

ORIGINAL RESEARCH

Prevalence of abdominal injuries in trauma patients and their common pattern of abdominal injuries

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ABSTRACT

Aim: Prevalence of abdominal injuries in trauma patients and their common pattern of abdominal injuries. **Materials and methods:** The present cross-sectional study was conducted in the Department of General surgery over a period of 12 months after taking written informed consent. A total of 55 patients were recruited during the study period. The pattern of abdominal injury, time of injury, mechanism of trauma, and associated injuries were documented. Patient condition was next classified as either stable or unstable. Finally, a plan was developed for additional evaluation and management. Each patient's outcome was coded as one of the following: Surgical intervention; admitted for observation; admitted to the Intensive Care Unit; recovered while under observation; or died while in the ED. **Results:** During the 2 year period of study, a total of 1445 trauma patients were admitted to our centre. Of these, 55(3.8%) patients had abdominal trauma, and these made the study population. Most frequent sign and symptoms in both blunt and penetrating trauma was abdominal pain, tenderness and abdominal distension. The majority of patients sustained blunt abdominal injuries. 33(60%) were treated surgically and remaining 22(40%) were treated conservatively. Post-op complications were recorded in 16(29%) patients, the most common being wound dehiscence. The mortality rate was 12.7%. **Conclusion:** Improved motor vehicle safety, rapid emergency transport in well-equipped ambulances and rapid intervention should help to reduce the mortality and morbidity of many of the victims of major trauma.

Keywords: Trauma, Abdominal Injury, Surgery, Mortality

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INTRODUCTION

Trauma is still the most frequent cause of death in the first four decades of life, and remains a major public health problem in every country, regardless of the level of socioeconomic development (1). Globally approx. 1/3rd of trauma patients have abdominal trauma & it accounts for a large fraction of tragic loss of life & unrecognized abdominal injury remains a distressing frequent cause of preventable death (2). Traumatic abdominal injury, whether blunt or penetrating is the 3rd common type of injury after head (30%) & chest (20%) (3).

Abdomen is vulnerable to injury since there is minimal bony protection for underlying organs (4). Abdominal trauma is increasing at a faster rate due to increase in urbanization, motorization, civil violence,

and criminal activities (5). It is classified as either blunt or penetrating and may involve damage to the abdominal organs. Road Traffic Accidents are a common source of blunt abdominal trauma in civil practice. Sign & symptoms of abdominal trauma include pain, tenderness, bruising, distension, rigidity, guarding & rebound tenderness (2).

Penetrating abdominal trauma (PAT) is usually diagnosed easily, based on clinical signs, blunt abdominal trauma (BAT) is more likely to be diagnosed late or altogether missed because clinical signs are less obvious. That's why mortality & morbidity continue to be significant in blunt abdominal trauma (2). Complication factors such as associated injuries, administration of medication &

intoxication with alcohol or other substances further reduces the reliability of the clinical exam (6).

Men tend to be affected slightly more than women (5). Indicators of mortality & morbidity in abdominal injuries are type of injury, degree of injury, cause of injury & the physiological state of pt. at admission. Analysis showed that age, duration prior to admission, surgery, duration prior to surgery, blood transfusion & admission to ICU as indirect predictors of morbidity & mortality (7).

Abdominal injuries are commonly associated with other injuries and these may complicate the management and affect the outcome. The head/neck and musculoskeletal were the most frequently injured regions. It has been found that brain contusion & sub-arachnoidalhaematomas are being the most frequent head injuries next to head injury were the chest injuries i.e. nearly 8% even though % seems to be smaller but it has also added more & more to the mortality & morbidity. Hemothorax or pneumothorax (50.4%) & rib fracture (38.6%) are the most common types of chest injury (8-10).

In the present study, the presence of associated injuries was found to be significantly associated with both mortality and length of hospital stay (morbidity). Early recognition and treatment of associated injuries is important in order to reduce mortality and morbidity associated with abdominal injuries.

MATERIALS AND METHODS

The present cross-sectional study was conducted in the Department of General surgery over a period of 12 months after taking written informed consent.

SAMPLE SIZE

A total of 55 patients were recruited during the study period.

INCLUSION CRITERIA

All types of abdominal injury including road traffic accident, assault and fall from height.

EXCLUSION CRITERIA

Patient suffering from head injury, bony injury and chest injury.

STUDY TOOLS

Relevant points in history and physical examination were recorded using the investigator designed working Case reporting form.

STUDY PROTOCOL

1. Sociodemographic data: Age, sex, residence, and arrival time.
2. Clinical data: Initial assessment of ABCDE (airway and cervical spine control; breathing; circulation; dysfunction of the central nervous system; and exposure), followed by regional examination of head and neck; chest; abdomen;

extremities; and back. An initial determination of abdominal trauma type would be made by thorough physical examination.

TRAUMA DATA

The pattern of abdominal injury, time of injury, mechanism of trauma, and associated injuries were documented. Patient condition was next classified as either stable or unstable. Finally, a plan was developed for additional evaluation and management.

INVESTIGATIONS

Two types of investigative data were analyzed:

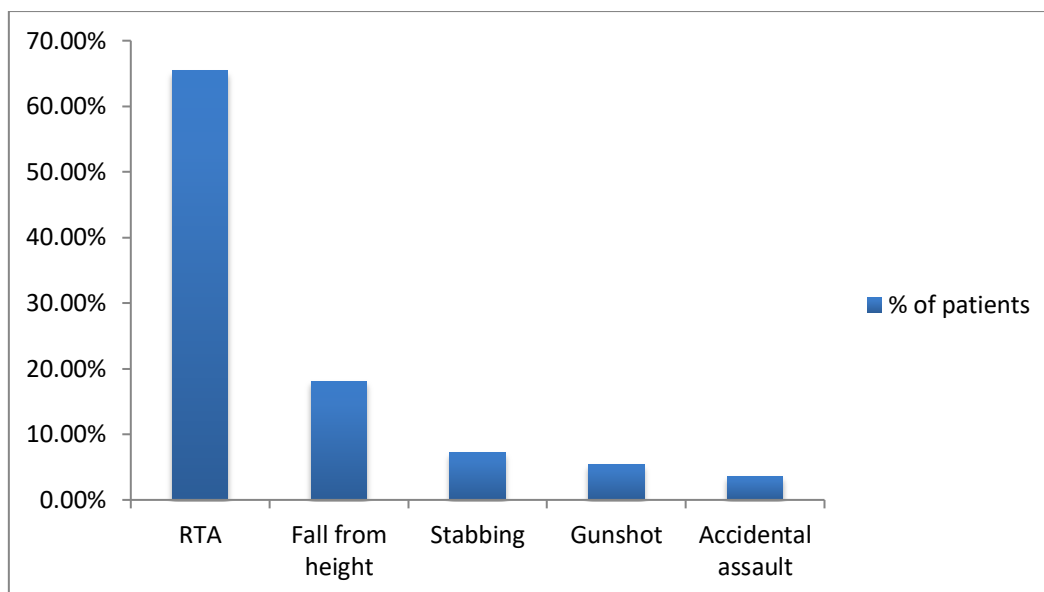
- a. Laboratory investigations: These included complete blood count, blood typing, and cross matching and coagulation profile, as required.
- b. Radiographic investigations: Plain chest X-ray, pelvi-abdominal ultrasound, and, CECT Abdomen and Pelvis.
- c. 3. Clinical outcome: Each patient's outcome was coded as one of the following: Surgical intervention; admitted for observation; admitted to the Intensive Care Unit; recovered while under observation; or died while in the ED.

STATISTICAL ANALYSIS

All data were entered into a statistical model for analyzing mortality factors for PAT and were performed using SPSS using 22. Data was presented in the form of frequency/percentage & mean \pm standard deviations. For all univariate analyses, a chi-square test was used for binary variables and a student t-test for continuous variables.

RESULTS

During the 2 year period of study, a total of 1445 trauma patients were admitted to our centre. Of these, 55(3.8%) patients had abdominal trauma, and these made the study population. There were 43(78.1%) males and 12(21.8%) females with a male to female ratio of 3.5:1. The age of patients at presentation ranged from 5 to 75 years with a median age of 25 years. The peak age incidence was 18-30 years accounting for 29(52.7%) cases. 39(70.9%) patients were age 30 years and below. Most frequent sign and symptoms in both blunt and penetrating trauma was abdominal pain (in 51 patients), tenderness (in 49 patients) and abdominal distension (in 38 patients). The majority of patients 48(87.2%) sustained blunt abdominal injuries and the remaining 7(12.7%) had penetrating abdominal injuries. RTA was the most common cause of blunt injury accounting for 36(65.4%) patients. Other causes include fall and accidental assault in 10(18.1%) and 2(3.6%) patients respectively. Penetrating abdominal injuries such as stabbing or gunshot were recorded in 4(7.2%) and 3(5.4%) patients respectively (graph 1).



Graph 1: Distribution of patients according to pattern of injury

Isolated abdominal injuries occurred in 24(43.6%) while 31(56.3%) patients had associated extra-abdominal injuries. In our study, liver is the most commonly injured organ in blunt abdominal injuries while small bowel perforation injury is the most common in penetrating cases (table 1).

Table 1: Distribution of patients according to abdominal (organ) injuries(N=55)

Organ Injured	N	Percentage
Liver	24	43.6%
Spleen	12	21.8%
Jejunum	10	18.1%
Renal	7	12.7%
Pancreas	7	12.7%
Mesenteric tear	5	9%
Ileal injury	4	7.2%
Large intestine	4	7.2%
Retroperitoneal heamatoma	2	3.6%
Duodenal injury	2	3.6%

In our study, according to abbreviated injury scale, moderate (score 2), serious (score 3) & severe (score 4) injuries were recorded in 2(3.6%), 28(50.9%) & 19(34.5%) respectively. The majority of patients(54.5%) had systolic BP >90 mmHg on admission and the remaining (45.4%) had systolic BP 90 mmHg, below or NR. Out of 55 patients, 33(60%) were treated surgically and remaining 22(40%) were treated conservatively. Surgical intervention was needed for all penetrating cases (100% i.e. 7/7) in our study as compared to blunt cases (63.6% i.e. 21/33). Surgery for extra-abdominal injuries was performed in 15% (5) of the cases. E.L. with repair of injured organ was the most frequent intra-abdominal surgical procedure performed in 27 cases (87%). In our study, all the patients with GIT injury i.e. perforation or gangrene were operated irrespective of the grade (severity) of the injury (table 2).

Table 2: Distribution of patients according to the type of surgical procedure performed(n=33)

Type of surgical procedure	N	Percentage
Bowel repair	13	39.3%
Resection & anastomosis	9	27.2%
Damage control surgery (perihepatic packing)	3	9%
Splenectomy	3	9%
Splenorrhaphy	1	3%

Table 3: Distribution of patients according to intra-operative findings (N=33)

Intra operative findings	N	Percentage
Bowel perforation	15	45.3%
Lacerated liver	10	30.3%

Mesenteric tear/Hematoma/laceration	10	30.3%
Splenic laceration	6	18.1%
Serosal tear	5	15.1%
Retroperitoneal haematoma	4	12.1%
Pancreatic laceration/injury	3	9.0%
Bowel gangrene	2	6.0%

Post-op complications were recorded in 16(29%) patients, the most common being wound dehiscence. Other post-op complications: seropurulent discharge (3 patients), cardiac arrest including sepsis, shock (3 patients), AC renal failure for which dialysis was done (3 patients), respiratory failure (4 patients), biliary leak (2 patients), sub acute (post-op) intestinal obstruction (2 patients), microscopic hematoma, bed sores and fecal discharges from wound site (table 4).

Table 4: Distribution of patients according to post-op complications (N=16)

Post op complications	N	Percentage
Wound infection	3	18.7%
Wound dehiscence	4	25%
Respiratory distress (pneumonitis)	4	25%
Acute renal failure (dialysis done)	3	18.7%
Cardiac arrest (shock/sepsis)	6	37.4%
Biliary leak	2	12.5%
Subacute intestinal obstruction	2	12.5%
Bed sore	1	6.2%
Anastomosis leak	1	6.2%

The overall length of hospital stay (LOS) ranged from 2 days to 56 days with a median of 11 days. According to our study, patients who had serious trauma {[AIS 3]; 12 patients (50%)} & severe trauma [AIS 4; 9 patients (37.5%)] with BP <90 mmHg [11 patients (45.8%)] and those with associated injuries [18 patients (75%)] and patients whose arrival time was >24 hours [7 patients (29.1%)] stayed longer in the hospital. Of the 55 patients, 48(87.2%) were alive and the remaining 7(12.7%) patients died. The most common cause of death was shock. Age of patients [{>50 years}, 57.1% (4/7 patients)], systolic BP <=90 mmHg [4/7 patients (57.1%)], presence of associated extra-abdominal injury [4/7 patients (57.1%)] were the main predictors of mortality. These factors also act as independent risk factors for morbidity too (table 5).

Table 5: Distribution of patients according to factors that predicted mortality (n=7)

Variables	N	%
Age- >50 years	4	57.1%
<50 years	3	42.8%
Pulse- <100/min	5	71.4%
>100/min	2	28.5%
Breathing difficulty	2	28.5%
Systolic BP <90mm Hg	4	57.1%
Associated injury	4	57.1%
Cause of mortality		
Shock	4	57.1%
Sepsis	2	28.5%
Cardiac arrest	1	14.2%

DISCUSSION

The majority of abdominal trauma patients in the present study were found to be young in their 3rd decade of life, the peak age incidence was in the age group of 18-30 years(52.7%) & tended to affect more males than females (78.1% vs 21.8%) with a male to female ratio of 3.5:1, this group represents the economically active age and the reason for the high incidence of abdominal trauma in this age group reflects their high activity levels and participation in high-risk activities. Male predominance in our study

is due to their increased participation in high-risk activities.

Our study report is in agreement with majority of other studies: Chalya et al (11) indicated the peak incidence in the age group of 21-30 years (46.5%) and male to female ratio was 3.2:1(76.3% vs 23.7%); MAB Siddique (12) reported peak age incidence in 21-30 years(52%) with ratio of 15.6:1(94% vs 6%). P Musau (7) studied risk indicators of morbidity & mortality in abdominal injuries on 80 patients indicated 21-30 years

(53.8%) as the peak age incidence with a male to female ratio of 12.3:1 (92.5% vs 7.5%).

In our study 87.2% of the cases were of blunt abdominal trauma, which is consistent with report of Allen et al (13): 77.5%; Nyongole et al (14): 65.3% and Chalya et al (11): 77.8% of blunt trauma as compared to penetrating abdominal trauma.

In our study RTA (65.4%) were the most common cause of blunt abdominal trauma which is consistent with report of MA Gad (1): 62.8% and Allen et al (13): 69.5%. Findings from all these studies call for urgent preventive measures at reducing the occurrence of road traffic accidents and subsequently to reduce the incidence of these injuries.

Most of the patient in this study presented with abdominal pain (92.7%), tenderness (89%) and distension (69%). Other signs and symptoms were guarding, rigidity, breathing difficulty, hypotension and tachycardia. This report is consistent with report of MAB Siddique et al (12), in which most frequent symptoms was abdominal pain; other common symptoms and signs were vomiting, dyspnoea, dehydration and hypotension. Similarly in the report of Madhumita Mukhopadhyay (15), most of the patients presented with abdominal pain.

In our study injury to extremities were the most frequently injured region which is in agreement with finding from other studies: MA Gad et al (1), reported most common associated injuries were to an extremities (51.2%), chest injuries (34.1%) and head & neck injuries (14.6%). Nyongole et al (14) indicated 37% cases of abdominal trauma with associated injuries in which skeletal injury occurred in 73.5% of cases.

The presence of complications has an impact on the final outcome of patients presenting with abdominal trauma; fact supported by our study. Our complication rate of 29% which is comparable to study of MAB Siddique (12) who reported 28% cases with complication but our rate was found to be significantly high compared with other studies (20.7% in study of Chalya et al (11) and 17.02% in study of Madhumita Mukhopadhyay (15).

Wound dehiscence (25%) was the most frequent post-op complication. This observation is at variant with other studies (M Ohene et al (16) reported 15.3% cases of intra-abdominal abscess; Chalya et al (11) reported 27.1% cases with surgical site infection as most common complication and it is consistent with report of Maurice Asuquo (17) showing 6.9% cases; Madhumita Mukhopadhyay (15) reported anastomotic leakage as the most common complication in 25% cases.)

In our study the overall mortality rate was 12.7% and it was significantly associated with age of patients > 50 years, presence of associated extra-abdominal injuries, admission systolic BP < 90 mm Hg. The mortality rate was higher with blunt abdominal trauma patients as compared to penetrating abdominal trauma (71.4% vs 28.6%). It has been observed in our

study that sometimes injuries are missed or they are diagnosed late as patients with blunt trauma show clinical signs less and majority had no visible external abdominal injury that added to their high mortality. Also, BAT in our study are associated with high extra-abdominal injury more (90.3%) that also added to their high mortality rate. It has also been noticed that all cases of penetrating abdominal trauma were operated in our study while in blunt trauma delayed or missed diagnosis lead to delayed surgical intervention that causes high morbidity and mortality. Our report is consistent with report of Shalu Gupta et al (18) who showed the mortality rate of 11.1% in 63 cases of BAT. They explained that mortality in blunt abdominal trauma was high and it is related to delayed presentation and diagnosis, associated injuries and delayed surgical intervention. They showed that presence of other systemic injury takes precedence over abdominal trauma and failure to recognize an extra-abdominal injury contribute to patients death more. Similarly in report of Atif et al (19), mortality was high in BAT i.e. 4.4% in 200 patients of blunt abdominal trauma. He proved that BAT injuries are missed more due to altered level of consciousness due to head injury, severity of injury, lack of symptoms at admission that added to their high mortality in BAT.

Our mortality rate of 12.7% is consistent with study of P. Musau (7) i.e. 12.5%, his study indicated that type of injury, cause of injury, degree of injury and the physiologic state of the patient at admission as the independent indicators of mortality. In his study blunt injuries accounted for greater incidence of deaths, RTAs (50%) occupied a distinct position as a cause of mortality.

Other authors indicated higher mortality rate: Chalya et al (11) showed the mortality rate of 17.9%, his risk factors for mortality is consistent with our study i.e. according to him predictors for mortality was age of patients > 40 years, presence of associated extra-abdominal injuries, severity of injury, systolic BP < 90 mm Hg, arrival time > 24 hours and presence of post-operative complication. According to study of MA Gad (1), mortality rate was 25.8% which is relatively high compared to our study.

Maurice et al (17) reported 10.3% mortality and this was due to the fact that most severely injured die prior to hospitalization. According to his study, mortality was common in patient with gun shot injury as compared to other, which is consistent with our study where mortality in penetrating trauma was due to gunshot injury (100%).

Since stab/gunshot or road traffic accidents remain the common causes of abdominal injury, real possibility of decreasing death from these injuries lies in the social stability and prevention of automobile accidents by improvement of law and order and mass people awareness. Major advances in the rapid transportation of the injured patients by trained personnel in well-equipped ambulances could save the lives of many of the victims of major trauma.

CONCLUSION

Abdominal trauma is now considered as a serious health problem. A number of independent risk factors for mortality and morbidity were identified in our sample of 55 abdominal cases. These included type of abdominal trauma (whether blunt or penetrating), presence of associated extra-abdominal injuries, age of patients, systolic BP, severity of injury and arrival time to hospital. Improved motor vehicle safety, rapid emergency transport in well-equipped ambulances and rapid intervention should help to reduce the mortality and morbidity of many of the victims of major trauma.

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