



## PATTERNS AND OUTCOME OF PENETRATING ABDOMINAL TRAUMA.

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**ABSTRACT...** To determine the mode of penetrating injuries to abdomen and to determine the effect of these injuries on outcome and to formulate recommendations for management of patients sustaining penetrating abdominal trauma. **Study Design:** Descriptive, cross sectional. **Setting:** Surgical Department Sandeman Provincial hospital, Quetta. **Period:** 1 year from July 2014 to June 2015. **Materials and Methods:** 147 consecutive cases of abdominal trauma presenting to emergency were studied for pattern of injury and management outcome. Data was recorded and analyzed using SPSS v10. Frequency tables were generated for various variables. **Results:** The commonest mode of injury was stabbing occurring in 76 cases (51.7%) followed by gunshot injuries in 60 cases (40.8%), 11 patients (7.4%) sustained blast pellet injuries. Patients were either managed conservatively or underwent laparotomy depending on mechanism of injury and clinical presentation. Stab and blast pellet wounds which were superficial were managed by local wound exploration those with peritoneal breach, hemodynamic instability and visceral evisceration were managed by Laprotomy. All gunshot injuries underwent mandatory Laprotomy. Gut was most commonly injured viscus followed by liver and kidney. Types of procedure performed were primary repair, bowel resection, protective ileostomy, splenectomy, nephrectomy, 2 patients were managed by damage control i.e. liver packing. Overall mortality was 5%. **Conclusion:** Mandatory laprotomy for all gunshots, and stabs and pellets that penetrate the peritoneal cavity proves to be safe and a prudent policy.

**Key words:** Abdominal Trauma, DPL, Laportomy, Penetrating, Outcome, Patterns.

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## INTRODUCTION

Trauma is an injury caused by physical force<sup>1</sup>, referred to as the neglected step child of modern medicine.<sup>2</sup>

While no one expects to be seriously injured, trauma is infact one of the most pressing public health problem all over the world. It is 4<sup>th</sup> commonest cause of death in all ages, and is most frequent cause of death in less than 45 years.<sup>3</sup> Every year more than 5 million people die of injuries.<sup>4</sup> Around 7% of annual trauma deaths in U.K. are the result of penetrating mechanism.<sup>5</sup>

There is increase in inter-personal violence and is this epidemic is being neglected since decades.<sup>6</sup> The reason of increase in violence is easy accessibility of fire-arms which has resulted in increase in direct attacks, murders and suicidal

attempts and in-appropriate laws of fire-arms possession.

Abdominal trauma (either blunt or penetrating) is a cause of high morbidity and mortality<sup>8</sup>, being common in both military and civilian practice. Gun-fires and stabbing are the most common sources of abdominal trauma. Penetraing trauma often leads to life-threatening injuries. Early recognition of intra abdominal injuries is the distinct sole factor affecting ultimate morbidity and mortality.<sup>9,3</sup>

When a patient presents to the resuscitation room in emergency department with cardiovascular instability, peritonitis or obvious evisceration of abdominal contents they are taken to operating room for Laprotomy.<sup>10-13</sup>

The groups of patients that present with stable abdominal penetrating injuries are the group where investigations and management can be controversial. Patients sustaining stab wounds to abdomen are listed for non operative cases if there is absence of of hemo-dynamic instability and peritonitis.<sup>14</sup>

About 55% of stabs to anterior abdominal wall can safely be managed non –operatively.<sup>15</sup> In recent reports by Dermetriades et al. on injury to abdominal solid organ by stab, reported that among solid organs liver is commest injured organ; most patients were efficaciously treated without laparotomy and without any abdominal complications.<sup>16</sup>

Management after initial resuscitation varies from conservative approach to aggressive surgical intervention depending on mechanism of injury and clinical presentation and varies among centres.

Mandatory Laprotomy has traditionally been recommended for treatment of abdominal gunshot wounds. One reason cited for aggressive surgical management has been the high incidence of intra-abdominal injuries in cases of penetrating trauma, previously reported to be as high as 98%.<sup>17</sup>

Because of increased knowledge mechanisms of organ injury and its related radiological imaging techniques, has shifted the attention of physicians towards non-operative decisions in selected patients.<sup>18-20</sup>

CT-scan is routinely used to decide the necessity for operation<sup>21,22</sup> and has replaced DPL and IVU. Despite the reported safety of laparoscopy (LC) in trauma, its use is still limited. Investigation of abdominal trauma patients using LC can reduce the need of laparotomy in nearly 75% patients.<sup>7</sup> Now consultant general surgeons have learnt proficiency in advanced LC procedures, and mostly acute operations are performed by duty surgical registrar.<sup>23</sup> This along with lack of clinical consistency in doing serial examinations and fear of potential missed injuries when abdomen

is unexplored makes selective conservatism impractical.<sup>7</sup>

As for the magnitude of the problem locally, Pakistan is under going an epidemiological transition; it is facing double burden of disease. Between 1960-1994, there has been marked increase in injuries and related risk factors, possibly reflecting changes in lifestyles, urbanization and rural development.<sup>4</sup> 22 % of emergency visits in public hospitals are injury related.

The diagnosis and management of abdominal injuries is sometimes difficult for surgical team working in emergency, resulting in serious outcome. Diagnosis is frequently delayed because of associated injuries that tend to mask the presence and severity of abdominal injuries. In penetrating injuries the plight of seriously injured patient depends upon immediate and specific treatment offered. Mandatory laparotomy for penetrating abdominal trauma results in high rate of unnecessary operations and is associated with morbidity and increased cost. Complication rates of unnecessary surgery must be weighed against mortality and morbidity of missed injuries. The goal of trauma surgeon is to avoid unnecessary laparotomy while minimizing missed injuries. As no such study regarding penetrating abdominal trauma has been conducted in our local set up, this topic has been selected to recognize current pattern of abdominal trauma, the way these patients are currently managed, the effectiveness of management as reflected by associated morbidity and mortality and to suggest ways and means to improve the serious outcome through an organized plan of assessment and resuscitation.

## METHODOLOGY

This was a Descriptive, cross-sectional study. Patients of either gender and age above 15 and below 45 years with penetrating abdominal trauma were included in this study. Patients having pre-existing chronic illness like diabetes, tuberculosis, jaundice, ischemic heart disease, chronic obstructive pulmonary disease. Patients with penetrating abdominal trauma having associated injuries to head and neck, chest and limbs. Patients having abdominal injuries

associated with involvement of diaphragm. Relevant permission from concerned department were taken.

Sample size calculated in 147 patients with penetrating abdominal trauma keeping confidence level at 95%, anticipated population proportion of 25% by stabs and absolute precision required as 7%.

The study was accompanied in Sandeman provincial hospital Quetta, all patients with penetrating abdominal trauma presenting to Emergency Room were admitted, primary survey was followed by secondary survey, once the patient was stabilized, including complete physical examination from head to toe. All necessary investigations including blood complete picture, blood grouping and cross match, urine detail report, serum electrolytes, serum urea, serum creatinine, blood sugar, HBs Ag, anti-HCV antibodies, X-ray chest and abdomen and ultrasonography were performed. Criteria for surgery was decided by vitals and investigations. All patients with gunshots to abdomen and patients with stabs having peritonitis, hemodynamic instability, visceral evisceration or those having organ injury on investigations, were operated. All the information was recorded on Proforma especially designed for it. The study variables were age, gender, duration of injury, pattern of injury, frequency of visceral injuries, mode of treatment, hospital stay and mortality.

Patients were examined in respectable and comfortable manner.

Lama patients and those patients who left for other private surgical center were considered as 'drop out' in the study. All the data was analyzed on computer by using SPSS version 10. Descriptive statistics like mean with standard deviation were calculated for age. Sex ratio, frequency for pattern of injury and percentage for mortality were determined. Results were presented in the form of tables and graphs.

## RESULTS

147 patients presenting to surgical unit III with penetrating abdominal trauma during a period of 1 year were studied. Majority of patients were adult males between the ages of 20-40 year. There were 9 female patients of which 1 sustained suicidal firearm injuries.

In this there was predominance of homicidal injuries.

Most frequent mode of injury was stab wound making 51.7% of all injuries followed by gunshots which accounted for 40%. Blasts are infrequent in civilian practice and were responsible for 7.4% of cases.

All patients were resuscitated according to ATLS guidelines. Thorough primary survey secondary survey was performed. 92% of the patients who underwent laparotomy had obvious signs of intra abdominal visceral injury on physical examination. All patients with abdominal gunshots were managed by Laprotomy. 2 out of these 60 patients had no visceral injury and so positive rate of injury was 96%. 76 patients had stab wound of which 45(59%) had no peritoneal breach and were managed by local wound exploration, 29 patients underwent Laprotomy (39%). Indications for laparotomy being hemodynamic instability, peritoneal breach, and visceral evisceration. 10 patients only had hemoperitoneum and no organ injury. Rate of negative Laprotomy was 34%. Most commonly injured viscus was gut, small in 22 and large gut in 19 cases, liver in 12, kidney in 5, stomach and spleen in 3 cases each.

Most common complication was wound infection, occurred in 20% of patients. Other complications included fecal fistula due to anastomotic breakdown, respiratory tract infection and multi organ failure. 3 patients required reexploration for management of fecal fistula. Duration in hospital on average was 10.7 days.

8 patients did not survive, 2 before surgical intervention was undertaken and 6 in the post operative period. Overall mortality was 5%.

Mode of Injury	Frequency	Relative Frequency	Percentage %	Confidence Interval	Range for True Population Proportion
Gun Shots	60	60/147	40.8 %	+7.95 -	32.87-48.77
Stabs	76	76/147	51.7%	+8.08 -	43.62-59.78
Others (Blast Pellets)	11	11/147	7.4%	+4.25 -	3.23-11.73

Table-I. Mode of injury in penetrating abdominal injuries

Outcome	Frequency	Relative Frequency	Percentage %	Confidence Interval	Range for True Population Proportion
Expired	6	6/60	10%	+7.59	2.41-17.59
Recovered	54	54/60	90%	+7.59	82.4-97.59

Table-II. Outcome of patients with gunshot to abdomen

Organs Injured	No. of Cases	%Age
Small Intestine	22	23
Large Intestine	19	20
Stomach	3	3.19
Pancreas	3	3.19
Kidney	5	5.31
Spleen	3	3.19
Liver	12	12.76

Table-III. Organs injured

Complications	Percentage	Frequency
Wound Infection	24	23
Fecal Fistula	6	5
Wound Dehiscence	10	10
Chest Infection	13	12
Multi Organ Failure	5	5

Table-IV. Complications encountered among operated

## DISCUSSION

The diagnosis and management of intra abdominal injuries is one of the most challenging areas in emergency surgery. An effective and organized approach coupled with high index of suspicion and an awareness of the consequences of missed injuries is necessary ingredients in successful management.

Cases of penetrating abdominal injuries to our center are increasing day by day. Most patients present in the age group of 15-45 years, resulting in country's double loss; first in the form of treatment cost and second being the most productive age group, it results in enormous working hour-loss. Previous-studies have also reported peak incidence of abdominal trauma in same age groups.<sup>7,24-26,21</sup> A cohort from Auckland,

reported 91% prevalence of average age of 32 years in trauma patients in 12 years duration.<sup>20</sup> In another study involving 72 cases of abdominal trauma with age-range of 15-60 years, mean age of affected persons was 29 years, 79.7% of age 15-35 years and there were 90.5% male patients.<sup>21</sup> Basher et al. in a 12-years cohort study reported age range of 21-30 years with 88% male populations and 12% female ones. The higher incidence can be attributed to higher incidence of risk taking behavior of youth and having ready access to firearms in our society.

The fact that homicide is leading cause of injury in our study is also reflected in other studies from various part of country. Frequency of firearm injuries/deaths range from 61% in Sind, 64.9% in DI Khan and 77.7% and 78.5% in Peshawar.<sup>21</sup>

Although the incidence of stabs was higher than gunshots, firearm injuries are on increase. In a prospective study of penetrating abdominal trauma at university of calabar southern Nigeria the commonest mode of injury was stabbing [46.1%] while gunshot ranked second [38.5%].<sup>27</sup> The evaluation and management of penetrating abdominal injury care has drastically changed over the last few decades. Consecutive series of PAI confirms a wide variation in individual approach to management. Selectivity for conservative management must be based upon local trauma epidemiology and experience. Missed intra abdominal injury is associated with significant morbidity and even mortality. However, there is also considerable mortality associated with non-therapeutic laparotomy. Regarding management of penetrating injuries, a selective approach is now advocated by many authors. This is particularly true for stab wounds to abdomen to avoid high rate of negative Laprotomy. This rate in our study was 34%, which was comparable to that of western studies, 24% in one study and as high as 50% in another.<sup>6</sup> We explored every case of penetration of peritoneum because where clinical and available diagnostic studies are unable to resolve the issue, Laprotomy is more prudent than expectant observation. Sophisticated investigations like triple contrast CT scan, laparoscopy, endoscopy, and selective angiography were not used because diagnostic modalities are not available emergency hours in our institution.

The pattern of injury depends upon the size and depth of the organ and the offending agent. The higher frequency of small gut, liver and colonic injuries can thus be explained on these bases.<sup>8,20</sup>

All intra peritoneal injuries were managed in standard manner using different techniques depending on grade of organ injured, combination of organs injured and general condition of the patient.

The most commonly injured organ in this study was are the small intestine (22 cases), large Intestine (19 cases) followed by liver. Similar statistics were seen in study at Iran carried out

by H. Baradaran<sup>1</sup>. Most studies have concluded that small intestine, colon and liver are the organs most frequently damage by penetrating trauma multiple organ injuries were seen in 20 patients. 24.2% patients had post operated complications, majority were infective in nature. Wound infection was the most frequent complication; the incidence was comparable to other studies this was due to contamination of intestinal contents because of gut injury.<sup>3,5</sup> In study conducted at department of surgery, University of Kansas, overall morbidity was 23% irrespective of the procedure performed.

All patients received prophylactic antibiotics, patients who underwent surgical intervention additional post operative antibiotics governed by ward protocol.

Duration of stay in hospital was 10.7 days on average.

Mortality rate was 5% which was lower than in many studies; the reason being inclusion criteria. This study included patients in adult group without comorbidities and polytrauma patients were not included; all these factors contribute to higher mortality.

The outcome of penetrating injuries to abdomen depends not only on management of individual organ injury but also on pre-hospital care, early transportation, early and prompt resuscitation, quick decision to operate, operative skill post operative management.

## CONCLUSION

Trauma is leading cause of morbidity and mortality among all age groups. The injury of organ depends on the nature of weapon and mechanism of injury. The single factor which influences outcome of patients with penetrating injuries is early recognition of intra abdominal injuries and identifying need for surgery. Time should not be wasted in investigations in hemodynamically unstable patients and they should be resuscitated in emergency room and early Laprotomy should be carried out. Hemodynamically stable patients and those without signs of peritonitis should be evaluated further; and thus facilities of CT scan,

laparoscopy and selective angiography should be made available in emergency. This would result in shorter hospital stay, and reduce mortality and morbidity associated with unnecessary surgical intervention.

There should be regular audit of all cases of penetrating abdominal injuries to update our management plan.

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