



## Prospective Study of Penetrating Abdominal Injuries

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### ABSTRACT

**Background:** *The incidence of penetrating abdominal injuries is increasing in modern civilian era.*

**Objective:** *To determine the types of penetrating abdominal injuries & outcome of management.*

**Method:** *Relevant details of patients treated with penetrating abdominal injuries were recorded 7 analysed.*

**Result:** *there were 25 patients of PAI, mostly male. Male & female ratio was 21:4. The age ranged from 8 years to 60 years. The peak age of patients was third & second decade. Causes of various penetrating injuries were – Stab wounds- 15 (60%), GSW-3 (12%), Cow horn injury-2 (8%), RTA-1 (4%), Glass injury- 1 (4%), Cracker explosion- 1 (4%), Blast injury-1 (4%) & Unknown (stick)- 1 (4%). Three patients were managed conservatively. 22 patients had laparotomies. Various organ injuries observed in 25 patients were: Stomach-7 (28%), Mesentery-7 (28%), Small intestines- 6 (24%), Liver- 5 (20%), Colon-3 (12%) & Abdominal wall-2 (8%). Rare injuries were: Gall bladder-1 (4%), Spleen- 1 (4%) & Diaphragm- 1 (4%). Evisceration of intestines in 5 patients (20%) & Evisceration of Omentum in 4 patients (16%).*

**Conclusion:** *Stab wounds are main cause of PAI; mostly young males are injured. Laparotomy is safe & good method of treatment. Selective patients may be managed conservatively. Mortality rate was 4% overall & 4.54% in operative group.*

**Keywords:** *Penetrating Abdominal Injuries, Gun Shot Wound, Road Traffic Accident, Laparotomy & Anastomosis, Evisceration, Stab wounds, Non-Operative management.*

### INTRODUCTION

In modern era; civil violence, crimes, armed conflicts & traffic accidents have increased penetrating abdominal injuries<sup>1-4</sup>.

Stab wounds (SW) and Gunshot wounds (GSW) are major causes of Penetrating Abdominal

Injuries<sup>1-3</sup>. Up to world war I, PAI were managed conservatively & mortality rate was high. However during world war II, studies showed that early laparotomy improved survival results<sup>1,2,5</sup>. Therefore later on early laparotomy was standard treatment. From 1960 Shaftan<sup>6</sup> started treatin

patients of PAI by selective conservative methods. He had fair results. This technique was followed by Nance & Cohn (1969)<sup>7</sup> and Nancy et al (1974)<sup>8</sup>. Frequent clinical examination, monitoring, added diagnostic procedures, abdominal paracentesis, laparoscopy, imaging focused abdominal sonography (FAST), computed tomography (CT), magnetic resonance imaging (MRI) were used. All these reduced laparotomies & now selective non-operative treatment of PAI is possible<sup>6,7,8</sup>.

This retrospective study was performed to evaluate the pattern of PAI and results of treatment at Jhalawar, Rajasthan, India.

### METHOD

A retrospective study of 25 patients of Penetrating Abdominal Injuries was done.

Relevant details- age, sex, cause of injuries, various organs injured were noted. A written well informed consent was taken from patients & their attendants. Conservative & Surgical management were analysed & their outcome were noted.

### RESULTS

Out of 25 patients, 21 were males and 4 were females giving a Male: Female ratio of 21: 4. The age group ranged from 8 years to 60 years. The majority of patients were in second & third decades (Table -1)

**Table – 1:** Age & Sex distribution of patients

Age in Years	Male	Female
1-10 years	2	0
11- 20 years	1	4
21-30 years	13	0
31-40 years	2	0
41-50 years	1	0
51-60 years	2	0

Commonest causes of PAI were Stab wounds- 15 patients followed by GSW- 3 patients, Cow horn injury- 2 patients. Other causes were RTA, Glass injury, Cracker, Blast and unknown (Stick?). Each cause had one patient. (Table-2)

**Table – 2:** Causes of Penetrating Abdominal Injuries

Causes of PAI	No. of Patients	Percentage
Stab	15	60%
GSW	3	12%
Cow horn injury	2	8%
RTA	1	4%
Glass injury	1	4%
Cracker Injury	1	4%
Blast injury	1	4%
Unknown Injury (Stick)	1	4%

Three patients were treated conservatively. First, 28 year old boy had single stab in left lumbar region. He was stable, no signs of peritonitis. USG & Flat plate abdomen was normal. Second, 8 years old boy had penetrating injuries by pellets of gunshot, two superficial pellets were removed elsewhere. On CT scan, one pellet was in right lobe of liver with mild fluid in Morrison's pouch. Third, 60 years old male was hit by cow horn, had penetrating wound in lower left side of abdominal wall with hematoma. All three patients were well. Twenty two patients underwent laparotomy.

The most common injuries seen were in stomach, small intestine, mesentery and liver (Table-3)

Injured Organ	No. of Patients	Percentage
Stomach	7	28%
Mesentery	7	28%
Small intestine	6	24%
Liver	5	20%
Colon	3	12%
Abdominal wall	2	8%
Gall Bladder	1	4%
Spleen	1	4%
Diaphragm	1	4%
Evisceration of intestine	5	20%
Evisceration of Omentum	4	16%

Stomach perforations were in 7 patients, which were sutured. Both anterior & posterior surfaces were checked. Similarly perforation of small intestine & colon were sutured. Four patients had resection of a part of injured intestine and end to end anastomosis done. Here injured intestine had multiple perforations or/ and gangrene.

One 16 year old girl had laparotomy for perforation peritonitis. On laparotomy, rectal perforation of >1 cm. was identified, debrided & sutured. In this case pelvic colostomy was done. Probably a stick was introduced per rectally, which perforated rectum. Lacerations or tears in omentum & mesentery were debrided and sutured. Penetrating injuries of liver were treated by suturing and/ or gel foam packing. Small lacerated injury to lower pole was packed with gel foam. Perforation of fundus of Gall bladder had cholecystectomy and wound of diaphragm was sutured. Eviscerated organs i.e intestine & omentum were put back in peritoneal cavity. Devitalised omentum was excised. Gangrenous intestine in 2 patients was resected & end to end anastomosis was done. One patient carrying a wooden cart was hit by motorcycle and a wooden piece entered in lower abdomen causing evisceration of small intestine. One patient was drinking alcohol, drinking glass slipped, broke down and a piece of glass entered in right side of abdomen and loops of smallgut herniated. Eight year old boy was firing crackers, the cracker injured abdomen and two pieces entered in stomach & colon.

There were wound infections in 6 patients (27%). Respiratory complications in 4 patients (18%). One patient of blast injury which had associated multiple injuries in chest, abdomen & limbs died. Mortality rate was 4.54%.

## DISCUSSION

In this study, age of patients ranged from 8 years to 60 years, the majority being in the 20 to 30 years. In 25 patients of Penetrating Abdominal Injuries 21 were male and 4 were female, thus male and female ratio is 21: 4. Similar age groups were observed by others<sup>1,3,4</sup>. Lee<sup>1</sup> observed male: female ratio was 89.5: 10.5 in 219 patients of SW. Ohene-Yeboah<sup>3</sup> had male: female ratio 9.1:1 in 411 patients of PAI.

In this study of 25 cases of PAI, the commonest cause is Stab Wounds 15, GSW 3, rare cause are cow horn- 2, Road Traffic Accidents- 1, Cracker

explosion- 1, Glass injury- 1. Blast injury-1 and unknown object- 1. Deodhar<sup>4</sup> had 25 patients of stab wounds, GSW- 1 in 26 patients of PAI. Musau<sup>2</sup> had 34 stab wounds, 17 GSW & 2 RTA in 53 patients of PAI. Lee<sup>1</sup> studied 219 patients of SW of abdomen. Thus in civilian life, common cause of PAI are:- Stab Wounds & GSW. Common injured organs were: Stomach, Small intestine, Mesentery, Liver & Colon. Abdominal wall is injured in 2 cases & one patient in each group had injury to Diaphragm.

Deodhar<sup>4</sup> had single stab wound in 21 patients and multiple stab wounds in 4 patients. He observed protrusion of viscera through SW in 6 cases. His 6 patients of peritoneal penetration underwent Laparotomy, 3 patients have no visceral injuries. Lee<sup>1</sup> treated 219 patients of stab wounds of abdomen, out of which exploration was not done in 111 (50.7%) patients. Exploration was done in 108 cases (49.3%) patients which revealed : no injury in 14 (6.4%), though 6 (2.8%), evisceration, injury with no repair in 3 ( 1.4% ), injury required repair in 91 (41.5%). Musau<sup>2</sup> managed 53 patients of PAI, 40 (75%) patients were operated including 6 patients, who were managed conservatively initially, out of which 1 had positive laparotomy & 5 had negative laparotomies. 9 out of 40 patients have negative laparotomies, 7 had normal vital signs, 2 cases had unstable vital signs with associated extra abdominal injuries & 1 patient had evisceration of omentum.

Ohene- Yeboah<sup>3</sup> treated 411 patients of PAI : 251 (61.1%) SW, 85 (20.7%) GSW, 48 (11.7%) RTA, 11 (2.7%) impalement, 9 (2.2%) fall from height & 7 (1.7%) by flying objects. 331 (80.5%) of 411 patients had an emergency laparotomies. Finding were: 187 (56.5%) peritonitis, 95 (30.3%) evisceration & 49 (14.8%) hemoperitonium. No injury was found in 92 (27.8%) of 331 patients.

Indication of laparotomies are : Peritonitis, Shock, Evisceration, Free peritoneal air, Positive diagnostic paracentesis of abdomen, Blood in nasogastric tube or per rectal, Hemoperitonium, Visceral injury1-4. Similar indications are in our study.

McFarlane<sup>11</sup> advocated mandatory laparotomy in GSW of abdomen. Other studies made it possible to manage some patients of GSW conservatively<sup>12-13</sup>. Musau<sup>2</sup> managed 2 GSW conservatively & 1 was subjected to negative laparotomy. Incidence of negative laparotomies varies: 16.1% in Musau<sup>2</sup>, 2.4% in Lee<sup>1</sup>. Ohene-Yeboah<sup>3</sup> treated 411 patients of PAI out of which 331 (80.5%) had laparotomies, 67 (16.3%) had wound exploration & 13 (3.16%) had non operative treatment. 92 (27.8%) of 331 laparotomies had normal findings, of these 72 (33%) Stab wounds & 14 (18%) GSW. Incidence of negative laparotomy can be reduced by serial clinical examination, laparoscopy, CT & MRI studies and a better conservative approach may be adopted<sup>1-4,7,13,14</sup>.

Liver is commonly injured, followed by jejunum & spleen. Nana & Cohn<sup>7</sup> also found liver being commonly injured followed by small intestine. Lee<sup>1</sup> found organ injured most commonly was small gut (20%), liver (14%), stomach (13.3%), colon (12.6%) & rarely other organs. Musau<sup>2</sup> noted injuries to G.I.T & related structures most, injury to liver, spleen, kidney & urinary bladder. Ohene- Yeboah<sup>3</sup> studied various organ injuries in 411 patients of PAI: 23.2% in small gut, 21.1% abdominal wall injuries, 12.9% in stomach, 10.2% colon, 10% liver. 7.4% omentum, 4.6% spleen, 2.8% gall bladder & urinary bladder & rarely to other organs.

Gastrointestinal perforations, 3 were closed by suturing, multiple perforation required resection & anastomosis. 10 cases of injury to left colon had colostomy. Liver injuries were treated by various methods- Gel foam packing, suturing, debridement. In spleen injuries, Splenectomy when ever needed. Injuries to omentum & Mesentry had debridement & suturing. In compromised blood supply to gut, resection & anastomosis of involved segment was done. Similar procedures were done in this study.

Lee<sup>1</sup> treated 111 patients of SW non-operatively, there was no complications, 108 had operations, in which 25.5% patients had complications in immediate surgery group. Musau<sup>2</sup> observed 12.5%

complications which were: sepsis, gangrene of abdominal wall & entero-cutaneous fistula. Ohene- Yeboah<sup>3</sup> had 13.6% post operative complications : wound infection. Intra abdominal abscesses, entero-cutaneous fistula. Deodhar<sup>4</sup> observed 27% complications: minor wound infection, burst abdomen, post-operative complications, gastric & faecal fistula & chest infection.

Ohene-Yeboah<sup>3</sup> observed 4.4% mortality in 411 patients of PAI: 1.2% in SW, 14.1% in GSW & 6.3% in RTA. Causes of mortality were: refractory haemorrhage, shock, peritonitis, associated injuries & respiratory complications. Musau<sup>2</sup> observed 7.54% mortality in 53 cases of PAI. Deodhar<sup>4</sup> observed 20% mortality due to peritoneal sepsis, haemorrhagic shock & respiratory infections. Lee<sup>1</sup> noted 2.3% mortality in 219 patients of SW, 4.4% in immediate surgery group of 90 cases.

## CONCLUSION

25 patients of Penetrating Abdominal Injuries were managed; mostly males were injured. The peak age was third & second decade. Commonest cause of PAI is stab followed by GSW. Common injuries were Stomach, Mesentery, Small gut, Liver, Colon & rarely other organs. Some patients have Evisceration of intestine & omentum. Laparotomy was safe & dependable. Mortality rate was 4%.

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**Abbreviations :** GSW- Gun Shot Wounds, SW- Stab Wounds, RTA- Road Traffic Accidents, PAI- Penetrating Abdominal Injuries, USG- Ultra Sonography, CT- Computed Tonography, MRI- Magnetic Resonance Imaging