



International Journal of Surgery Science

E-ISSN: 2616-3470

P-ISSN: 2616-3462

© Surgery Science

www.surgeryscience.com

2021; 5(1): 374-377

Received: 10-01-2021

Accepted: 24-02-2021

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Clinical presentation of blunt abdominal trauma

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DOI: <https://doi.org/10.33545/surgery.2021.v5.i1f.695>

Abstract

Non-penetrating trauma causes damage from a combination of compression, shearing and bursting forces. Sudden, pronounced increase in intra-abdominal pressure created by outward forces can cause rupture of hollow viscera or can cause burst injury of solid organ as seen in lap belt injury. Cases of Blunt abdominal trauma were identified. Informed consent was obtained from those who were willing to be the part of the study. For the acutely ill patients who could not give consent at admission, consent was taken from next of kin (adult relative/ guardian) in presence of an independent witness. In our study most patients i.e >78% arrived late in the hospital. There were total 8 mortality observed in this study, 6 were from delayed interval group and 2 were from early interval group.

Keywords: Blunt abdominal trauma, non-penetrating trauma, clinical presentation

Introduction

The Abdomen is the region of the trunk that lies between the diaphragm above the inlet of the pelvis below. Superiorly, the abdominal wall is formed by the diaphragm, which separates the abdominal cavity from the thoracic cavity. Inferiorly the abdominal cavity is continuous with the pelvic cavity through the pelvic inlet. Anteriorly, the abdominal wall is formed by the lower part of thoracic cage & below by the rectus abdominus muscle, external oblique muscle, internal oblique muscle & transverse abdominus muscle & fasciae. Posteriorly, the abdominal wall is formed in the midline by the vertebrae & their intervertebral discs, upper part of bony pelvis, the psoas muscle, the quadratus lumborum muscle, and the aponeurosis of origin of transversus abdominus muscle^[1, 2].

The abdomen is divided into nine regions for descriptive purpose by two horizontal lines and two vertical arbitrary lines. The horizontal lines are the trans-pyloric and, at the level of pylorus of the stomach and passes through the tip of the ninth costal cartilage, and the other horizontal line is the intertubercular line passing between the iliac tubercles. The two vertical lines are from the midclavicle downwards. The resulting regions are right and left hypochondriac, epigastric, right and left lumbar, umbilical, right and left iliac, and hypogastric^[3, 4].

Understanding the mechanisms of injury is crucial in the management of a patient with abdominal trauma. In general, injuries can be due to following mechanisms^[5, 6]:

- Non-penetrating trauma causes damage from a combination of compression, shearing and bursting forces. Sudden, pronounced increase in intra-abdominal pressure created by outward forces can cause rupture of hollow viscera or can cause burst injury of solid organ as seen in lap belt injury.
- Compression of abdominal viscera between the applied force to the abdominal wall and the posterior thoracic cage or the vertebral column can produce a crush injury.
- Abrupt shearing forces can cause a tear of organs or vascular pedicles.
- Oblique forces and deceleration injury cause shearing of viscera where anchored, such as at the duodenojejunal flexure, ileocaecal junction and peritoneal attachments of the bowel.
- Deceleration injuries occur in high speed vehicular accidents and in falls from great heights. On impact, the organs continue to move forward at the terminal velocity, tearing the organs at their sites of attachment.
- Direct impact to the underlying organ in penetrating injuries including stab injury, gunshot injury, bull gore injury.

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Direct impact to the underlying organ in penetrating injuries including stab injury, gunshot injury, bull gore injury.

Methodology

Setting

The study was carried out in tertiary teaching institute.

Design of Study

This was a retrospective with prospective observational study of cases of Blunt abdominal trauma in a tertiary teaching institute.

Inclusion criteria

- Adult (age>18yrs) of either sex
- Patients with Blunt Abdominal Trauma with radiologically diagnosed solid organ as well as hollow viscus injuries.
- Patients with Blunt abdominal trauma with other associated injuries like head injuries or long bone fractures.

Exclusion criteria: 1) Age < 18 years.

Sampling: Convenient, continuous, consecutive and clinic based sampling method was used.

Consent

For collection of the retrospective data waiver of consent was obtained from the institutional Ethics board.

Cases of Blunt abdominal trauma were identified. Informed consent was obtained from those who were willing to be the part of the study.

For the acutely ill patients who could not give consent at admission, consent was taken from next of kin (adult relative/guardian) in presence of an independent witness.

Emergency surgery department register were screened for diagnosis of blunt abdominal trauma written in the column of diagnosis. Accordingly the data was collected from the medical records of the hospital diagnosed to have 'Blunt abdominal trauma with solid organ or hollow viscus injury'.

The data of the patients so enrolled was collected in the prescribed proforma and was tabulated. Identity of patients enrolled in the study was not be revealed.

Results

Table 1: Age distribution:

Age in years	Frequency	Percent
≤ 20	2	2.0
21-30	53	53.0
31-40	26	26.0
41-50	11	11.0
>50	8	8.0
Total	100	100.0

Blunt abdominal trauma was seen at all ages, predominantly in the prime of life between 21-30 years (53%)

Table 2: Gender distribution

Gender	Frequency	Percent
Female	15	15.0
Male	85	85.0
Total	100	100.0

The Gender distribution has male preponderance with a male:female ratio of 6:1.

Table 3: Mode of injury

Mode of Injury	Frequency	Percent
Vehicular accidents	60	60.0
Railway accident	20	20.0
Fall from height	13	13.0
Assault	7	7.0

The modes of injury were also evaluated *viz.* Vehicular accidents, Railway accidents, Falls, Assaults. As expected Vehicular accidents have been the major cause of trauma. In our study they contribute 60% followed by Railway accidents 20%.

Table 4: Time interval between injury and admission to hospital and mortality

Time interval b/w injury and admission	Frequency	Percent	Death
< 2 Hours	22	22.0	2
2 Hours - 1 Day	63	63.0	6
> 1 day	15	15.0	0
Total	100	100.0	8

In our study most patients i.e >78% arrived late in the hospital. There were total 8 mortality observed in this study, 6 were from delayed interval group and 2 were from early interval group.

Table 5: Symptoms and signs

Clinical features	Frequency	Percent
Pain in abdomen	81	81.0
Vomiting	13	13.0
Distension	2	2.0
Hematuria	4	4.0

Majority of patients presented with Pain in abdomen (81%) followed by vomiting (13%)

Table 6: Signs

Presenting Sign	Frequency
Abdominal tenderness	80
Rebound tenderness	20
Pallor	24
Pulse>90/min	52
BP<90mm of Hg systolic	22

Of all 100 patients the most common clinical sign was Abdominal tenderness (80%), most commonly localized to a particular quadrant depending on the underlying organ injury.

Table 7: Associated Injury

Associated injuries	Frequency	Percent
Present	34	34.0
Absent	66	66.0
Total	100	100.0

In this study 34 patients had associated injuries (34%)

Table 8: Various associated injuries

	No of cases	Percentage
Head	10	30%
Thoracic	7	20%
Orthopaedic	10	30%
Soft tissue	3	8%
Combination	4	12%

Associated extra abdominal injuries were found in 34 cases. The common extra abdominal injuries were head injuries and long bone fractures, others including chest injuries with rib fractures, pelvic fractures and crush injuries.

Discussion

Age of 100 patients ranged from 19 to 72 years. Most of the patients 53% were between 21-30 years (table II). 79% of the patients were between 20-40 yrs. The average age of population in our study was 28 years.

The age incidence was shown to be variable in different series, but the results are comparable to findings of Nabachandra H. *et al.* [7], Marine Makanga [8] and Mousami Singh *et al.* who stated that in blunt abdominal trauma average age of presentation was 31, 27 and 29 respectively.

Among the study participants, marked male preponderance was observed. 85% were males and 15% were females. The male: female ratio was 6:1

The findings were synonymous with the results of the study conducted by Nabachandra H. *et al.* [7] Marine Makanga [8], Mousami Singh *et al.* [9] and Shojaee M. *et al.* [10] where Male: Female ratio was 3.8: 1, 5:1, 4:1, 4.2:1 respectively.

The reason behind the increase incidence in males in our study is due to the fact that in our country males are exposed to trauma as most of the time they remain outdoors and a significant section of females remain indoors.

In our study, among 100 patients, the most common mode of injury was Road traffic accident (RTA) which accounted for 60% of blunt injury abdomen, followed by Railway accident (20%), fall from height (13%) and assault (7%) In the studies conducted by Nabachandra H. *et al.* [10], Mousami Singh *et al.* [9] also revealed that Road Traffic accidents was leading cause for blunt abdominal injury, 86.4% and 70% respectively.

The above table clearly depicts that the road traffic accident is the most common mode of injury. This is due to the rapid development in technology, in all fields including automobile industry where the first priority has been given to speed rather than safety.

In the present study, abdominal pain was the most common presenting complaint accounting for 85% and abdominal tenderness was the most common sign accounting for 88% of cases. But the signs and symptoms in abdominal injuries are notoriously unreliable and are often masked by concomitant head injuries, chest injuries and pelvic fractures. Significant

injuries to the retroperitoneal structures may not manifest signs and symptoms immediately and be totally missed even on abdominal x rays and DPL predisposing the patients to grave consequences of missed injuries. In Davis *et al.* study [11], 43% of patients had no specific complaints and no signs or symptoms of intra abdominal injury when they presented to the emergency room. But 44% of those patients eventually required exploratory laparotomy and 34% of patients had an intra abdominal injury. This emphasizes the importance of careful and continuing observation and repeated examination of individuals with Blunt abdominal trauma.

In the present study, the associated the extra-abdominal injuries were present in 34% of the patients. This is in accordance with the findings of studies conducted by Frandon *et al.* [12].

Conclusion

- The study confirmed the well known fact that predominantly younger population of 21- 30 yrs which form the reproductive age group is affected by trauma with a marked male preponderance.
- Road traffic accidents form the most common mode of injury. Hence measures should be taken to prevent these accidents and care of the victim at the accident site.
- Spleen and liver were the common organs involved in Blunt abdominal trauma, found in 67% and 23% cases respectively. Associated injuries were present in 34% cases and included head injury, chest injury and bony fractures. The complication rate was 18% with chest infection being the commonest complication.

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