

PENETRATING INJURY ABDOMEN: A STUDY AT GOVERNMENT GENERAL HOSPITAL

A. Ravi Kamal Kumar¹, S. V. P. L. Chandrakumar², A. Vijayalaxmi³, B. Anja Naik⁴, K. Y. N. Bharat⁵, Jaheer Abbas⁶

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ABSTRACT: Penetrating injuries to the abdomen form an important chunk of surgical problems confronting the trauma surgeon. These injuries usually affect young healthy individuals in the society. Previously all abdominal penetrating injuries used to be subjected to laparotomy. But it was found that there were more number of negative (non-therapeutic) laparotomies if this principle is followed. Shaftan in 1960 questioned the rationale of mandatory laparotomy in all cases of penetrating abdominal injuries, hence the laparotomy rates have fallen since then and a more selective approach is now followed depending on the clinical examination and investigations. A clinical study was conducted at Govt. General Hospital to study the modes of injury, epidemiology, evaluate the indications for emergency laparotomy in these cases and also to study the mortality and morbidity of abdominal penetrating injuries. 41 cases of penetrating injuries of abdomen were admitted in the emergency department in a 2 year period at Govt. General Hospital. These cases after initial resuscitation were subjected to clinical examination followed by Local wound exploration, U/S of abdomen, CT scan of abdomen. The indications for immediate laparotomy were evisceration of bowel and/ or omentum, hemodynamic instability, hemoperitoneum. The remaining cases were kept under observation with serial abdominal and physical examinations and other investigations as necessary. They were taken up for laparotomy as and when necessary depending on the physical examination. Penetrating injury abdomen is most common in young males in the age group of 20-30 years. Abdominal stab injuries mostly homicidal are common in this parts of India. Local wound exploration under local anaesthesia can be used as an initial triage tool in the emergency department. But peritoneal penetration as such is a poor indicator of significant organ injury. Serial physical and abdominal examinations form an important tool which can tell the surgeon the need for laparotomy which is coupled with other investigations like U/S and CT scan. Small bowel and liver are the most common organs involved. Wound infections are the commonest postoperative complications. Mortality is zero in this study as all cases are due to low velocity stabs. No gun shot injuries were reported in this study hence zero mortality.

KEYWORDS: Penetrating injury abdomen, local wound exploration, exploratory laparotomy.

INTRODUCTION: 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 civilians involve younger healthy population, who are very much responsible for the progress of the society. Since most of the deaths in penetrating injuries occur within minutes to hours, hence form an important part of surgical emergencies.

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Abdomen is the most commonly involved part in penetrating injuries. Its anatomical location makes it unprotected and most susceptible for penetrating injuries either homicidal or accidental. Penetrating injuries can be homicidal / accidental for which exploratory laparotomy is done. Because of increased rates of negative laparotomies selective management was suggested by various studies like that of Shaftan et al.¹ (1960).

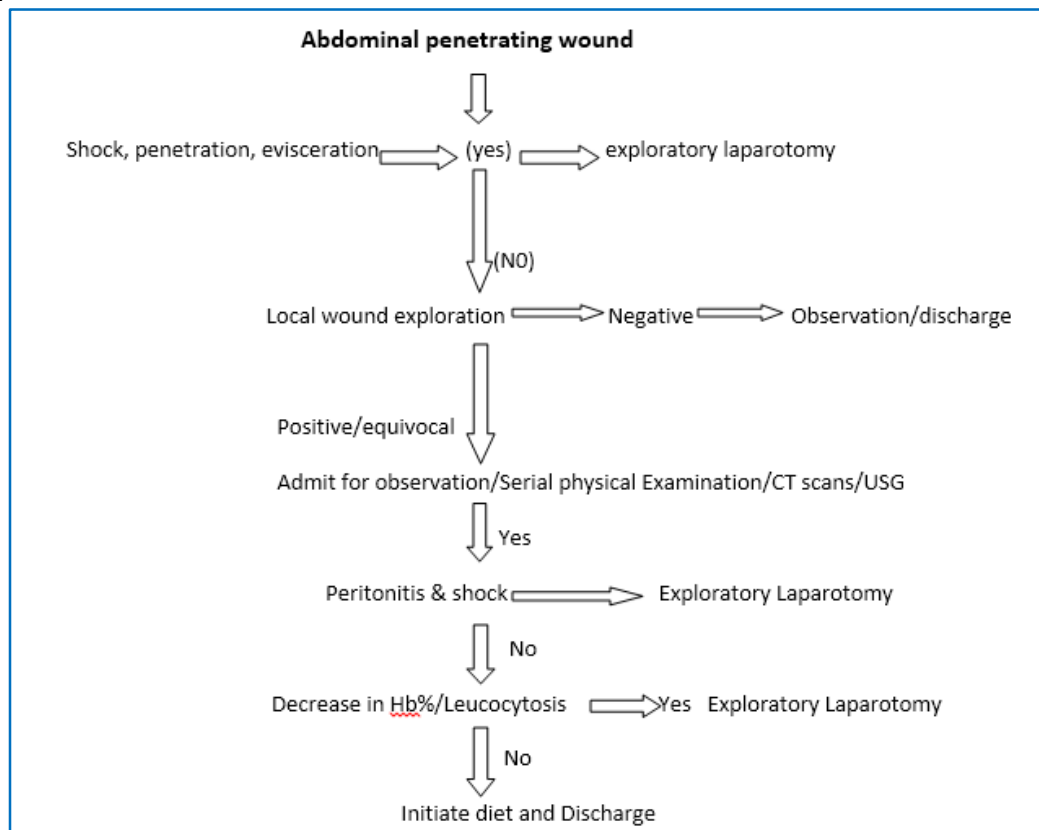
This study was done to evaluate the various modes of injuries, indications for emergency laparotomy and morbidity/mortality in penetrating abdominal injuries.

MATERIALS AND METHODS: This study is a prospective study of 41 cases penetrating injuries to abdomen admitted at Govt. General Hospital, Guntur, during the period of August 2010 to September 2012. All the patients with a history of penetrating injury to abdomen were included. Different modes of penetrating injury were taken into consideration. Documentation of patients included identification, history, clinical findings, diagnostic tests, operative findings, operative procedures, complications during the stay in hospital and subsequent follow-up were all recorded.

Demographic data collected included age, sex, occupation and nature of event leading to injury. The decision for operative or non-operative management depended on clinical examinations and results of diagnostic tests.

In general the following algorithm was followed for the evaluation and management of abdominal stab injuries in the present study.²

ALGORITHM FOR EVALUATION AND MANAGEMENT OF PENETRATING ABDOMEN INJURY



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Out of 41 cases in the present study 12 cases were found to have evisceration of omentum and 6 cases evisceration of omentum with bowel. Hence those 18 cases were taken up for laparotomy upfront. Rest of 23 cases was subjected to local wound exploration (LWE) under local anaesthesia. No peritoneal penetration was found in two cases on LWE. Hence they were discharged after appropriate wound care. Rest of 21 cases were admitted and subjected to serial physical examinations, U/S of abdomen, CT scan of abdomen with contrast. Four of these cases were found to be stable at the end of observation period and were initiated with diet and discharged. Rest of 17 cases was subjected to laparotomy. Out of these two cases were negative laparotomies and 15 cases had therapeutic laparotomies.

OBSERVATIONS AND RESULTS: The 41 patients taken into study were divided into 5 groups based on age i.e., 10-20yrs, 21-30yrs, 31-40yrs, 41-50yrs and 51-60 yrs. of which highest rate of admission was seen in 21-30yrs age group followed by 31-40yrs age group. It was like 41% of patients belonged to 21-30yrs age group, which is attributed to high activity of this group in society. In the present study 35 cases were male and 6 cases were female. Homicidal stab injury was the commonest mode of penetrating injury followed by bull gore injury.

Nature of trauma	No. of cases	percentage
Homicidal stab	34	83
Bull gore	2	5
Self-inflicted	1	2
Gunshots	0	0
Others (sharp objects, arrow, RTA)	4	10
Total	41	100

Table 1: Showing various modes of penetrating trauma

Peritoneal breach was present in 35 patients i.e., 78% of cases. Evisceration of omentum was seen in 12 patients while bowel with or without omentum was seen in 6 patients. 23 cases of penetrating abdominal injuries, underwent x-ray erect abdomen, of which abnormal findings like gas under diaphragm, generalized ileus, ground glass appearance, soft tissue abnormalities were noted in 7 cases only.

Organs involved in patients with penetrating injuries abdomen and management is depicted in the following table. More than one organ may be involved in each case.

Organs involved	No. of patients	Percentage	Description
Small bowel	14	45	Transmural/partial thickness Involvement
Stomach	2	6.5	Transmural
Liver	4	13	Bleeding controlled by abgel/suture
Colon/rectum	2	6.5	Transmural/serosal tears

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Spleen	1	3	Splenectomised
Mesentery/mesocolon	3	10	Ligature of bleeding sites
Diaphragm	1	3	Full thickness penetration
Omentum	4	13	Ligature of bleeding sites

Table 2

The following table shows the various operative procedures carried out on the patients in the study.

Procedure	Number of patients
Closure of bowel perforation (Some of the cases associated with mesentery injury)	13
Resection and anastomosis	1
Repair of mesentery	9
Splenectomy	1
Hepatorrhaphy/ gelfoam packing	4
Colostomy / ileostomy	1
Colon repair	1
Gastric perforation repair	2
Diaphragmatic repair	1
Negative laparotomy	2

Table 3

Morbidity and mortality was also assessed in the current study. The following postoperative complications were noted in the present study.

Complications	Number of patients (In operated cases)	Percentage
Wound dehiscence	2	6
Wound infection	5	14
Faecal fistula	0	0
Respiratory complication	4	11.5
Intra-abdominal sepsis (Pelvic abscess)	2	6

Table 4

The duration of stay in the hospital ranged from 1-29 days with an average of 8 days. Mortality was nil in the current study.

DISCUSSION: In the present study majority of patients belonged to 21-30yrs age group followed by those of 31-40yrs age. In Nance FC et al.³ (1974) study people of 21-30 yrs. were

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commonly affected. In Nagy et al.⁴ (1999) age group commonly inflicted was 20-35yrs age. Therefore young and productive age group persons are the usual victims of penetrating injury to abdomen. Taking up the sex incidence 85% cases comprised male population. In Nance FC et al.³ (1974) males comprised of 85%. In Leppaniemi AK et al.⁵ (1999) 87% of cases were males. In Nagy et al.⁴ (1999) 88% of cases were males.

In the present study, stab injuries to abdomen accounted the most common cause of penetrating injuries to abdomen i.e., 83%, followed by injuries due to sharp objects and bull gore. There was no gunshot injury in the current study, as in India strict laws are in force for acquisition of firearms. In Nance FC et al.² (1974) stab injury accounted to 53% while rest were due to gunshot injury 47%. This difference was because the reference study was carried out in an urban centre and possession of guns and firearms was common in that country.

In our study peritoneal penetration was noted in 51% of penetrating injuries (apart from eviscerations). This correlates well with Nance FC et al.³ (1974) where peritoneal penetration was noted in 82% cases. In Leppaniemi AK et al.⁵ (1999) peritoneal penetration was in 72% of cases.

Coming to management aspect, this study showed that 85% of cases underwent exploratory laparotomy while that in Leppaniemi AK et al.⁵(1999) the number of operated cases were 68% and in Nance FC et al.³ (1974) it was 75%. Moreover in our study laparotomy was therapeutic in 80% of cases and negative in 15% of cases while in Nance FC et al.² (1974) study, in 78% it was therapeutic. In Nagy et al.³ (1999) 78% cases required therapeutic laparotomy.

The role of roentgenograms was also studied which shows 30% of abnormal roentgenograms while it is 8% in Kester et al.⁶ (1986) implying that abdominal roentgenograms are unreliable in diagnosis of penetrating injuries. This discrepancy is due high incidence of bowel injuries in our study.

Table showing the results of local wound exploration:

Peritoneal Penetration on LWE	Positive exploratory Laparotomy and procedure	Negative Laparotomy/conservative
Present	15	6(2+4)
Absent	0	2

Table 5

Significance of peritoneal penetration on LWE- as per the above data the positive predictive value is 0.71 which correlated well with leppanemi AK et al.^[5] where the positive predictive value of LWE was 0.6. Negative predictive value is 1 in both the studies.

Coming to the commonest organs involved in penetrating injury to abdomen the results were depicted in comparison to various studies in the following table.

Organs involved	Present study	Leppaniemi et al	Nance fc et al
Small bowel	45%	15%	29%
Liver	13%	22%	30%

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Stomach	6.5%	8%	13%
Colon/rectum	6.5%	9%	6%
Spleen	3%	4%	4%
Mesentry/mesocolon	23%	14%	8%
Diaphragm	3%	11%	---
Biliary system	---	2%	2%

Table 6

Hollow viscus organs are most frequently injured in patients of penetrating trauma to abdomen. In Nance FC et al.³ (1974) study liver and small bowel are the commonest organs involved and our study also shows similar findings. The other series of studies [Lowe RJ et al.⁷ (1980), Dawidson et al.⁸ (1976), Feliciano DV et al.⁹ (1988)] gunshot wounds to abdomen commonly cause injury to small bowel, colon and liver.

Incidence of evisceration of omentum /bowels was of 67% which correlated well with Nagy K et al.^[4](1999) where 75% cases had omental protrusion. And it was also observed that those with omental evisceration along with bowel had commonly associated internal injuries than with that of omentum evisceration alone.

In this current study wound infection is the most frequent complication post operatively, second most common being respiratory tract complication, abdominal sepsis and wound dehiscence occurred in those with colonic and small bowel injuries. This is in correlation with Ivatury RR et al.¹⁰ where 17% of colonic trauma cases developed intra-abdominal sepsis.

In the present study the duration of hospital stay ranged from 3-30 days average 8 days. In Leppanienei AK et al.^[5] the duration of stay ranged from 1-38 days with an average of 6 days.

There was no mortality in the present study because all are due to low velocity stab wounds. Gunshot wounds are associated with 8 times greater mortality than stab wounds of abdomen.¹¹ this is likely to be due to the lower kinetic energy of stab wounds compared to gunshot wounds.

CONCLUSION: Penetrating injury abdomen is a common surgical emergency, involving young males in the age groups of 20-30 usually belonging to lower socioeconomic status. Careful and repeated clinical examinations and appropriate diagnostic test leads to successful management. Indications of laparotomy are haemodynamic instability, generalized peritonitis, and peritoneal penetration, evisceration of omentum alone or along with bowel and pneumo or haemo peritoneum. Abdominal roentgenograms are unreliable. Peritoneal penetration as such is a poor indicator of significant organ injury and requires serial abdominal examinations, CT/US to identify patients who can be safely treated without operation. Small bowel and liver are the most commonly involved organs. Wound infections are the commonest post-operative complications followed by respiratory infection, intra-abdominal sepsis. Post-operative complication in hollow viscus injury is more compared to solid organ injury.

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AUTHORS:

1. A. Ravi Kamal Kumar
2. S. V. P. L. Chandrakumar
3. A. Vijayalaxmi
4. B. Anja Naik
5. K. Y. N. Bharat
6. Jaheer Abbas

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of General Surgery, Guntur Medical College.
2. Assistant Professor, Department of General Surgery, Guntur Medical College.
3. Assistant Professor, Department of General Surgery, Guntur Medical College.
4. Senior Resident, Department of General Surgery, Guntur Medical College.

5. Junior Resident, Department of General Surgery, Guntur Medical College.
6. Senior Resident, Department of General Surgery, Guntur Medical College.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. A. Ravi Kamal Kumar,
Flat No. 10, garudadri Towers,
Beside HP Gas Godown,
Guntur-522006.
E-mail: ravikka2@gmail.com

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