

A study of blunt and penetrating abdominal trauma, its various patterns of injuries, and its management

Pallav Patel, Jaydeep Gadhavi, Hiren Parmar

Department of Surgery, GMERS Medical College, Gandhinagar, Gujarat, India.
Correspondence to: Hiren Parmar, E-mail: drhirenparmar@gmail.com

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Abstract

Background: Abdominal trauma is one of the most common injuries among injuries caused mainly due to road traffic accidents. The rapid increase in motor vehicles and its aftermath has caused rapid increase in the number of victims to blunt abdominal trauma (BAT). Motor vehicle accidents account for 75%–80% of BAT. The knowledge in the management of BAT is progressively increasing due to the inpatient data gathered from different parts of the world. In spite of the best techniques and advances in diagnostic and supportive care, the morbidity and mortality remains at large. The reason of this could be due to the interval between trauma and hospitalization, delay in diagnosis, inadequate or lack of appropriate surgical treatment, postoperative complications, and associated trauma especially to spine, head, thorax, and extremities.

Objective: To study the blunt and penetrating abdominal trauma, its various patterns of injuries, and its management.

Materials and Methods: After initial resuscitation of the trauma victims, a careful history was taken to document any associated medical problem. Documentation of patients, which included identification, history, clinical findings, diagnostic test, operative findings, operative procedures, and complications during the stay in the hospital and during subsequent follow-up period, was recorded on a Performa specially prepared. The decision for operative or nonoperative management depended on the outcome of the clinical examination and results of diagnostic tests. Patients selected for nonoperative or conservative management were placed on strict bed rest and subjected to serial clinical examinations that included hourly pulse rate, blood pressure, respiratory rate, and repeated examination of abdomen and other systems.

Result: The most common age group involved in BAT was between 13 and 20 years, whereas in penetrating abdominal trauma was between 21 and 30 years. This study showed that of 100 cases of abdominal trauma, 19 were presented with shock (blood pressure <100 mm Hg) while 30 had blood pressure between 100 and 110 mm Hg. Following BAT of 75 patients, 48 managed conservatively while 27 undergone operative management. Following penetrating abdominal trauma of 25 patients, only one managed conservative whereas all other required exploration.


Conclusion: The best way of reducing the morbidity and mortality from BAT is prevention. There is an acute need of trauma center that is well equipped with all modern facilities in tertiary care center.

KEY WORDS: Blunt abdominal trauma, penetrating abdominal trauma, conservative management, surgical management

Introduction

Abdominal trauma is one of the most common injuries among injuries caused mainly due to road traffic accidents.

The rapid increase in motor vehicles and its aftermath has caused rapid increase in the number of victims to blunt abdominal trauma (BAT). Motor vehicle accidents account for 75%–80% of BAT.^[1] Blunt injury of abdomen is also a result of fall from height, assault with blunt objects, sports injuries, industrial mishaps, bomb blasts, and fall from riding bicycle. BAT is usually not obvious. Hence, often missed, unless, repeatedly looked for. Due to the inadequate treatment of the abdominal injuries, most of the cases are fatal. The knowledge in the management of BAT is progressively increasing due to the inpatient data gathered from different parts of the world. In spite of the best techniques and advances in diagnostic and supportive care, the morbidity and mortality remains at

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large. The reason of this could be due to the interval between trauma and hospitalization, delay in diagnosis, inadequate or lack of appropriate surgical treatment, postoperative complications, and associated trauma especially to spine, head, thorax, and extremities.^[2] BAT makes up 75% of all blunt trauma and is the most common example of this injury. The majority occurs in motor vehicle accidents, in which rapid deceleration may propel the driver into the steering wheel, dashboard, or seat-belt causing contusions in less serious cases, or rupture of internal organs from briefly increased intraluminal pressure in the more serious, dependent on the force applied. There are two basic physical mechanisms at play with the potential of injury to intra-abdominal organs, namely, compression and deceleration. When BAT is complicated by "internal injury," the liver and spleen are the most frequently involved, followed by the small intestine. In rare cases, this injury has been attributed to medical techniques such as the Heimlich Maneuver.^[3] Penetrating trauma is an injury that occurs when an object pierces the skin and enters a tissue of the body, creating an open wound. The penetrating object may remain in the tissues, come back out the way it entered, or pass through the tissues and exit from another area. An injury in which an object enters the body or a structure and passes all the way through is called a perforating injury, while penetrating trauma implies that the object does not pass through. Perforating trauma is associated with an entrance wound and an often larger exit wound. Penetrating trauma can be serious because it can damage internal organs and presents a risk of shock and infection. The severity of the injury varies widely depending on the body involved, the characteristics of the penetrating object, and the amount of energy transmitted to the tissues.

Objective

1. To study the incidence and pattern of blunt and penetrating abdominal injury in hospitalized trauma victims.
2. To establish relationship and comparison between conservative and operative treatment and outcome.
3. To study the relationship between time interval from the injury to getting definitive treatment and its impact on outcomes in the patients with blunt and penetrating abdominal injury.
4. To evaluate various modes of presentation and relationship of dynamics of injury and intra-abdominal organ injuries.
5. To evaluate various available modalities for detection of intraperitoneal injuries.
6. To evaluate role of various modalities of treatment available for solid and hollow organ injuries with aim to reduce the mortality and morbidity.
7. To evaluate common complications of blunt and penetrating abdominal trauma.

Materials and Methods

After initial resuscitation of the trauma victims, a careful history was taken to document any associated medical problem. Documentation of patients, which included identification, history, clinical findings, diagnostic test, operative findings, operative procedures, complications during the stay in the hospital and during subsequent follow-up period, was recorded on a Performa specially prepared. Demographic data collected included the age, sex, occupation, and nature and time of the accident leading to the injury. Routine blood and urine tests and radiological investigations were carried out in all the patients. After initial resuscitation and achieving hemodynamic stability, all patients were subjected to careful examination, depending on the clinical findings; decision was taken for further investigations such as four-quadrant aspiration, diagnostic peritoneal lavage, abdominal X-ray, and abdominal ultrasound and contrast-enhanced computed tomography scan. The decision for operative or nonoperative management depended on the outcome of the clinical examination and results of diagnostic tests. Patients selected for nonoperative or conservative management were placed on strict bed rest and were subjected to serial clinical examinations that included hourly pulse rate, blood pressure, respiratory rate, and repeated examination of abdomen and other systems. Appropriate diagnostic tests, especially ultrasound of abdomen, were repeated as and when required. Postoperative follow-up was carried out to note for complications.

Inclusion Criteria

All patients who had blunt and penetrating abdominal injury and hospitalized for the same.

Exclusion Criteria

All patients who had blunt abdominal injury but not hospitalized, patients below 12 years of age, patients having duration of injury to hospital arrival time more than 2 days, and patients having gunshot and blast injury.

Results

Following are the clinical observation and results of the study conducted in our institute of 100 patients having blunt or penetrating abdominal trauma. This study showed that the most common age group involved in BAT was between 13 and 20 years (25 of 75 patients) and in penetrating abdominal trauma was between 21 and 30 years (13 of 25 patients). This study showed that men were involved most commonly in both types of injury measuring 51 of 75 cases in BAT and 24 of 25 cases in penetrating abdominal trauma. Only one case was noted in penetrating abdominal trauma, which was due to stab injury by knife.

Table 1: Blood pressure distribution

Blood pressure (mm Hg)	Number of cases following abdominal trauma
<100	19
100–110	30
110–120	30
>120	21

Table 2: Treatment

Treatment	Number of cases following blunt trauma	Number of cases following penetrating trauma
Conservative	48	3
Operative	27	22
Total	75	25

The most common mode of blunt abdominal injury in this study was road traffic accidents having 38 of 75 patients, followed by assault in the form of “gadtapatu.” Of 25 cases of penetrating abdominal trauma, 23 were due to stab injury and 2 due to accidental injury suggesting stab injury as the most common mode of penetrating injury. Half of the patients with abdominal trauma had acceleration injury due to assault in the form of gardapatu and stabbing while another half of the patients had deceleration injury due to road traffic accident and fall from height. The most common associated injury with abdominal trauma was extremity injuries involving 18 patients in which lower limb injuries were slightly more common, while next common associated injury was in 12 cases and head injury in another 8 cases. Abdominal pain was present in all 100 patients, while next common symptom was nausea. The most common cause of abdominal pain in BAT without hemoperitoneum was muscular pain, while pain in hemoperitoneum cases was due to parietal peritoneal irritation and injured organ itself. About 10 patients were experiencing breathlessness that can be due to associated hypotension, abdominal distension, and chest injury.

This study showed that of 100 cases of abdominal trauma 19 were presented with shock (blood pressure <100 mm Hg), while 30 cases had blood pressure between 100 and 110 mm Hg.

Liver remains the most commonly injured organ in blunt trauma, followed by spleen and kidney; while small bowel remains the most commonly injured organ in penetrating trauma, followed by liver and mesentery. There were two cases for liver and splenic injury, and one case of liver and kidney injury, one case of small bowel and mesenteric injury, and another one case of pancreas with kidney injury. Liver is the most common organ injured in the multiple organ injury. In total three cases are involved in injury. In this study, the most common injured organ alone in BAT was liver followed

by spleen, whereas the most common injured organ alone in penetrating abdominal trauma was small bowel.

Following BAT of 75 patients 48 managed conservatively while 27 undergone operative management. Following penetrating abdominal trauma of 25 patients only one managed conservative and all other required exploration. All patients were followed up on the outpatient department bases after discharge. Follow-up was carried out for a minimum period of 2 month. All of the patients did well in follow-up.

Discussion

In this study of BAT, about 64% cases were managed conservatively and 36% were managed by operative procedures, while in the study by Gupta and Talwar about 68.25% undergone exploration. This difference can be due to more severe injury and hemodynamic instability in those patients. In both studies, the most common mode of injury was road traffic accident and men were more prone to injury. The most common cause of BAT was found to be road traffic accident while the most common cause of penetrating abdominal trauma was stab injury.^[4] The most common age group was in between second, third, and fourth decade, with men preponderance.^[5] In all age groups, men were affected more than women. Most of the patients were admitted within the first 6 hours of injury. In this study, liver is the most commonly involved organ followed by spleen in BAT while small intestine is the most commonly involved organ in penetrating abdominal trauma.^[6] In this study, USG remains the most suitable investigation in our setup, whereas computed tomography scan plays a significant role in polytrauma with multiple organ injuries.^[7] Abdominal contrast-enhanced computed tomography plays a role in retroperitoneal hematoma, pancreatic injury, and major vessel injury, and in those patients who are kept conservatively managed by intravenous fluids and blood products with solid organ injury. Of 100 cases, 75 patients having blunt trauma and 25 having penetrating abdominal trauma. Of 75 blunt trauma cases, 48 were managed conservatively and 27 required operative intervention while of 25 penetrating trauma cases, 1 was managed conservatively and 24 required operative intervention. Of 10 cases of splenic injury, five were managed conservatively while four cases managed by splenectomy and in one case of penetrating injury leading to foreign body impaction in spleen managed by foreign body removal by exploration while conserving the spleen. Thus splenic injury should be managed conservatively if possible, operative intervention should be done only in hemodynamically unstable patients.^[8] Among those patients required operative intervention, most of the patients with liver injury required Abgel packing of liver laceration and wash of hemoperitoneum, while all patients with traumatic intestinal perforation either due to blunt

or due to penetrating injury managed by suturing of perforation in two layers by nonabsorbable sutures. One case of the bladder rupture also managed by closure of perforation in two layers by absorbable sutures.^[9] The highest incidence of operative intervention was found among the patients of road traffic accident in BAT. Two patients having liver injury died. They were managed conservatively. The cause of death in one patient was aspiration pneumonia with hypotension while in another patient was due to pneumonia leading to septicemia. All patients were managed by Advanced Trauma Life Support^[10] guidelines by rapid primary survey and decision taken whether to operate or do conservative management. Then detailed secondary survey was carried out while monitoring the vitals and abdominal girth of patient who were kept on conservative management. Those not maintaining vitals were explored and managed accordingly.

Conclusion

The best way of reducing the morbidity and mortality from BAT is prevention. Efforts on controlling traffic, making people conscious about the traffic rules, better facilities of working, and more safety will lessen the incidence of accident. Facility of emergency ward definitely helps in the initial phase of the treatment and reduces the morbidity and mortality. Well-trained and coordinated team of trauma specialist surgeons, radiologist, orthopedics, and anesthetists in trauma centers can reduce the morbidity and mortality of patients. There is an acute need of trauma center, which is well equipped with all modern facilities in tertiary care center.^[11]

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