



A CLINICAL STUDY OF PENETRATING ABDOMINAL TRAUMA WITH SPECIAL REFERENCE TO ITS MANAGEMENT : AN INDIAN SCENARIO

Surgery

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ABSTRACT

Introduction: The incidence of penetrating abdominal injuries has been on the rise. The common availability of firearms, the lack of proper law, armed conflicts, civil violence and road traffic accidents are the major causes of penetrating abdominal injuries. As patient with penetrating abdominal trauma are at risk of harbouring life threatening injuries, early diagnosis and timely intervention is the most important steps to reduce its morbidity as well as mortality. Recently due to improvement of the present healthcare system, the outcome of these injuries is improving.

Materials And Methods: A descriptive observational study was carried out on 60 cases of penetrating abdominal injuries. A predesigned pre-tested schedule was used for data collection. Interview of the study subject and evaluation of all clinical reports was done to obtain the history, clinical findings, management, complications, mortality and follow up. Before data collection, informed consent was obtained from each and every study subjects.

Results: The overall incidence of penetrating abdominal trauma was found to be 2.30% of the total admission of 6217 patients in the department of surgery. The most common cause of penetrating abdominal injury found in this study is stab injury by sharp objects which is followed by gunshot injury. The commonest age group affected was 20 to 30 years which comprises about 41.67%. In this study we found a male preponderance in cases of penetrating injury to the abdomen. In most of the cases the mode is homicidal stab or gunshot injury followed by accidental injuries. Pain, abdominal distension and bleeding from the wound are the main presenting symptom. After initial evaluation with USG (FAST), CT scan abdomen is the most valuable investigation so far. In this series, it is found that the small intestine is the most commonly involved viscera followed by colon, omentum, mesentery and liver respectively. Most common complications after operative intervention was wound infection. The average hospital stay was 6 to 15 days. It has been observed that the post-operative complications, associated injuries and multiple organ injuries are the cause of increased hospital stay.

Conclusion: Penetrating trauma can be serious because it can damage internal organs and presents a risk of shock and infection. In the present year, due to overall improvement in the communication and transportation, better monitoring systems and resuscitative measures, improvised diagnostic methods, better availability of blood and blood products, better medications and more skilful surgical techniques, the outcomes of these injuries are improving.

KEYWORDS

Penetrating abdominal Injury, Life threatening, Operative Intervention, Resuscitation, Septicaemia

INTRODUCTION

Since its inception, the man suffered injuries through falls, fire, drowning and interpersonal conflict. In this age of speed, civil violence, armed conflicts, crimes of passion and traffic accidents, the incidence of penetrating injuries to abdomen have been on the increase.¹

Penetrating trauma is an injury that occurs when an object pierces the skin, breaches peritoneum 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. Penetrating trauma can be serious because it can damage internal organs and presents a risk of shock and infection.

Abdomen being the third most commonly injured organ, represents 20% of the injuries requiring operative intervention.⁴ The common availability of fire arms, the lack of proper law and governing personnel, the incidence of such injuries are on the rise.³ It can also result from communal riots, political rivalry, business conflicts and family disputes. Other causes of penetrating injury being fall from a height on sharp object, industrial accidents, bull gore injury, impalement injuries, bullet injuries, etc.

In the present year, due to overall improvement in the communication and transportation, better monitoring systems and resuscitative measures, improvised diagnostic methods, better availability of blood and blood products, better medications and more skilful surgical techniques, the outcomes of these injuries are improving.²

So, this study is aimed to analyse the causal factors, clinical course and various management modalities and their outcomes in case of penetrating abdominal trauma.

METHODS-

A descriptive observational study was carried out for a period of one year from 1st July, 2016 to 30th June 2017 in Owaisi group of hospitals and princess ESRA hospital and College. Patients above 12 years of

age with history of penetrating injury to the abdomen attending the hospital were included in this study. A total number of 60 cases of penetrating abdominal injuries were included in this study. A predesigned pre-tested schedule was used for data collection. Interview of the study subject and evaluation of all clinical reports was done to obtain the history, clinical findings, management, complications, outcome during the stay in hospital, mortality and follow up. Before data collection, informed consent was obtained from each and every study subjects.

RESULT-

During this period of study, 143 patients suffered penetrating injuries of Abdomen out of 2173 patients who were admitted for abdominal trauma. Thus the incidence of penetrating abdominal trauma was found to be 6.58% out of all trauma patients admitted. The overall incidence of penetrating abdominal trauma was found to be 2.30% of the total admission of 6217 patients in the department of surgery.

The most common cause of penetrating abdominal injury found in this study is stab injury by sharp objects which is followed by gunshot injury. The other causes include animal horn and injury associated with road traffic accident.

Table 1- Causes Of Penetrating Abdominal Trauma

Mode of Injury	Number of Cases	Percentage
Stab injury	34	56.67%
Gunshot wound	11	18.33%
Splinters	4	6.67%
Fall on sharp object	7	11.67%
Others	4	6.67%
Total	60	

The commonest age group affected was 20 to 30 years which comprises about 41.67%. Next most common age group affected was 4th decade (26%). The mean age group came out to be 32.88 years.

Table 2- Age Distribution

Age Group (Years)	No of Cases	Percentage
13-20	8	13.33
20-30	25	41.67
30-40	17	28.33
40-50	5	8.33
50-60	2	3.33
60-70	3	5.00

In this study we found a male preponderance in cases of penetrating injury to the abdomen. This may be because males are more commonly involved in the criminal activities and inter-personal conflict. Out of 60 cases, we found 55 cases to be male and the rest 5 to be female. Hence the male female ratio in the present study comes out to be 11:1.

Table 3- Sex Distribution

Sex	Number of Cases	Percentage
Male	55	91.67
Female	05	8.33

It is found in this series that a total of 22 cases (36.67%) out of 60 cases had one or more associated injuries along with abdominal injuries.

Table 4- Associated Injuries

Associated Injury	Number of Cases	Percentage
Head Injury	06	10
Soft Tissue Injury	09	15
Chest Injury	02	3.33
Skeletal Injury	05	8.33
Total	22	36.67

It is found that most commonly the penetrating abdominal injuries are due to homicidal stab or gunshot injury followed by accidental injuries. The criminal status of penetrating abdominal injury is as follows:

Table 5- Criminal Status Of The Wound

Criminal Status	Case	Percentage
Homicide	49 cases	81.67%
Accidental	9 cases	15%
Suicidal	2 cases	3.33%

It is very crucial to know the time interval between the injury and admission as it directly affects the outcome of the patient. In the present study most of the patients were found to attend the medical facility as early as within 6 hours.

Table 6- Time Interval Between Injury And Admission

Time Interval	Number of Cases	Percentage
< 6 hr	42	70 %
6-12 hr	2	3.33 %
12-24 hr	3	5.0 %
24-48 hr	3	5.0 %
> 48 hr	1	1.67 %

The patients with penetrating abdominal injury presented with various symptoms. However moderate to severe pain were observed in almost all the cases. Abdominal distension was present as presenting symptoms in some cases and vomiting in others. Few cases had bleeding from the wound.

Table 7- Mode Of Presentation

Serial Number	Symptom	Cases	Percentage
1	Pain	52	86.67
2	Vomiting	20	33.33
3	External Bleeding	12	20.0
4	Abdominal Distension	30	50.0
5	Evisceration	13	21.67

All the patients of penetrating abdominal injury after initial resuscitative measures were taken through radiological investigations like Plain x-ray of the chest and abdomen and ultrasonography of the abdomen. No CT scan was done in this series. 6 patients did not undergo radiological investigation because of the poor general condition and/or obvious indication for surgery. The following are the different results of investigations found in the present study. Straight X Ray

abdomen was performed in majority of abdominal trauma patients and following findings were noted:

Table 8: X-ray Finding In Penetrating Abdominal Injury

Serial Number	X Ray Finding	Cases	Percentage
1	Normal	31	51.67
2	Free Gas under Diaphragm	22	36.67
3	Dilated Bowel Loop	12	20.0
4	Generalised Haziness	09	15.0
5	Obliterated psoas shadow	02	3.33

Focused assessment with sonography for trauma (FAST) was used for almost all the cases on arrival in the casualty department. FAST was found to be very effective in diagnosing the solid organ injury whereas its effectiveness in detecting hollow viscus injury was found doubtful especially in cases presenting early.

Table 9- USG Finding in Penetrating Abdominal Trauma

Organ Involved	Number of Cases
Splenic Injury	2
Liver Injury	5
Renal Injury	2
Pancreatic Injury	1
Hollow viscus Injury	34
Free Fluid in abdomen	52

Diagnostic peritoneal tapping was performed in 34 cases with inconclusive findings. But the positive results were of definite help in making the diagnosis. A tapping of non-clotting blood, bile stained fluid, fluid stained with faecal matter were considered as positive tapping.

Table 10- Finding Of Peritoneal Tapping

Serial Number	Finding	Cases	Percentage
1	Non clotting blood	13	38.24
2	Bile Stained fluid	04	11.76
3	Fluid with faecal matter	02	5.88
4	Negative	15	44.12

The selective approach for the management of penetrating trauma had been used. However, in majority of the patients with penetrating abdominal trauma underwent some kind of surgical intervention (96.67%), conservative treatment was followed in only two patients (3.33 %).

Penetrating injury may involve any viscera in the abdomen to varying extent. In this series, it is found that the small intestine is the most commonly involved viscera followed by colon, omentum and mesentery and liver in decreasing order. The following table shows the frequency of organ involvement.

Table 11- Frequency Of Organ Involved

Organ Involved	Number of Cases	Percentage
Small Intestine	27	45
Colon	14	23.33
Mesentery	06	10
Omentum	06	10
Liver	05	8.33
Rectum	03	5
Stomach	03	5
Diaphragm	03	5
Urinary Bladder	02	3.33
Spleen	01	1.67
Pancreas	01	1.67
Gall Bladder	01	1.67
Bile Duct	01	1.67
Retroperitoneal Haematoma	04	6.67

Different complications were developed following penetrating injury and after its management. Complications varied from minor cough and fever to major life threatening septic complications. Overall wound infection being most common.

Table 12- Post Operative Complications

Serial Number	Complication	Number of Cases	Percentage
1	Wound Infection	16	26.67
2	Chest Complication	05	8.33
3	Shock	02	3.33
4	Intra Peritoneal Abscess	03	5.0

All the 60 cases of penetrating abdominal injury in this series were treated as indoor patients. The shortest duration of hospital stay was 4 days whereas the longest duration of hospital stay was 43 days. The average hospital stay was 6 to 15 days. It is observed that associated injuries and multiple organ injuries increased the hospital stay.

Table 13- Duration Of Hospital Stay

Time Span	Number of Patients	Percentage
0 to 5 Days	3	5.0
6 to 10 Days	16	26.67
11 to 15 Days	15	25
16 to 20 Days	09	15
21 to 25 Days	07	11.67
26 to 30 Days	03	5.0
More Than 30 Days	07	11.67

DISCUSSION-

The present study comprise of a clinical study of 60 cases of penetrating abdominal injuries admitted and treated in Owaisi Group of Hospitals & Princess ESRA Hospital of DCMS from 1st July 2016 to 30th June 2017. Available literatures on this subject were reviewed. Penetrating abdominal trauma is a commonly encountered problem in surgical practice.⁶ So, every effort was made to study these trauma patients so that appropriate steps can be taken to save the life of the trauma patients in this part of the country. The incidence of penetrating abdominal injury was found to be 2.95% of the total admissions and 6.99% out of the total trauma patients admitted in the Department of Surgery, whereas in western data shows a higher trend around 35% out of total admission cases.⁷ Out of the abdominal trauma cases, penetrating injury accounted for 36.99% of the cases. In this series a male preponderance was found which is consistent with Lone *et al.*'s report with male to female ratio of 11:1.⁸ This may be because males are more commonly involved in the criminal activities and interpersonal conflict.³ Regarding the age of the patients, the commonest age group for penetrating abdominal trauma in this series was found to be 20 to 30 years.⁹ However, cases as young as 13 years and as old as 70 years have also been found. The major cause of penetrating abdominal injury was homicide (81.67%).¹¹ Accidental trauma was encountered for 15% and suicidal were in 8% cases. The most frequent mode of injury in this series was stabbing (56.67%)¹⁰ followed by gunshot injury (18.33%), fall over sharp objects (11.67%) and splinter 77 injury (6.67%) in decreasing order. 6.67% of the cases had other modes of injury like road traffic injury and rhino horn as well as bull horn injury. The time interval between injury and hospitalization was 30 minutes to 50 hours. Maximum number of patients (60%) reported within 6 hours of injury. The different modes of presentations in this series includes pain abdomen (86.67%), fullness of abdomen (50%), vomiting (33.33%), evisceration (21.67%), external bleeding (20%), and symptoms of Shock (13.33%). Associated extra-abdominal injuries were present in 22 cases (36.67%), head injury and soft tissue injury being the commonest. Regarding investigation findings, 48.33% showed positive findings in x-ray, 71.67% had positive ultrasound findings whereas only 31.67% had a positive peritoneal tapping.^(12,13) Resuscitation measures were taken in all the cases and aggressive resuscitation required in 8 cases (13.33%). 96.67% patients required operative intervention and only 2 cases were opted for conservative management one of which didn't respond to conservative treatment and ultimately had to be operated.^(14,15) In this series the time interval from admission to surgery is 30 minutes to 63 hours and the maximum number (85%) of surgeries was done within 6 hours from the time of admission. Both the clinical findings and investigations were most indicative for exploratory laparotomy. Indications for laparotomy as identified in this series were peritonitis, absent bowel sound, ultrasound findings, pneumoperitoneum in x-ray and organ evisceration. The most commonly injured intra-abdominal organ was the small intestine (45%) followed by large intestine (23.33%), mesentery (10%), omentum (10%), liver (8.33%), stomach (5%) and rectum (5%) in decreasing order.¹⁶ Retroperitoneal hematoma was present in 4 cases. Diaphragm, urinary bladder, spleen, pancreas,

gallbladder and common bile duct were the least commonly involved organs. In 2 cases (3.33%) no intraperitoneal injuries were found. The most common complication in this series was wound infection (26.67%) followed by chest infection (8.33%), intra-abdominal abscess (5%) and shock (3.33%).¹⁷ The average hospital stay was 6 to 15 days. The shortest duration of hospital stay was 4 days whereas the longest duration of hospital stay was 43 days. The mortality in this series was 3.33%. 2 cases died, one due to respiratory failure and another due to septicemia and shock. Rapid transportation, early diagnosis, proper method of resuscitation and treatment helped in reducing the mortality rate and complications in penetrating abdominal injuries.

CONCLUSION-

Penetrating trauma can be serious because it can damage internal organs and presents a risk of shock and infection. In the present year, due to overall improvement in the communication and transportation, better monitoring systems and resuscitative measures, improvised diagnostic methods, better availability of blood and blood products, better medications and more skillful surgical techniques, the outcomes of these injuries are improving.⁷

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