

# When to Operate an Abdominal Gunshot Wounds

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## ABSTRACT

**Background:** Violence has become part and parcel of the daily routine of living, the prospective study of 86 patients, sustaining abdominal gunshot wounds was designed to evaluate the pattern, presentation and treatment outcome.

**Study Design:** Descriptive Study.

**Place of Study:** This study was conducted at the department of Surgery, Ghulam Muhammad Maher Medical College Sukkur from January 2011 to January 2012.

**Materials and Methods:** Patients presenting with abdominal firearm wounds at accident and emergency department were included in this study, clinically all were evaluated, resuscitated and their findings were recorded on proforma. Patients with signs of acute abdomen (peritonitis)/shock underwent midline emergency laparotomy, others having minimal or equivocal abdominal signs were selected for observation (non-operative management) group.

**Results:** Total number of patients included was 86, all were males, they belonged to age varying from 15-70 years, 54 (62.8%) were below the 40 years of age, in 44 (51.1%) cases instrument of attack used by assailant was pistol/shotgun, 45(52.3%) cases were victims of armed robbery, in 75(87.2%) entrance wounds were present in anterior abdominal wall where as in 11(12.1%) were present posteriorly, 67(77.9%) underwent emergency laparotomy and 19(22%) were observed initially. Two patients belonging to observation group showed failure, needed delayed laparotomy and both had positive laparotomy.

**Conclusion:** Gunshot wounds of abdomen can be safely managed non-operatively, in the absence of abdominal tenderness haemodynamic instability or inevaluable factors as head injury and heavy intoxication. Success of non operative management depends upon continuous monitoring and frequent clinical examination.

**Key Words:** Abdominal Gunshot, laparotomy, haematemesis, hemicolectomy.

## INTRODUCTION

Gunshot injuries are major problem worldwide from medical and economical perspectives<sup>1</sup>, and are associated with profound morbidity and significant mortality<sup>2</sup>. In many Africans and developing countries the reason behind firearm injuries are communal clashes, sectarian religious crisis, armed robbery, hunting, political violence, student strife and suicidal attempts.<sup>3,4,5</sup>

After World War I, laparotomy remained standard for penetrating abdominal injuries<sup>6</sup>, till 1960 when Shafon<sup>7</sup> demonstrated that patient with penetrating abdominal wounds could be accurately identified and selectively managed non-operatively.

In 1974 Nance et al<sup>8</sup> found that selective observation of abdominal gun shot wounds could be safe and effective, with decreasing morbidity and hospital stay without additional mortality. Subsequently Muckart et al<sup>9</sup> and Demetriades<sup>10</sup> et al, concluded that selective, non operative management could be safely carried out without rise in morbidity and mortality, and decrease in the number of negative laparotomies. Keeping this in mind this study was designed to evaluate the patients, who deserve emergency laparotomy and who do not.

## MATERIALS AND METHODS

This descriptive study was carried out prospectively in surgical department of Ghulam Mohammad Maher Medical College Hospital Sukkur, from Jan 2011 to Jan 2012. Patients included were of any sex belonging to age group above 15 years, with abdominal firearm wounds.

Anatomical abdominal land marks were, anterior abdomen (Area between xiphoid and costal margins superiorly, pubic symphysis, inguinal ligament inferiorly and mid axillary line posteriorly), back area (confined between tips of scapula superiorly, mid axillary lines laterally and gluteal folds inferiorly).

Patients with gunshot wounds within these surface markings, or patients with entrance wounds outside these land marks, but clinical features of abdominal injuries or radiological evidence of missile in abdomen were included in the study too. The patients having unevaluable trauma due to intoxication and head injuries were excluded from the study. All patients under went primary and secondary survey according to ATLS guide lines. After brief clinical history and examination, entry & exit wounds with their location were noted; the type of weapon used and reason for the attack was recorded.

I/V line established, Foley's catheter retained and nasogastric intubation was done. Haemodynamically unstable patients were promptly resuscitated, and immediately shifted to operation theatre. Surgery within 4 hours of arrival at accident & emergency department was considered to be operative management. Shock (BP <90 mmHg and pulse >100b/min), generalized peritonitis, leakage of intestinal contents through the wound, bleeding per rectum, haematemesis and frank blood in urine were all indications for exploration of abdomen. Tangential through and through abdominal gun shot wounds were not considered absolute indication for laparotomy, patients having tenderness localized to wound with no evidence of cardiovascular instability were regularly assessed two hourly, and were labeled conservative management group, surgery in such cases after four hours was considered as observation (non operation management) failure. The cut of point of four hours was selected, as is used in audit filter in trauma registers for delayed operative management according to North American National trauma Database.

Pre operative chest radiograph, abdominal ultrasound and x-rays, and urine examination were carried in haemodynamically stable patients; IVP were ordered in selective patients. Radiological features suggestive of pneumoperitoneum, presence of missile intra abdominally with presence of physical signs were candidates for surgery. Each patient was kept on third generation cephalosporin. During surgery visceral injuries were recorded and dealt accordingly.

## RESULTS

Eighty Six patients of abdominal gun shot wounds were included in study from Jan 2011 to Jan 2012, all were males, belonged to age group from 15-70 years Table-I. Sixty seven (77.9%) presented with clinical picture of peritonitis/ state of shock, all under went emergency laparotomy, 19 (22%) had minimal or equivocal abdominal findings and were kept in initial observation (non-operative management) group.

Time interval from incidence to arrival at emergency department varied from ½ hour to 6 hours with mean of 3 hours. Wounding weapon used by assailant could be identified in 44 patients where as in rest of cases remained unidentified Table-II. Reason for firearm abdominal wounds are shown in Table-III. In 75(87.2%) patients entry wounds were present in anterior abdominal wall, and in 11(12.7%) cases posteriorly (thorax, trunk and gluteal region). Entry wound was single in 63 cases (73%) where as in 23 (26.7%) entry wounds were more than one. Clinical features with which patients presented are shown in Table-IV.

**Laparotomy group n=67:** Patients belonging to this group were 67(77.9 %) they presented with hypotension

(B.P less than 90) or clinical picture of frank peritonitis, all underwent laparotomy immediately, within 4 hours. Organ system injuries were 129, these are shown in Table-V, commonly involved system was GIT, predominantly affected was small intestine in the form of perforations or tangential lacerations. Majority needed simple repair, others, segmental resection and end to end single layer sero sub mucosal anastomosis, colonic injuries were dealt with simple repair, right hemicolectomy, segmental resection anastomosis with protective diversion or exteriorization of affected segment according to the situation.

Liver was the second, commonly involved organ by fire arm injuries 17(24.26%) cases, superficial and deep lacerations were present in ten cases, through and through in four and three were associated with complex injuries involving hepatic & portal vessels, and were dealt with resectional debridement, deep stitches with selective vascular ligation sponge stone and packing. Cholecystectomy was performed in 02 cases of gall bladder injuries. Stomach, diaphragm, and urinary bladder injuries were repaired simply. Rectal injuries were treated by repair and covering colostomy. Splenectomy was done in most of the cases where as splenorrhaphy in few. Nephrectomy was performed in major trauma of kidney. Two patients had pancreatic injury one was treated by distal pancreatectomy other did not require any surgical procedure. Three patients sustaining inferior vena caval injuries were repaired, but died immediately post operatively due to irreversible shock. Vast majority of patients suffered two or more injuries and mortality rate was proportional to number of organs involved, twelve patients (13.9%) in the immediate laparotomy group expired, 03 inferior vena caval injury, 02 with liver injuries, 06 from associated colonic injuries and one from transfusion induced coagulopathy. Hospital stay ranged from 05-120 days (median 15 days). Postoperative complications were wound infection (20.9%), anastomotic leak (4.5%), intra abdominal abscess (5.8%), septicemia (12.7%), pneumonia (8.1%), burst abdomen (8.1%), these were treated accordingly.

**Initially observed group n=19:** Nineteen patients (22%) presented with equivocal or minimal abdominal findings, they were kept in non operative management (observational) group. Eleven cases had entry and exit wounds, 04, were with tangential anterior abdominal wounds, and 04 had only entry wounds. Radiological examination did not reveal findings suggestive of pneumoperitoneum or multiple significant air and fluid levels. Ultra sound findings were not significant. All of them were haemodynamically stable, so were observed closely, two cases resulted into failure by developing fever, progressive diffuse abdominal tenderness and tachycardia, so underwent delayed exploratory laparotomy after 04 hours. Both cases had two

perforations in small gut, which were primarily repaired. None of the patient belonging to this group died.

**Table No.1: Age distribution of abdominal gunshot wounds N=86**

| Age of the patients in years | Number of patients |
|------------------------------|--------------------|
| 15-20                        | 5                  |
| 21-30                        | 31                 |
| 31-40                        | 18                 |
| 41-50                        | 15                 |
| 51-60                        | 13                 |
| 61-70                        | 4                  |
| Total                        | 86                 |

**Table No.2: Weapons Used in n=44 patients**

| Weapon used | No of patients | %age  |
|-------------|----------------|-------|
| Pistol      | 17             | 38.6% |
| Hand gun    | 10             | 22.7% |
| Revolver    | 3              | 6.8%  |
| Shot gun    | 12             | 27.2% |
| Rifle       | 2              | 4.5%  |

**Table No.3: Causes of gunshot abdominal injuries N=86 cases.**

|                      |    |        |
|----------------------|----|--------|
| Armed robbery attack | 45 | 52.3%  |
| Accidental           | 2  | 2.33%  |
| Shot by unknown      | 5  | 5.81%  |
| Communal strife      | 10 | 11.62% |
| Property dispute     | 11 | 12.7%  |
| Celebration ceremony | 4  | 4.6%   |
| Sectarian            | 7  | 8.1%   |
| Family dispute       | 2  | 2.3%   |

**Table No.4: Clinical features of abdominal gunshot injuries. n=86**

| Symptoms        | N  | %    | Signs        | N  | %    |
|-----------------|----|------|--------------|----|------|
| Abdominal pain  | 86 | 100  | Peritonitis  | 67 | 77.9 |
| Distension      | 19 | 22   | Shock        | 17 | 19.7 |
| Vomiting        | 25 | 29.6 | Paraplegia   | 1  | 1.16 |
| Haematemesis    | 5  | 5.8  | Evisceration | 6  | 6.9  |
| Haematuria      | 5  | 5.8  | Haemothorax  | 2  | 2.3  |
| Rectal bleeding | 6  | 6.9  |              |    |      |

**Table No.5: Type of Organ Injured n=69**

|    | Organ Injured             | N  | %    |
|----|---------------------------|----|------|
| 1  | Small bowel               | 41 | 59.4 |
| 2  | Colon                     | 25 | 36.2 |
| 3  | Liver                     | 17 | 24.6 |
| 4  | Stomach                   | 11 | 15.9 |
| 5  | Urinary bladder           | 5  | 7.2  |
| 6  | Spleen                    | 6  | 8.6  |
| 7  | Kidney                    | 4  | 5.7  |
| 8  | Rectum                    | 6  | 8.6  |
| 9  | Gall bladder              | 2  | 2.8  |
| 10 | Pancreas                  | 2  | 2.8  |
| 11 | Major vessel              | 3  | 4.3  |
| 12 | Retroperitoneal haematoma | 7  | 10.1 |

## DISCUSSION

Violence has become part and parcel of daily routine living and is extremely difficult to obtain true magnitude of problem<sup>11</sup>. The escalation of trauma and inter personal violence in many countries is referred as neglected epidemic<sup>12</sup>, that has resulted in approximately 50% of murders committed with fire arms. In this study all patients were male, as in the study of Onuba<sup>13</sup>, majority 54(62.8%) were below the age of 40 years, and weapons used were identified in 44(51.1%) cases, locally made pistols/ shot guns were the weapons of attack in majority of cases. In 45 (52.3%) cases reason for violence was armed robbery attack that coincides with the study of Chiana Kwana et al<sup>14</sup>. Pistols/ shotguns used were loaded with locally made pellets which resulted in multiple entry and exit wounds mainly. Time between incidence and arrival at accident and emergency department ranged from ½ hour to 6 hours average delay in this study was 03 hours, in contrast with other studies which was 50 minutes<sup>15</sup>. The prolong delay in arrival and getting medical treatment might had impact upon many number of severely injured patients, those possibly might have expired during transportation, it could have also be detrimental effect in patients with non fatal injuries as blood loss and faecal contamination of peritoneal cavity gets prolonged, that may be a contributing factor for post operative septicemia and mortality in cases of colonic injuries. Primary repair in colonic injuries was done only in carefully selected patients, otherwise colostomy was of choice for colorectal trauma has got place in our setup as is adopted by others<sup>16,17,18</sup>. Post operative Complications were higher than in the study of Mohammed Iqbal<sup>19</sup>. In this series 67(77.9%) cases presented with clinical picture that deserved emergency laparotomy, similar figure is mentioned by Inchien in literature, that ranges from 69-78%. A. salim & G. C. Velmahos believe that a carefully performed physical examination is the cornerstone of the management of abdominal gunshot wounds<sup>20</sup>. S.Nabeel Zafar et al<sup>21</sup>, has observed successful non operative management in 22.2% of abdominal gunshot wounds, in our series we have managed 19.7% cases successfully conservatively. Commonly injured systems were gastro intestinal tract, and biliary tract because these occupy wide area of the abdominal cavity. In vast majority of cases surgical intervention was done within 04 hours on the basis of clinical examination, some delay in surgery on the basis of equivocal physical signs did not prove detrimental, can be postponed safely until clinical findings of injury become evident. This policy of selective non operative management has been re appraised by Muckart et al. The proponents of mandatory exploration often under estimate the importance of negative laparotomy; some has reported significant morbidity and even mortality<sup>22</sup>. The present

selective conservatism policy adopted is based exclusively on physical examination as was adopted by Inchlen, that is based upon careful initial examination and frequent serial examinations, failure was noted in 02 patients who were being treated under this policy, showed failure and underwent laparotomy for peritonitis and fever without any complication.

## CONCLUSION

Gunshot wounds of abdomen can be safely managed non-operatively, in the absence of abdominal tenderness haemodynamic instability or inevaluable factors as head injury and heavy intoxication. Laparotomy is not mandatory for all cases.

## REFERENCES

1. Rainio J, Sajantila A. Fatal gunshot wounds between 1995 and 2001 in a highly populated region in Finland. *Am J Forensic Medicine Pathol* 2005; 26:70-77.
2. Saidi HS, Nyakiamo J, Faya S, gunshot injuries as seen at Agha Khan Hospital, Nowrosi, Kenya. *East Afr Med J* 2002; 79:188-192.
3. Agbjec AM, Osuntokun O. Ocular gunshot injuries in Ibadan. *Afr J Med Sci*, 1991; 20: 35-4.
4. Thomas MO, Ogunleye EO. Penetrating chest trauma in Nigeria. *Asian Cardiovasc Thorac Ann* 2005; 13:130-106.
5. Garba ES, U Kwenya Ay. Secterian religious rises in Kadun, Nigeria. 30 cases of abdominal gunshot injuries. *South Med J* 2002; 95:12-28.
6. Moore EE, Moore JB, Vain Duzer – Moore S, Thompson JS. Mandatory Laparotomy for gunshot wounds penetrating the abdomen. *Am J Surg* 1980; 140:847-851.
7. Shaftan GW, Indications for operation in abdominal trauma. *Am J Surg* 1960; 99:657-664.
8. Nance FC, Wennar MH, Johnson LW, et al. Surgical Judgement in the management of penetrating wounds of the abdomen: Experience with 2212 patients. *Ann Surg* 1974; 179:639-646.
9. Muckart DJJ, Abdool – Carrim ATO, King B. Selection Conservative management of abdominal gunshot wounds. A prospective study. *Br J Surg* 1990; 77:652-655.
10. Demetriades D, Charalabides D, Lakhoo N, Pantanowitz D. gunshot wounds of the abdomen. Role of selection management. *Br J Surg* 1991; 78: 220-222.
11. Inchien Chamisa. Civilian abdominal gunshot wounds in Durban, South Africa: a prospective study of 78 cases. *Ann R Coll Surg Engl* 2008; 90:581-586
12. Baker SP. The neglected epidemic : Stone Lectures 1985 America Trauma Soevety meeting *J Trauma* 27:343-8.
13. Onuba O. Management of civilian gunshot wounds in a Nigerian general hospital. *Arch Emerg Med* 1987; 4:73-76.
14. Chiana Kwana GU, Ihegihi CC, Okafor PI, Anyanwu SN, Mbonu OO. Adult surgical emergencies in a developing country : the experience of Nnamdi AZ, kwe University Teaching hospital, Nnewi, Anambra State Nigeria *world J – Surg* 2005; 29:804-808.
15. I vatury RR, Nullathambi MN, Roberg RJ, Rohman M, Stahl W. Penetrating thoracic injuries : infected stabilization V.S prompt transport. *J Trauma* 1987; 27:66-73.
16. Krispin A, Zaitsev K, Hiss J. The elusive slug : bullet intestinal embolism. *Forensic Sci Med Pathol* 2010;6 (4);288-92.
17. Khan FM, Ayyaz M, Sharif M. An experience at mayo Hospital, Lahore. *An King Edward Med Col* 2003;9(4):303-04.
18. Bhatti AA, Gondal, Aslam M. Penetrating abdominal trauma;a prospective study, *Professional Med J* 2004;11(2):111-16.
19. Muhammad Iqbal,Muhammad Ateeq , , aisal G Bhopal .Surgical profile of patients with firearm injury abdomen .*JRMC*;2011;15(2):92-95 .
20. Salim A, Velmahos GC. When to operate on abdominal gunshot wounds. *Scandinavian J Surg* 2002; 91: 62-66.
21. Zafar SN, Rushing A, Hant ER, Kisat MT, Villagas CV, Chie A, et al. Outcome of selective non operative management of penetrating abdominal injuries from North American National Trauma Database. *Dr J Surg* 2011; 99(Supp):155-165.
22. Lowa R, Boyd D, Baher R. The negative Laparotomy for abdominal Trauma. *J Trauma* 1972; 12:853-61.

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