

## Laprotomy in gun-shot wounds; a prospective study highlighting the organ involvement and complications in a tertiary care hospital

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### Abstract

**Objective:** To determine the frequency of common abdominal organs involved and post-operative complications in patients presenting with abdominal gun-shot injuries presenting at tertiary care centre.

**Study Design:** Prospective observational

**Place and duration:** This study carried out in the Department of Surgery, Abbasi Shaheed hospital Karachi. It was a two years study from 1.02.2011 to 31.01.2013

**Material and Methods:** Our sample collection was non-probability consecutive and our sample size was 121 cases. All patients following selection criteria with ethical review and informed consent were recruited. All these patients then undergone laparotomy by the experienced surgeon and the site of organ involved such as small bowel, colon, liver and stomach and also the complications were recorded. All the final outcomes were recorded at the seventh day of admission.

**Results:** Out of 121 selected patients, 100 (82.6%) were males and 21 (17.4%) were females with a mean age of  $30.8 \pm 11.5$  years. The most common age group was in between 15 to 25 years with the gunshot wounds. 61 (50.4%) of the patients had small bowel while 49 (59.5%) patients had colon injuries. Most common post-operative complication observed was wound infection in 41 (33.5%) and septicaemia only in 7 (5.8%) patients. Out of 41 (33.5%) patients having wound infection 16 (39.0%), 15 (36.4%) and 10 (24.6%) patients had wound infection between the age of 10 to 25, 26 to 40 and 41 to 55 years respectively. While the most common age group for septicaemia was in between 41 to 55 years in 3 (42.9%) patients

**Conclusion:** Our conclusion is most common organ involved in gunshot injury is hollow viscera and wound infection and sepsis is most common complication observed.

**Keywords:** wound, gunshot, laparotomy, post-operative complications, Injury to small bowel, large bowel, stomach

### Introduction:

Penetrating abdominal trauma typically involves the violation of the abdominal cavity by a gunshot wound (GSW) or stab wound. The management of penetrating abdominal trauma has evolved greatly over the last century.<sup>1</sup> In penetrating abdominal trauma due to gunshot wounds, the most commonly injured organs are small bowel, colon, stomach and liver.<sup>2</sup> Forty percent of homicides and 14% of suicides by firearm involved injuries to the torso.<sup>3</sup> Penetrating abdominal trauma affects approximately 35% of those patients admitted to urban trauma

centers and 1-12% of those admitted to suburban or rural centres.<sup>4-6</sup>

More than 80% of deaths occur within 24 hours of admission, 66.7% at the initial operation associated with abdominal vascular injury. In contrast, survival from penetrating abdominal injury without vascular injury remains high.<sup>7,8</sup> While damage-control surgery has been used with some success in the management of patients with extensive abdominal trauma, it is associated with significant morbidity, including sepsis, intra-abdominal abscess, and gastroin-

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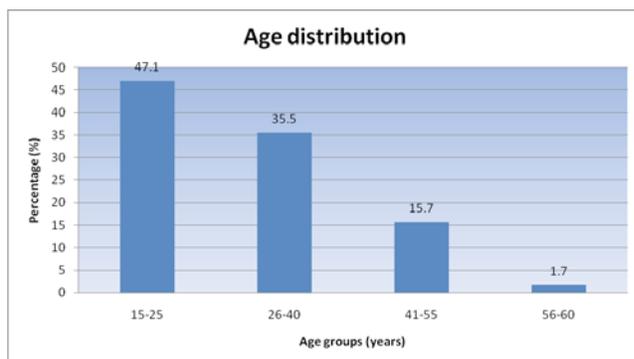
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Table 1: Distribution of injuries sustained &amp; post operative complications (N=121)

Variables	n	%	
Site of Injury	Small bowel	61	50.4
	Colon	49	59.5
	Liver	06	5.0
	Stomach	15	12.4
	Wound Infection	41	33.9
Post-operative complications	Septicemia	07	5.8
	Uneventful recovery	27	22.3

Table 2: Distribution of age by post-operative complications

Variables		Complications			
		Wound Infection		Septicemia	
		n	%	n	%
Age (Years)	15- 25	16	39.0	2	28.6
	26-40	15	36.6	2	28.6
	41-55	10	24.4	3	42.9



testinal fistula, according to Nicholas et al.<sup>9</sup> The character of the bleeding (e.g. arterial pumping, venous flow) may assist in determining whether major vascular injury has occurred.<sup>10</sup>

The objective of this study was to determine the frequency of common abdominal organs involved and post-operative complications in patients presenting with abdominal gunshot injuries at a tertiary care centre.

#### Material and Methods:

The study design was prospective observational with the use of non-probability consecutive sampling technique. The study was conducted in the Department of Surgery, Abbasi Shaheed Hospital, Karachi. Abbasi Shaheed Hospital is tertiary care hospital having three surgical units consisting of 120 beds dealing major kind of trauma like gut shot and road traffic accidents. The study duration was two years from 1 Febru-

ary 2011 to 31 January 2013. Prior permission was obtained from hospital concerned authorities to conduct the study and confidentiality of data was ensured. The informed consent was also obtained from the patients or their attendants before recruiting patients. All patients of age > 12 years of either gender presenting with history of abdominal gunshot injury of any duration with injuries from the nipple line to pubis anteriorly and from the line joining the inferior angle of scapula to the lower buttock crease posteriorly presenting to department of surgery were included. While the patients with injuries other than abdominal injury or patients with comorbidities or on conservative management or those patients with superficial injuries that do not require further evaluation were excluded from the study. The relevant demographics such as age and gender were noted in the porforma. The age was divided into groups to assess The site of organs involved such as small bowel, colon, liver and stomach and the complications such as wound infection and septicaemia were recorded by the principal investigator. Further duration of hospital stay from the admission to discharge was also noted. All the final outcomes were recorded at the seventh day of admission.

#### Data Analysis:

The data was entered and analyzed using SPSS version 17. Descriptive statistics was used to summarize the categorical variables like gender, injuries sustained and post operative findings like small bowel, colon, liver, stomach, wound infection and septicaemia whereas age was presented as mean±S.D. Stratification was done by age, gender and duration of injury on the outcome variable injuries sustained and post operative findings.

#### Results:

A total of 121 patients with history of abdominal gunshot injury fulfilling the inclusion and exclusion criteria were included in this study. There were 100 (82.6%) males and 21 (17.4%) females with a mean age of 30.8 ± 11.5 years. 57(47.1%) patients were between 15 to 25 years of age followed by 43 (35.5%) patients between

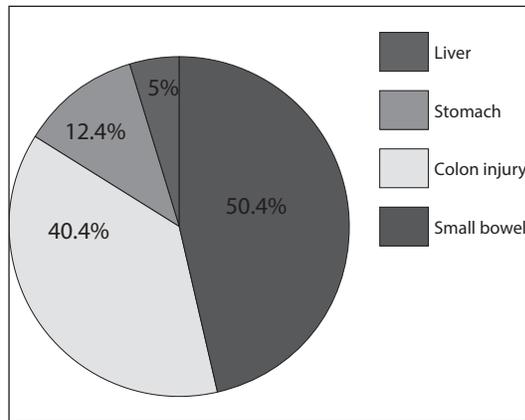


Figure 1: Percentile of organ involved in gunshot injury in the present study:

26 to 40 years. (Figure:1)

Approximately 61 (50.4%) of the patients had small bowel while 49 (40.4%) patients had colon injuries followed by stomach and liver in 15(12.4%) and 6(5%) patients respectively. About 31 (50.5%) patients of small bowel injury had age between 15 to 25 years, 19 (38.3%) patients of colon injury had age between 27 to 40 years, 4 (66.7%) patients of liver injury had age between 26 to 40 years and 9(60%) patients of stomach injury had age between 15 to 25 years of age. (Table:1) 24(39.3%) patients of small bowel injury had duration 1 to 2 hours, 19 (38.7%) patients of colon injury had duration of more than 6 hours, similarly 50(81.9%) male patients were with small bowel injury and 39 (79.6%) male patient with colon injuries .

Most common post operative complication observed was wound infection in 41(33.5%) patients followed by septicaemia only in 7(5.8%). 16(39.0%) patients had wound infection were between 15 to 25 years of age while 3(42.9%) patients had septicaemia were between the age of 41 to 55 years. (Table:2) 15(36.6%) patients had wound infection between 1 to 2 hours of duration and septicaemia 3 (42.8%) patients had duration 3 to more than 6 hours. 35(85.4%) male patients had wound infection and 5 (71.4%) male patients had septicaemia.

### Discussion:

Globally, the rate of violence related to gunshot is increasing.<sup>14</sup> One of the most common causes of penetrating abdominal trauma (PAT) is gunshot wound. The severity of the wound depends upon the distance of the weapon from which the bullet is fired.<sup>15</sup> One of the study recorded that majority of patients that got injured belong to 21-30 years of age followed by those that belong to 31-40 years. It was also documented that males were mostly involve by PTA and noted that 81.67% were male while female were 18.33 %.<sup>16</sup> Another study documented that the rate of PAT in males were 22 times more as compare to that of females and were mostly belonging to 15-44 years of age.<sup>17</sup> The above finding are consistent with our study in which the mean age of patients was  $30.8 \pm 11.5$  years with 100(82.6%) male and 21(17.4%) female. This indicated that the young males are the most common victims because they have more external activities and exposure.

Many studies recorded that small bowel was the commonest viscera to be involve by penetrating injuries. It was predicted that the rate of large and small bowel injuries were highest.<sup>16-18</sup> Another study noted that gunshot injuries most commonly involve small intestine and large intestine. The most frequent organ to be damaged was small intestine followed by colon and liver.<sup>19-20</sup> This was in relation with our study in which 61(50.4%) of the patients had small bowel injury while 49(40.5%) patients had colon injuries, stomach was involved in 15(12.4%) cases while liver was involved in 6(5%) cases.

One of the study documented that the extent of injury is important in case of PAT as the rate of death depends on it. The morbidity is minimal while mortality is almost zero if patient got anterior abdominal wall injury without peritoneal injury. PAT without involving vasculature has high survival rates.<sup>18</sup> There was general consensus that the patients who showed signs of peritonitis and unstable hemodynamics after suffering from abdominal gun-shot injuries are the candidates for the laparotomy.<sup>21</sup> One of the study documented that in 95% cases significant intra-

abdominal injuries occur because of gunshot and in such cases local wound exploration is not indicated. Therefore, hemodynamic instability, peritoneal penetrating injuries and general peritonitis are the indications for exploratory laparotomy.<sup>16</sup> There are different diagnostic methods that are specific and sensitive like sequential physical examination can provide excellent results and further testing like ultrasound, CT scan, diagnostic peritoneal lavage but none of them are gold standard for the evaluation and management of abdominal injuries. With the help of these tests the rate of unnecessary laparotomy can be reduced so the patients with or without peritoneal breach that are asymptomatic or having mild symptoms can undergo non-selective management.<sup>21-23</sup>

Another study recognized that the most frequent complication postoperatively were infection and intra-abdominal sepsis accounting for up to 63%.<sup>16</sup> Additional study recorded that the complication rate was about 20.4% including ileus in 10%, wound infection in 6%, and evisceration in 4% patients. However, due to unnecessary laparotomies 1.4% patients have died. So, if possible unnecessary laparotomy should be avoided. It is an important decision to make that either laparotomy is needed or not.<sup>24</sup> A major problem for patients who survive a traumatic injury is morbidity due to infectious complications. In our study wound infection ensued in 41(33.9%) patients and 7(5.8%) developed septicemia while 27(22.3%) patients presented uneventful recovery

The assets of this study are that, the consecutive assortment method has assured that we have sampled the interpretations of broad range of surgeons and their skills of treating the patients with gun-shot injuries. However, there are some confounders found in this study such as performance bias. Conferring the interpretations of skills of the surgeons and to what range they are constant with their experience would be illuminating and productive to regulate the misinterpretation about the complications of the

laparotomy in gun-shot injuries.

#### **Conclusion:**

We conclude that abdominal gun-shot wounds are more prevalent in young adults to middle age male population. The most common involved organs are small bowel, colon and stomach. The previous studies have shown similar trends with acceptable slight proportion differences except for liver, which was less commonly involved in our study. The post-operative complications of wound infection and septicemia were also prevalent in most of the reviewed studies but with different proportions as dependent on quality of care (post-operative).

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**Funding source:** None

#### **Role and contribution of authors:**

Dr Arshad Ullah Khan, collected the data, references and wrote the initial writeup.

Dr. Samia Ghani, Assistant Professor, department of surgery, LCMD & DSH, critically went through the article and advise for necessary changes and discussion and conclusion

Dr Sumayya Tajwar, collected the data, references, and helped in introduction and discussion writing.

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