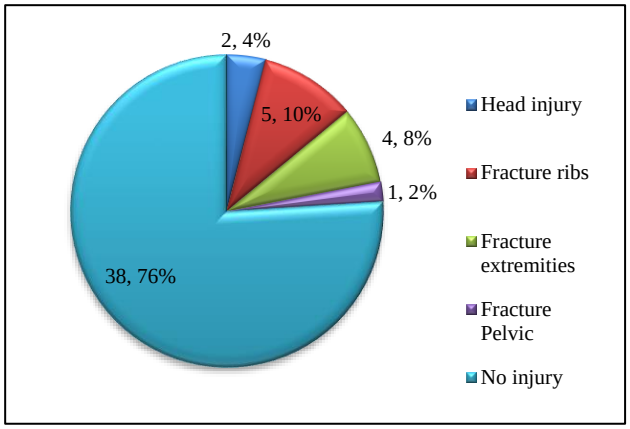

Figure 2: Distribution of associated injury in bladder tumour antigen patients.

In majority of study subjects (n=38) (76%) no associated injury was present with bladder tumour antigen (BTA). Among the associated injuries most common injury associated was ribs fractures (n=5) (10%) followed by fracture of extremities (8%), head injury (4%) and pelvic fractures (2%).

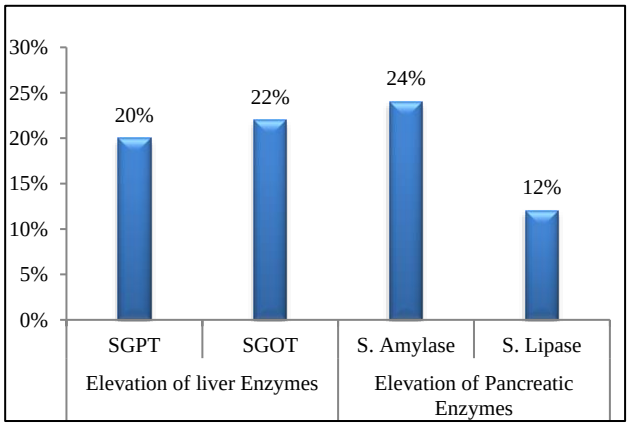

Figure 3: Bar graph showing elevation of enzymes.

As shown in Figure 3 in present study, SGPT was found to be elevated among 10 (20%), SGOT among 11 (22%), *S. amylase* among 12 (24%) and S. lipase among 6 (12%) cases

Plain X-ray abdomen: Plain X-ray abdomen was done in 44 cases. Findings as below:

Plain X-ray abdomen was done in 44 cases. This was not done in 6 cases as the patient condition did not permit to shift them to X-ray. The result was inconclusive in 66% (n=33) of all cases and in about 12% (n=6) of all cases there was gas under diaphragm present followed by presence of ground glass appearance in 10% (n=5) of all cases. Gas under diaphragm was found in 6 cases out of 8 cases bowel perforation detected at laparotomy.

Ultrasound examination

A total of 48 cases were subjected for ultrasound examination out of which 11 cases had scan detected solid organ injuries for which they underwent laparotomy (in 7 cases) and found to have significant injuries. Eight cases had scan detected normal solid organs on USG with free fluid which were found to have hollow viscus injuries at laparotomy and in 13 cases with minimum hemoperitonium.

Table 2: USG abdomen examination.

Organ injured	No. of cases		%
Spleen	6		13
Liver	4	11	8
Kidney	1		2
Intraperitoneal free fluid (minimal-moderate)	31 (hollow viscus injury in 8 cases)		64
Normal	6		13

CE-CT of abdomen

A total of 30 cases was subjected for CE-CT abdomen, out of which 20 cases had scan detected solid organ injury out of which 16 cases were found to have significant injury, on laparotomy. Eight cases had scan detected hollow viscous injury, in 3 cases detected retroperitoneal haematoma and one cases detected normal all persons who had CT scan had also an ultrasound scan done. CECT was done in 30 cases in which more common solid organ injury was found in spleen 9 (29%) cases, in liver 7 (23%) cases, followed by in hallow viscous injury 8 (26%) cases, retroperitoneal haematoma was found in 3(10%) cases and then pancreatic 2 (6%), kidney injury 2 (6%) cases.

Table 3: CE-CT abdomen.

CE-CT finding (organ injury)	No. of cases		%
Splenic injury	9	20	29
Liver injury	7		23
Kidney injury	2		6
Pancreatic injury	2		6
Hollow viscous injury	8		26
Retroperitoneal haematoma	3		10

Management: Conservative management was done in 34 (68.0%) and operative intervention was done in16 (32.0%) cases which is shown in Figure 5.

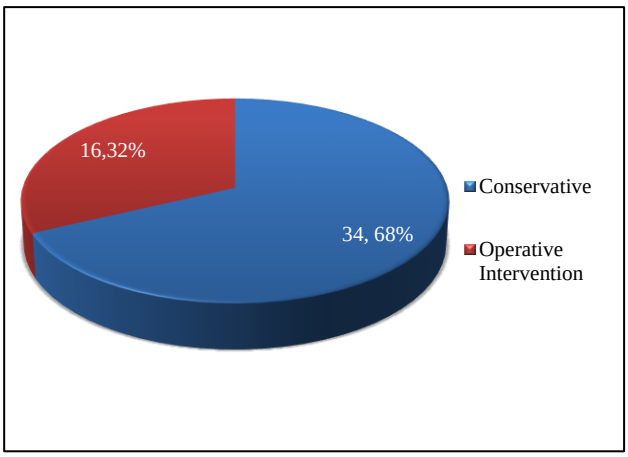

Figure 5: Management of BTA patients.

Operative procedure

Out of the 9 case with splenic injury, 4 cases underwent splenectomy and 5 cases managed conservatively. In liver injury out of 7 cases, 2 cases underwent hepatorraphy with peri hepatic packing and 5 cases managed conservatively. Out of 2 cases of renal injury, one cases underwent complete (Rt) nephrectomy and one case managed conservatively. Out of 2 cases of pancreatic injury, one case underwent (laparotomy) debridement and one case managed conservatively.

Out of 8 cases of bowel injury, in 2 cases- resection and anastomosis; in 4 cases primary repair of perforation with feeding jejunostomy in 2 cases; in 2 cases ileostomy formation done.

Table 4: Operative procedure.

Operative procedure	No. of cases
For bowel perforation	8
Spleen (splenectomy)	4
Liver (hepatorrhaphy with peri hepatic packing)	2
Kidney (nephrectomy)	1
Pancreas (debridement)	1
Retroperitoneal hematoma evacuation	2

Post-operative complication

The most common post-operative complication was found to be pelvic intrabdominal abscess and paralytic ileus found to have equal incidence of 31% (n=5) followed by anastomotic leak and wound dehiscence 12.5% each.

Table 5: Post-operative complications.

Post-operative complications	No. of cases	%
Anastomotic leak	2	12.5
Paralytic ileus (prolonged)	5	31
Wound dehiscence	2	12.5
Pelvic intra-abdominal abscess	5	31

DISCUSSION

In our present study, the age of patients ranged from one year to >80 years. Majority of the cases belonged to second decade of life 11-20 years age (34%) cases with mean age of 23.2±17.6 years. This was quite similar to the study by Amuthan et al, the maximum number of cases was in the third decade of life (20-30 years).[11] This indicates trauma is more common in young people.

This was also similar to the studies by Aziz et al, most of trauma victims were between the ages of 20-45 years with 42% between the ages of 26-40 years, in US by Ball et al, Gupta et al and in UK by Khan et al.[12-15]

In our present study population consisted of 46 (92.0%) males and 4 (8.0%) females. This was similar to the study by Amuthan et al, 84 (84%) were males and 16 (16%) were females, Gad et al, significantly more males than females presented with abdominal trauma (87.1% versus 12.9%) and Krishnappa et al, significantly more males than females presented with abdominal trauma (74% versus 26%).[11,16,17]

In our study most common cause of blunt trauma abdomen was road traffic accident 39 (78%), this was also similar to the studies by Mohapatraet al.[18] 62% cases of blunt injury abdomen were due to RTA, Curie et al also reported 58.6% cases of blunt injury to abdomen were due to RTAs, Aziz et al, 58% cases were of road traffic accidents and Gad et al, RTA was the most common cause (62.8%).[12,16,19]

In our study associated injury was found among 12 (24.0%) cases, which most common were ribs fracture 5 (10%) cases, fracture extremities 4 (8%) cases, head injury 2 (4%) cases which was comparable to finding by Mehta et al.[20] Abdominal injuries were associated with various extra-abdominal injuries amongst which most common were rib fractures (20%) and soft tissue injury (20%). The higher amount of rib fractures were probably due to increase number of upper abdominal trauma.

In our study, X-ray erect had 75% accuracy whereas in the study by Amuthan et al, detected cases of hollow viscus perforation with an accuracy of 100%.[11]

Another study (Mohapatra et al) reported accuracy of X-ray erect abdomen to be 100% in detecting hollow viscus injuries.[18]

In our study, USG abdomen done in 48 cases, out of which 11 cases had solid organ injury, CT-Scan also confirmed the solid organ injury with its grade. Therefore USG abdomen is reliable in detecting solid organ injury and free fluid in the abdomen with hollow viscus injury, as shown in Table 6.

Table 6: USG and CT scan showing no. of specific organ injury in BTA.

Organ injured	Splenic injury (no. of cases)	Liver injury (no. of cases)	Kidney injury (no. of cases)	Pancreatic injury (no. of cases)	Hollow viscus injury (no. of cases)	Retroperitoneal haematoma (no. of cases)	Intraperitoneal fluid	Normal
USG abdomen (48 cases)	6	4	1	-	8	-	31	6
CECT abdomen (30 cases)	9	7	2	2	8	3	28	1

In our study total subsets of 336 organ scans were performed on ultrasound specific injury was seen in total 50 cases on CT scan (total 210 CT scans performed was able to pick up 59 injuries).

Table 7: Total no. of injured and normal organs in CT scan and USG.

	Injury	Normal organ
CT-scan	59	151
USG	50	286

Odds ratio 0.44; p value 0.0.0002.

CECT forms the core investigation of choice in dealing with blunt injury abdomen cases and is useful in deciding operative versus conservative management.

In our present study conservative management was done for 34 (68%) and Operative Intervention was done for 16 (32%) patients. This was similar to the study by Amuthan et al, 56% were managed conservatively and 44% were managed surgically.[11] Our reports are comparable to Mohapatra et al who reported 39% laparotomy rates in their series.[18] In our present study, anastomotic leak was found among 2 (12.5%), paralytic ileus (prolonged) among 5 (31%), wound dehiscence among 2 (13%) and pelvic intraabdominal abscess among 5 (31%) patients.

In the study by John et al, 33 cases did not have any complication during the hospital stay and 17 patients had complications.[20] On further analysis, 80 percent of operated group developed complications whereas only 14.3% of the conservatively managed patients developed complications.

In the study by Amuthan et al, wound infection was the most common complication in 10 (17.24%) cases after undergoing surgery This was comparable to a study by Jolly et al.[11,21] which showed wound infection in 14% of the cases. Another study by Davis et al showed wound infection as a complication in 15% of the cases.[22] Wound infection was the commonest post-operative complication noted in the study by Maske et al and Mehta et al.[21,23] Similar observation was also reported by Chalya et al, Manohar et al, Sude et al and Awe et al.[24-27]

The study would need a larger sample size for generalization of the study findings and better extrapolation to general population secondly, the randomization of the study subjects into operative Management and NOM group would have yielded a better comparison.

CONCLUSION

CECT abdomen is the investigation of the choice to access types of injuries, extents and severity of abdominal injuries. X-ray erect abdomen is a useful investigation to identify hollow viscus injury (but may not detect in all cases) and USG abdomen is useful adjuvant in blunt trauma abdomen and in the early decision making whether the patient needs immediate laparotomy to control the bleeding (but may not detect all injuries). In our study we found that road traffic accidents (78%) form the most common mode of blunt trauma abdomen. So effort should be made to implement road traffic rules and regulation strictly. The public education regarding safety measures and traffic rule and regulation at all forum. Haemodynamic instability coupled with radiological findings are useful in deciding operative versus conservative management.

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