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**Original Research Article**

# A profile of 96 cases of penetrating injury of abdomen

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## ABSTRACT

**Background:** Trauma is a major health problem. Among various modes of trauma, penetrating trauma necessitates for immediate surgical intervention in most of the cases. Most commonly penetrating injuries in civilian group involves younger healthy population, who most productive and are very much responsible for the progress of the society and the country.
**Methods:** This is a prospective study of 96 cases of penetrating injury to abdomen admitted to Gandhi Hospital, Secunderabad during the period August 2011 to September 2013. All the patients with history of penetrating abdominal trauma requiring admission during the study period are included in this study. All cases were evaluated for abdominal organ injury due to penetrating trauma by clinical and radiological criteria all cases were evaluated for abdominal organ injury due to stab. All the patients with peritoneal, evisceration, signs of peritonitis, shock underwent laparotomy.
**Results:** 81 cases (84.3%) had significant abdominal injury requiring laparotomy. The criteria for laparotomy were evisceration (20.8%), shock (8.3%) and peritonitis (50%). Mere peritoneal penetration (83%) is a poor indicator of emergency laparotomy in stab injury. Erect X-ray abdomen is an unreliable criterion for laparotomy in presence of other signs.
**Conclusions:** Majority of the patients required operative intervention particularly those with hemodynamic instability, generalized peritonitis, evisceration of omentum and bowel, and continuing haemorrhage. Peritoneal penetration as such is a poor indication of significant organ injury; hence it requires direct organ specific evaluation, such as computed tomography or laparoscopy to identify patients who can be safely treated without operations.

**Keywords:** Abdominal injuries, Laparotomy, Trauma

## INTRODUCTION

Trauma is a major health problem in every country irrespective of the level of socio-economic advancement. Mortality rate was very high in abdominal penetrating injuries.[1] Among various modes of trauma, penetrating trauma requires an immediate surgical intervention in most of the cases. Most commonly penetrating injuries in civilian group involves younger healthy population, who are very much responsible for the development of the society. Since most of the deaths in penetrating injuries occur within minutes to hours, hence form an important part of surgical emergencies.[2]

Abdomen is the third most frequently involved region in penetrating trauma requiring intervention in 25% of civilian cases.[3] These penetrating injuries are frequent in urban areas and are classified into stab wounds and gunshot wounds which require different modes of treatment. In order to minimize the mortality rates in case of abdominal injuries, there is a need to study and identify the risk factors.[3,4]

The present study was aimed at analyzing the incidents, clinical characteristics, indications for laparotomy, therapeutic methods and the morbidity and mortality rates.

The following were the objectives of the study.

- To study indications for emergency laparotomy in penetrating abdominal injuries
- To study the etiology, extent of organ involvement in the penetrating injury and organ most commonly involved
- To assess the patient for surgical intervention and avoid negative laparotomy
- To know the morbidity rate, due to involvement of different organs
- To know the cause of death and evolve better management
- To study complications encountered in penetrating abdominal injuries and their management.

## METHODS

This was a prospective study comprising of 96 cases with penetrating injuries to abdomen. All the patients with history of penetrating abdominal trauma admitted to Gandhi Hospital during the period August 2011 to September 2013 were included in the study. Demographic data of the patients including age, sex, occupation and nature and time of the event leading to the injury were collected.

Entire documentation of the patients, which included identification, history, clinical findings, diagnostic test, operative findings, operative procedure, complications during the stay in the hospital and during the subsequent follow-up period were all recorded on a specially prepared proforma. After initial resuscitation and achieving hemodynamic stability, all patients were subjected to careful clinical examination. Depending on the clinical findings decision for further investigations such as four quadrant aspirations, local wound exploration, X-ray abdomen, and ultra sound. The decision for operative or non-operative management depended on the outcome of clinical examination and results or diagnostic tests.

Patients selected for non-operative or conservative management were placed on strict bed-rest were subjected to serial clinical examination which included hourly pulse rate, blood pressure, respiratory rate, and repeated examination of abdomen and other systems. Appropriate diagnostic test especially ultrasound of abdomen and CT scan of abdomen was repeated as and when required. Apart from routine investigations abdomen X-ray was done in most of cases. Patients underwent four quadrant aspirations. Aspiration of blood which did not clot was taken as positive. When the aspirates clotted the test was taken as negative.

### *Statistical analysis*

All the data were entered and analyzed using Microsoft excel, SPSS version 11.0 and Systat 8.0. The results were presented in terms of mean and percentages.

## RESULTS

In this study, abdominal trauma was present in 96 cases. Out of them 83 cases were males and 13 cases were females. Most of the patients (48%) were under the age group of 21-30 years. Accidental stab injuries and self-inflicted stab injuries were found to be the major causes of abdominal traumas in 21.8% and 22.9% patients respectively (Table 1).

**Table 1: Socio-demographic characteristics of the study participants.**

| Characteristics | Number of patients (n =96) | Percentage (%) |
|---|---|---|
| **Age in years** | | |
| 11-20 | 8 | 8.4 |
| 21-30 | 46 | 48 |
| 31-40 | 24 | 25 |
| 41-50 | 11 | 11.4 |
| 51-60 | 6 | 6.2 |
| 61-70 | 1 | 1 |
| **Gender** | | |
| Male | 83 | 86.4 |
| Female | 13 | 13.6 |
| **Mode of penetrating injury** | | |
| Homicidal stab injury | 49 | 51.2 |
| Bull gore injury | 4 | 4.1 |
| Self-inflicted stab injury | 21 | 21.8 |
| Accidental stab injury | 22 | 22.9 |
| Gun-shot injuries | 0 | 0 |

All the patients with penetrating abdominal injuries underwent local wound exploration for the detection of peritoneal penetration. Wounds with evisceration of omentum and/or bowel were considered as positive peritoneal penetration that was observed in 81 patients as depicted in Table 2.

**Table 2: Local wound exploration.**

| Peritoneal penetration | Number of patients | Percentage |
|---|---|---|
| Present | 81 | 84.375 |
| Absent | 15 | 15.625 |
| Total | 96 | 100 |

**Table 3: Indications for laparotomy in penetrating abdominal trauma.**

| Indications | Number of patients | Percentage |
|---|---|---|
| Peritoneal penetration of LWE | 80 | 83 |
| Generalized tenderness | 48 | 50 |
| Omental and/or bowel Evisceration | 20 | 20.8 |
| Hemodynamic instability | 8 | 8.3 |

All the 81 patients with peritoneal penetration underwent laparotomy. Omental with or without bowel evisceration was present in 20.8% of cases. Generalized tenderness was present in 48 cases (50%), hemodynamic instability in 8.3% of cases (Table 3).

**Table 4: Plain abdominal roentgenogram findings.**

| X-ray | Number of patients | Percentage |
|---|---|---|
| Normal | 53 | 55.2 |
| Abnormal | 23 | 23.9 |
| Not done | 20 | 20.9 |
| Total | 96 | 100 |

Table 4 presents the plain X-ray abdomen findings in 96 cases. X-ray findings were normal in 553 cases. Abnormal findings such as gas under diaphragm. generalized ileus, ground glass appearance, soft tissue abnormalities were noted in 23 cases. X-ray was not taken in 20 cases.

**Table 5: Ratio of operative to conservative treatment.**

| Procedure | Number of patients | Percentage |
|---|---|---|
| **Operated** | 81 | 84.4 |
| • Therapeutic | 65 | 80.2 |
| • Negative | 16 | 19.8 |
| **Conservative** | 15 | 15.6 |

After a detailed clinical evaluation and suitable investigation, 81 patients with peritoneal penetration underwent exploratory laparotomy. Of the 81 patients, 65 had therapeutic laparotomy and 16 had negative laparotomy. Remaining 15 patients selected for non-operative management (Table 5).

**Table 6: Organs injured in patients with penetrating abdominal trauma.**

| Organ | Number of patients (n =81) | Percentage (%) | Description |
|---|---|---|---|
| **Therapeutic laparotomy** | | | |
| Small bowel | 34 | 38.2 | Transmural /partial thickness |
| Stomach | 10 | 11.11 | Transmural |
| Liver | 6 | 7.4 | Bleeding controlled by abgel/gelfoam/suture |
| Colon | 6 | 7.4 | Transmural/ serosal tear |
| Spleen | 3 | 3.7 | Splenectomy |
| Mesentery or mesocolon | 10 | 12.3 | Ligation of bleeding sites. |
| Diaphragm | 4 | 4.9 | Full thickness |
| Omentum | 3 | 3.7 | Ligation of bleeding site. |
| **Negative laparotomy** | | | |
| Inferior epigastric artery | 4 | 25 | Non-expanding haematoma |
| No visceral injury | 12 | 75 | - |

Table 6 presents the organs injured in patients with penetrating abdominal trauma who underwent therapeutic and negative laparotomy. The most common associated injuries in therapeutic laparotomy underwent cases were small bowel injuries (38.2%) followed by injuries in stomach (11.11%). Inferior epigastric artery injury was observed in 4 (25%) cases that underwent negative laparotomy.

The following Table 7 shows the various operative procedures carried out on 65 patients who underwent therapeutic laparotomy. Grade I and II liver injuries were treated by hepatorrhaphy with chromic catgut along with gelfoam packing done in all the cases. Grade I and II spleenic injuries treated by splenectomy, abgel application over hilar region of spleen. Gastric perforations are closed by simple closure of perforation. Small bowel perforations were usually treated by simple suturing and closure of perforation, resection and end to end anastomosis. Mesenteric injuries were treated by simple suturing and ligating the bleeding points. Colonic injuries were treated with a temporary loop colostomy and primary closure.

**Table 7: Operating procedure.**

| Procedure | Number of patients |
|---|---|
| Closure of bowel perforation and end to end anastomosis | 40 |
| Repair of mesentery | 10 |
| Splenectomy | 2 |
| Splenorrhaphy | 1 |
| Hepatorrhaphy and Abgel application | 6 |
| Colostomy | 1 |
| Gastric perforation repair | 10 |
| Diaphragmatic repair | 4 |

The postoperative complications were observed in 20 patients. 8 (40%) patients had respiratory complaints followed by wound infections in 6 (30%) patients (Table 8).

**Table 8: Postoperative complications.**

| Complications | Number of patients | Percentage |
|---|---|---|
| Wound dehiscence | 2 | 10 |
| Wound infection | 6 | 30 |
| Fecal fistula | 1 | 5 |
| Respiratory complication | 8 | 40 |
| Intra-abdominal sepsis | 3 | 15 |
| Total | 20 | 100 |

The duration of hospital stay ranged from 1-29 days with an average of 8 days (Table 9). Mortality was noted in 5 (5.2%) patients. Remaining 91 patients were survived (Figure 1).

**Table 9: Duration of hospital stay of patients.**

| Number of days | Number of patients |
|---|---|
| 1-10 | 48 |
| 11-20 | 26 |
| 21-30 | 10 |
| 31-40 | 7 |

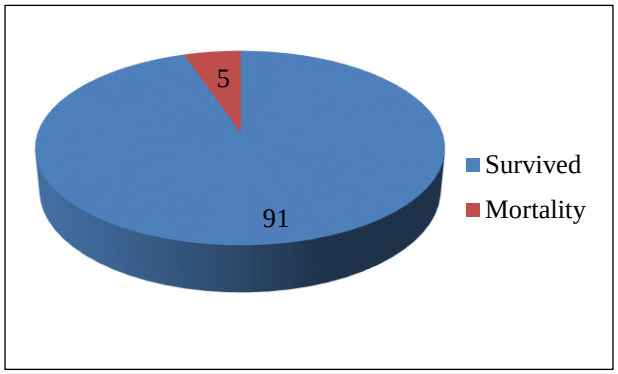


**Figure 1: Mortality and survival rates.**

## DISCUSSION

In the present study, majority of patients belonged to the 21-30 years age group followed by those in 31-40 age groups. Similar incidence of age group was observed in a study conducted by Nagy et al in which majority of the patients with penetrating trauma were under 20-35 years.[5] Therefore young and productive age group persons are the usual victims of penetrating trauma. Males were affected more compared to females. This observation is in accordance with the studies of Ahmadi Amoli et al and Yousefzadeh et al.[6,7]

Previous studies reported that most abdominal injuries were due to stabbing (47.4%).[8] In present study series, the most common cause for penetrating injuries to abdomen was homicidal stab injuries 49 (51.2%) followed by accidental 22 (22.9%) and suicidal 21 (21.9%). In other studies of Lone et al and Baradaran et al gunshot wounds were the most common (77.65%) reported cause. This difference was because the reference study was carried out in an urban centre and possession of guns and fire arms was common in their study population.[9,10]

In the present study, peritoneal penetration was noted in 83% cases of stab injuries to abdomen. Leppaniemi et al in his study, peritoneal penetration was observed in 72% cases.[11] Generalized peritonitis and hemodynamic instability was present in 50% and 8% of cases in the present study. Where as in the study of Nagy et al generalized peritonitis was seen in 12% and shock in 9% of cases respectively.[5]

In the present study, 84.3% of cases of penetrating abdominal injury underwent exploratory laparotomy and 15.7% cases underwent conservative treatment. Of them therapeutic laparotomy was done in 80% of cases and for remaining 20% cases negative laparotomy was done. These findings were almost similar with the studies of Nagy et al in which therapeutic laparotomy was done in 78% cases and negative laparotomy in 22% cases.[5]

In the present study, roentgenogram was abnormal in 24% of cases which doesn't correlates well with Kester et al where roentgenograms were abnormal in 8% of cases.[12] This little difference was due to more number of bowel perforations in our study. This shows that abdominal roentgenogram was unreliable in the diagnosis of penetrating abdominal trauma.

Liver and spleen injuries were more frequent in patients with penetrating abdominal trauma. Similar results were showed by Smith et al. and Isenhour et al.[13,14] On contrary, small bowel (38.2%) and stomach (11%) injuries were the commonest organs to be injured in our series.

In the present study, respiratory complication is the most frequent complication postoperatively accounting up to 28%, second most being intra- abdominal sepsis, wound infection and wound dehiscence accounting for 21.3% of them occurred in those with colonic and small bowel injury. This is in correlation with Ivatury RR et al.[15] In Croce intra-abdominal sepsis developed in 5 to 20% of cases after penetrating stomach and small bowel injury.[16]

In the present study, the duration of stay of patients in the hospital ranged from 1-29 days with an average of 8 days. These observations were consistent with the studies of Leppaniemi et al in which the duration of stay ranged from l-38 days with an average of 6 days.[11]

Rate of mortality in this study was 5.2%. It was 4.3% in the study of Hemmati et al.[17] Other investigators have

reported that mortality rate due to penetrating injuries was 8.2%.[9]

## CONCLUSION

Penetrating abdominal injuries are the surgical emergencies involving young males in the age of 21-30 years. Stab injuries accounts for major types of penetrating abdominal trauma. Indication of laparatomy was peritoneal violation, generalized tenderness, omental and/or bowel evisceration and hemodynamic instability. Small bowel and stomach are the most commonly involved organs during abdominal injuries. Respiratory problems were the common post-operative complications noted in this study. The mortality rate was 5.2%. Increased efforts for early treatment of the patients are likely to reduce the mortality rate in patients with abdominal trauma.

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