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A Clinical Study of Solid Visceral Injuries in Abdominal Trauma with References to Factors Determining Outcome

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ABSTRACT
The abdominal cavity has been considered one of the most vulnerable regions of the body and injuries involving it have been considered very serious. Out of all trauma, blunt or penetrating abdominal trauma is the most intriguing. Considering all these facts and the ever-increasing incidence of solid organ injuries in abdominal trauma, the present study aims to know the incidence of age, sex, distribution, mode of injury, incidence of substantial organ injuries, associated injuries and frequency of commonly injured organs. This was an institution-based observational and prospective study and randomised study. All the patients with traumatic abdominal solid organ injuries were admitted in the mentioned period in all surgical units of a tertiary care hospital. The sample size for this study was 43. The frequency of various complications and the mortality rates associated with these forms of injuries were also observed. The ages of the patients varied from 17 years to 61 years of age and the maximum number of cases (23 patients) belonged to the age group of 20-29 years with an incidence of 53.5% per cent. A striking male preponderance of 72 per cent was observed and male to female ratio was 2.6:1. Out of the total of 43 cases, 31 cases sustained blunt trauma to the abdomen while 12 cases were of penetrating trauma. Road traffic accidents were the commonest mode of blunt trauma while stabbing was more common in causing penetrating injuries to the solid organs. Conservative non-operative management was done in a hemodynamically stable patient. Definitive operative management was done for severe degrees of injuries in hemodynamically unstable patients. The commonest postoperative complications were wound infection and pneumonia. The overall mortality rate in the presence series was 13.9%. Conclusions Of the solid organ involvement spleen, liver, and kidneys were the commonest organs involved following either blunt or penetrating trauma. Associated injuries to other organs were not rare. In conclusion, it can be said that morbidity and mortality associated with abdominal organ injuries are quite responsive to treatment if early management can be initiated.

INTRODUCTION

The abdominal cavity has been considered as one of the most vulnerable regions of the body and injuries involving it have been considered very serious.

Out of all trauma, blunt or penetrating abdominal trauma is the most intriguing[1]. The abdomen is a "Pandora's box" and is a reservoir of a good number of vital organs. The abdominal wall acts as a barrier and insult to this barrier either with a blunt or penetrating injury, the organ inside starts weeping in different ways.

Trauma is the most common cause of death for individuals between the ages of 1 and 44 years and the third most common cause of death for all ages[2,3]. Solid organ injuries are more likely, in blunt rather than in penetrating trauma. The liver and spleen are considered to be the most commonly injured organs following either blunt or penetrating trauma. Many injured patients have more obvious extra-abdominal injuries which distract the surgeon from the abdominal injury, prolonging this delay[4].

The key to successful diagnosis of abdominal trauma with solid organ injury is a high index of suspicion, frequent physical examination, and close observation added with diagnostic evaluation.

New sophisticated imaging techniques have created a clear way to diagnose solid visceral injuries and made a spring to jump from invasive methods to non-invasive methods for diagnosis[4,5].

When dealing with a victim of suspected solid organ injuries, it is often difficult to separate diagnosis and therapeutic measures; it is improper to attempt to dissociate them. One must not only carry out his usual diagnostic evaluation but also attend to the early therapeutic needs of the patients. Since organ injuries know no visceral boundaries and initiate a profound physiological response liable to affect every cell and system in the body simultaneously and to varying unpredictable degrees, an essential feature of the training of any surgeon is the ability to recognize priorities[6,7]. Considering all these facts and the ever-increasing incidence of solid organ injuries in abdominal trauma, the present study aims to know the incidence of age, sex, distribution, mode of injury, the incidence of substantial organ injuries, associated injuries and frequency of commonly injured organs.

MATERIAL AND METHODS

Study Area: General Surgery Ward, Emergency, OPD of R.G. Kar Medical College and Hospital, Kolkata.

Study Population: Patients admitted in general surgery wards in R.G. Kar Medical College and Hospital.

Study Period: One year

Study Design: This will be an institution-based observational and prospective study, a randomised study.

Study Tools: Pretested and predesigned proforma of data collection.

Study Techniques: Patients presenting with abdominal trauma will be examined on admission and information will be gained regarding the time, mechanism and severity of the injury. Patients suspected or diagnosed of having traumatic abdominal solid organ injuries will be subjected to available investigations like laboratory tests, x-rays, USG, NCCT, and CECT. Appropriate treatment (resuscitation followed by operative intervention) will be advised. Patients diagnosed as having traumatic abdominal solid organ injuries on laparotomy will be treated by standard surgical procedures. Patients will be followed in the postoperative period for 6 months and their mortality and morbidity will be recorded.

Statistic: The present work comprises a study of 43 cases of solid organ injuries who were admitted to the six surgical units of RG KAR Medical College and Hospital from october 2020 to september 2021. Cases with solid organ injuries were included in the study and these cases were studied with respect to age and sex incidence, type and mode of injury, common presenting feature, frequency of association with other injuries, their management and effort of delay in treatment. The frequency of various complications and the mortality rates associated with these forms of injuries were also observed.

Table 1 depicts that most of the trauma patients with solid organ injuries belong to the age group 20-29 (53.5%). Most of the study population was male patients (72.1%) and the injuries occurred due to blunt trauma (72.1%) and the penetrating trauma injuries occurred due to stab injury (66.7%). Higher number of the patients had blunt trauma injuries are associated with isolated solid organ injury (77.4%) and most of the penetrating trauma injuries are associated with isolated solid organ injury (75%). In this study, most of the blunt trauma cases the affected organ is Spleen (51.6%) and most of the penetrating trauma cases the affected organ is Spleen (66.6%).

RESULT AND DISCUSSIONS

The present study comprises 43 cases of solid abdominal organ injuries admitted in the Six Surgical unit of RG KAR Medical College and Hospital during the period from October 2020 to September 2021. All the cases of trauma to solid organ injuries with or without associated injuries to other intra-abdominal viscera.

Table 1: Table showing distribution of patients in al parameters

Parameter	N	Percentage
Age group (years)		
10-19	2	4.7
20-29	23	53.5
30-39	10	23.3
40-49	4	9.3
>50	4	9.3
Gender		
Male	31	72.10%
Female	12	27.90%
Type of injury among patients		
Blunt Trauma	31	72.10%
Penetrating Trauma	12	27.90%
Mode of injury in blunt trauma		
RTA	18	58.10%
Fall From Height	7	22.60%
Assault	6	19.40%
Mode of injury in penetrating trauma		
Stab	8	66.70%
Fall on sharp Object	2	16.70%
Arrow	1	8.30%
Gored by Animals.	1	8.30%
Showing isolated solid organ injury vs injury associated with intra-abdominal injury in blunt trauma		
Isolated solid organ injury	24	77.40%
Injury Associated with intra-abdominal injury	7	22.60%
Isolated solid organ injury vs injury associated with intra-abdominal injury in penetrating trauma		
Isolated solid organ injury	9	75%
Injury Associated with intra-abdominal injury	3	25%
Organ involved in blunt trauma		
Spleen	16	51.60%
Kidney	5	16.10%
Liver	8	25.80%
Pancreas	2	6.50%
Organ involved in penetrating trauma		
Spleen	8	66.70%
Kidney	1	8.30%
Liver	3	25%
Pancreas	0	0

Isolated hollow visceral injuries and children below 10 years of age were not included in the group.

The ages of the patients varied from 17 years to 61 years of age and the maximum number of cases (23 patients) belonged to the age group of 20-29 years with an incidence of 53.5% percent. The next common age group was 30-39 years which comprised 10 cases with an incidence of 23.5%.

A striking male preponderance of 72 percent was observed and male to female ratio was 2.6:1.

Out of the total of 43 cases, 31 cases sustained blunt trauma to the abdomen while 12 cases were of penetrating trauma.

Road traffic accidents were the commonest mode of blunt trauma while stabbing was more common in causing penetrating injuries to the solid organs. Fall from a height was the second common mode of blunt abdominal trauma.

Splenic injury was common in both blunt and penetrating trauma with an incidence of 51.6% percent and 66.7% percent respectively. Injuries to the liver were seen in 25.8% of blunt trauma and 25% of penetrating trauma cases. Blunt kidney injuries were found in 5 cases (16.1%) and penetrating injury was found in only one case. Pancreatic injury occurred in two patients with blunt trauma.

Conservative non operative management was done in a hemodynamically stable patient. Definitive operative management was done for severe degree of injuries in hemodynamically unstable patients. Splenectomy was done for a major degree of splenic injury. Nephrectomy was done for severe degree of renal injuries.

The commonest postoperative complications were wound infection and pneumonia. And other complications were sepsis and pancreatic fistula.

The overall mortality rate in the presence series was 13.9%.

Age Incidence: In The present clinical study, the highest numbers of cases were observed in the age group of 20-29 years followed by the age group 30-39 years.

Sex Incidence: In the present study there was a male predominance with the male to female ratio being 2.6:1. 72 per cent of the cases in the present series were male.

Type and Mode of Injury: In the present series, 31 cases of solid organ injuries were caused by blunt trauma and 12 cases by penetrating trauma. Thus blunt

trauma was found to be more common in causing injuries to the solid abdominal organs.

Of the blunt injuries, the majority of the cases occurred following road traffic accidents i.e. 18 out of 31 cases. Fall from height was the 2nd common cause followed by assaults. Road traffic accidents were found to be the commonest mode of injury of blunt abdominal trauma in the present series which is comparable with other studies.

Stabbing was the most common mode of penetrating injury in the present series. Stab injuries were observed in 8 out of 12 cases of penetrating trauma in the present study.

Management: The abdomen is a commonly injured body region and frequently requires the care of a surgeon for definitive management. Ultrasound has become a nearly ubiquitous technology in emergency departments internationally and has found routine application in the assessment of intra-abdominal haemorrhage following blunt trauma[8-11]. It is considered an adjunct to the primary survey in ATLS and has the advantage of being rapidly performed at the bedside. Ultrasound for trauma evaluates the pericardium, hepatorenal fossa, splenorenal fossa, and retrovesicular space (pouch of Douglas). Resuscitationists may choose to obtain a FAST in the presence or absence of hemodynamic instability, as this exam may be repeated should physiologic decline develop at a later point. Abdominal exploration is classically indicated in blunt trauma patients who are nonresponders in the presence of intraabdominal fluid on FAST. If FAST examination capabilities are unavailable, Diagnostic peritoneal lavage is very rarely performed, is associated with iatrogenic injury, is relatively contraindicated in obesity, and suffers from low specificity[12-14]. Both techniques are unable to evaluate the retroperitoneum, which may represent a considerable source of haemorrhage. This ability has improved as CT technology evolves, although there are still significant limitations. Stable patients who had apparently normal X-rays of the abdomen underwent CT abdomen. Hemodynamically unstable patients with abdominal trauma not responding to resuscitation were prepared for immediate exploratory laparotomy[13-15].

All the patients had either injuries to the spleen, liver, kidney or pancreas. Spleen and liver grouped together constituted most of the injuries following blunt and penetrating trauma.

Spleen Injuries: Conservative management was done for two cases of blunt splenic injury. The patient had a low-grade injury and was hemodynamically stable. The rest of the cases with blunt and penetrating injury had a high-grade injury and was hemodynamically unstable and emergency splenectomy was done for each case.

Liver Injuries: Conservative management was done for two cases of blunt hepatic injury. The patient had a low-grade injury and was hemodynamically stable. The rest of the cases with blunt and penetrating injury had a high-grade injury and was hemodynamically unstable. Repair of the wound was done with (1-0) chromic catgut.

Kidney Injuries: Out of the total of 6 cases of kidney injuries conservative management was done in 4 cases. All the cases had low-grade injury of haematoma. Nephrectomy was done in the rest of the cases including one penetrating injury with a severe laceration.

Pancreatic Injuries: In the present series only two pancreatic injuries were found with major contusional injury. Exploration followed by repair and drainage was done.

Time since injury was found to be an important factor for post-operative recovery and complications. Early interventions play a vital role. In our study, most patients presented to us in less than 24 hours (62%) and most patients had postoperative recovery within 14 days (78%). Delayed presentation may cause sepsis due to intra-abdominal contamination. As penetrating injuries were more common foreign body contamination is there which can cause an increased risk of sepsis.

Complications: All the patients in the present clinical study were monitored from time to time during the postoperative period. Some of them had complications requiring special care and management. Wound infection and pneumonia both were the commonest complication (37.5%) in the present series which is comparable with previous reports by Anderson and Ballinger (1973). The variability in the incidence may be attributed to the limited number of cases in the present study.

Mortality: There were deaths of 6 patients out of 43 cases. The overall mortality rate of the present series is 13.9%. The mortality in penetrating was 33.3% and blunt trauma 6.4%. This is comparable to the studies by Kao *et al*.[8] and Latifi *et al*.

Follow up: Twenty five patients attended follow up after two weeks and one month and all are doing well. The rest of the patients were lost to follow up. Follow up beyond one month could not be done due to poor patient compliance.

Solid abdominal injuries comprise the majority of abdominal trauma cases which are frequently by blunt trauma, though mode of injury is variable.

Road traffic accidents are responsible for most of the blunt injuries to solid visceras of the abdomen. Stabbing is the commonest mode of penetrating trauma. Because of the nature and mode of such type of injury young males understandably are the classical sufferers in comparison to other age and sex group.

The presenting symptom is variable, but in all patients with suspected severe degree of organ injuries radiological investigations and exploratory laparotomy is regarded as the best diagnostic as well as therapeutic modality before embarking upon a definitive procedure.

Of the solid organ involvement spleen, liver, kidneys were the commonest organs involved following either blunt or penetrating trauma. Associated injuries to other organs were not rare.

CONCLUSION

It can be said that morbidity and mortality associated with abdominal organ injuries is quite responsible to treatment, if early management can be initiated. Categorization of the patients and accurate intervention without delay the result are promising.

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