

The Pattern of Abdominal Trauma in Ramadi city: An Experience of 74 Cases

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Research Article

Keywords: Abdominal trauma, Penetrating trauma, Blunt trauma, Abdomen

Posted Date: May 10th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-509013/v1>

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Abstract

Background: The abdomen is the third part of the body subjected to trauma. Abdominal trauma (AT) is divided into penetrating and blunt injuries, which differ in their distribution according to geographical areas. Early management can reduce its high morbidity and mortality.

Objectives: To evaluate the socio-clinical, operative findings, complications, and fatality rate of subjects with AT.

Patients and methods: Patients with isolated AT admitted to the emergency unit in the Al-Ramadi Teaching Hospital, Ramadi City, Iraq, and subjected to exploratory laparotomy were enrolled in the study. The study covered a period of 9 months (June 2019 to February 2020). Demographic, clinical, operative findings and the outcomes were registered and analyzed for all patients.

Results: At our hospital, 1119 patients were presented to the causality with trauma during the study period, 74 (6.6%) of them with AT. The majority of the patients were in the age group <30 years (70.3%) and the males formed 90.5% of the cases. Around 90% of the subjects were with penetrating AT, with gunshot (79.7%) was the commonest cause. Around 80% of the patients were presented within 1-12 hours following the trauma. There were 3 or more injured organs (58.1%) found during the operations. The fatality rate showed a statistically significant effect with the age of the patients, time of presentation, mean blood pressure, and hospitalization period (P-value <0.05).

Conclusion: AT showed a prevalence of 6.6%. Penetrating AT outnumbers the blunt injury. The mortality rate was 20.3%. In the youngest age group, a long time elapsed following trauma, lower mean blood pressure, and a long hospitalization period harmed the death rate.

Introduction

At the age of speed, civil violence, armed conflict, a crime of passion, and traffic accident, the penetrating and blunt injuries to the abdomen have been increased [1].

Trauma as an entity is still a main global health problem with its related morbidity and mortality [2][3].

The variety of causes of abdominal trauma as well as its types (penetrating or blunt) varies from country to another and even differ among different regions in the same country. This variation depends on many factors such as specific infrastructure of the region, frequency of personal assaults, crime, civil violence, and wars [2][3][4].

The main consequences of abdominal trauma are hemorrhage and sepsis. Early deaths following abdominal trauma are usually attributable to hemorrhage [5].

In abdominal blunt trauma, the injuries occur as the force transfer during compression, and deceleration will tear solid organs, and bowel mesentery resulting in intra-peritoneal bleeding. Blunt abdominal trauma

is a leading cause of disabilities and death among all age groups [6][7][8].

Recognition of serious intra-abdominal damage is sometimes may be a challenge to surgeons. A lot of injuries may occur and they are missing throughout the early evaluation of the patient. In addition, the mechanism of injury may result in additional injuries which often distract the attention from an intra-abdominal injury that may be threatening the patient's life.

In general, the liver and spleen seem to be the most frequently injured organs in adults, although the reports vary [2][4]. While in children the spleen and the kidney are the most frequently injured organs [6][7][8].

The penetrating injury is another type of abdominal trauma caused by different agents, mostly by a gunshot or stabbing, leading to direct damage of the viscera. The small intestine, colon, and liver are mostly affected [2]. In addition, high-velocity missile wounds have a cavitation effect that may extend several centimeters beyond the tract of the missile.

At present, no local data exist on the frequency of abdominal visceral injuries in patients with blunt and penetrating trauma. Hence, we did the current study to collect basic data to help further researches and for public safety. This study aimed to assess the demographic, clinical, operative findings, and outcomes in subjects with various types of abdominal injuries.

Patients And Methods

This cross-sectional study was conducted at Al-Ramadi Teaching Hospital in Ramadi City, Iraq over the period between June 2019 and February 2020. The study included 74 consecutive patients with abdominal trauma who underwent laparotomy. Informed consent was taken from every injured subject or her or his relative. The present study was approved by the Ethical Approval Committee of the University of Anbar (reference number 45, 4-5-2021). Patients with associated head and neck, chest, limbs, and pelvis injuries and those who arrived dead at the emergency unit were excluded from the study. Besides, any subject or his/her relative who did not wish to participate in the study, pregnant women, patients with negative laparotomy, and those who treated conservatively were excluded too. All patients were evaluated in the causality where the resuscitation was done for them paying attention to the airway, breathing, and circulation (ABC), and all the patients were received prophylactic antibiotics.

A thorough history concerning the age, gender, type, and cause of trauma, and the duration of the presentation following the time of the accident were recorded. Physical examination including general and abdominal evaluation was performed for all subjects. The investigations were done as needed, including routine blood tests (hemoglobin, blood group and cross-matching, and blood urea), plain X-ray films of the abdomen and chest, ultrasound of the abdomen, and CT scan. Blood was prepared for resuscitation and any blood lost during the exploratory laparotomy and its amount depends on each case. The laparotomy operations were performed by general surgeons through a midline incision. The

teamwork of general surgeons, urologists, and cardiovascular surgeons worked together in certain cases. The number of the injured abdominal organs was recorded for each patient.

In postoperative periods, complications were recorded. The fate of the patients whether dead or discharged to home was registered.

SPSS version 25 was used to analyze the data. The mean age of the patients was presented \pm SD. A simple table in frequencies and percentages was presented. Chi-Square test was used to compare between the categorical groups and independent sample T-test for the comparison between means. P-value < 0.05 is considered a statistically significant difference.

Results

Out of 1119 patients with different kinds of trauma, there were 74 (6.6%) patients with abdominal trauma. The age range was from 5–70 years with a mean age of 26.32 ± 12.452 years. The most age group affected was < 30 years ($n = 52, 70.3\%$). There were 67 (90.5%) males with a male to female ratio of 9.6/1 Table 1.

Table 1
The distribution of the 74 patients with abdominal trauma according to age and gender.

Age per years	Gender		Total N (%)
	Males N (%)	Females N (%)	
< 30	48 (92.3%)	4 (7.7%)	52 (70.3%)
≥ 30	19 (86.4%)	3 (13.6%)	22 (29.7%)
Total	67 (90.5%)	7 (9.5%)	74 (100%)

The mean age of the recovery group (28.51 ± 12.658) was higher than the death group (17.73 ± 6.745). Out of 66 patients (89.2%) with penetrating injury, there were 53 (80.3%) recovered and 13 (19.7%) died. The gunshot was the highest cause ($n = 59, 79.7\%$) in patients with an abdominal injury. Most of our patients were presented 1–12 hours following the trauma event ($n = 59, 79.7\%$). The mean blood pressure (77.46 ± 7.082) in the recovery group of patients was higher than in the death group (60.40 ± 13.265). The majority of cases ($n = 43, 58.1\%$) were noted to have 3 or more injured intra-abdominal organs. There was no statistically significant difference between the fate of the patients and gender, type and cause of injury, and the number of the injured organs (P-value > 0.05). While there was a statistically significant difference between the fate and the age, time of presentation following trauma, and the mean blood pressure of the patients (P-value < 0.05). The period of hospitalization was ranged from 4–32 days with a mean period of 10 ± 6.956 days, and there was a highly statistically significant difference between the death and the hospitalization period (P-value < 0.00001) Table 2.

Table 2

The relationship between fate and the socio-clinical and operative findings in 74 patients with abdominal trauma.

Variables	Fate		Total N (%)	P-value
	Recovery	Death		
	N (%)	N (%)		
Mean age	28.51 ± 12.658	17.73 ± 6.745		0.002
Gender				0.679
Males	53 (79.1%)	14 (20.9%)	67 (90.5%)	
Females	6 (85.7%)	1 (14.3%)	7 (9.5%)	
Total	59 (79.7%)	15 (20.3%)	74 (100%)	
Type of injury				0.725
Penetrating	53 (80.3%)	13 (19.7%)	66 (89.2%)	
Blunt	6 (75%)	2 (25%)	8 (10.8%)	
Total	59 (79.7%)	15 (20.3%)	74 (100%)	
Cause of injury				0.390
Gunshot	48 (81.4%)	11 (18.6%)	59 (79.7%)	
Stab wound	4 (66.7%)	2 (33.3%)	6 (8.05%)	
RTA	5 (83.3%)	1 (16.7%)	6 (8.05%)	
Sharp instrument	1 (100%)	0 (0%)	1 (1.4%)	
FFH	1 (100%)	0 (0%)	1 (1.4%)	
Fall on heavy object	0 (0%)	1 (100%)	1 (1.4%)	
Total	59 (79.7%)	15 (20.3%)	74 (100%)	
Time elapsed before admission				< 0.001
1–12 hours	53 (89.8%)	6 (10.2%)	59 (79.7%)	
> 12 hours	6 (40%)	9 (60%)	15 (20.3%)	
Total	59 (79.7%)	15 (20.3%)	74 (100%)	
Mean blood pressure (mm Hg)	77.46 ± 7.082	60.40 ± 13.265		< 0.001
Number of injured organs				0.364
1 organ	7 (100%)	0 (0%)	7 (9.5%)	

Variables	Fate		Total N (%)	P-value
	Recovery N (%)	Death N (%)		
	2 organ	19 (79.2%)	5 (20.8%)	
≥ 3	33 (76.7%)	10 (23.3%)	43 (58.1%)	
Total	59 (79.7%)	15 (20.3%)	74 (100%)	
Hospital stay per days	7.61 ± 4.085	19.40 ± 8.025		< 0.0001

Table 3
The injured organs according to the type of trauma in 74 patients with abdominal trauma.

Organ	Penetrating trauma		Blunt trauma		Total	
	Number	%	Number	%	Number	%
Small bowel	38	20.2	5	2.7	43	22.8
Liver	33	17.6	6	3.1	39	20.7
Large bowel	28	14.9	2	1.1	30	16
Spleen	20	10.6	5	2.7	25	13.3
Stomach	18	9.6	0	0	18	9.6
Kidney	10	5.3	3	1.6	13	6.9
Pancreas	7	3.7	1	0.5	8	4.3
Urinary bladder	5	2.7	1	0.5	6	3.2
Duodenum	3	1.6	2	1.1	5	2.7
Diaphragm	0	0	1	0.5	1	0.5
Total	162	86.2	26	13.8	188	100

The most commonly injured organ was the small bowel (n = 43, 22.8%). While the least involved organ was the diaphragm (n = 1, 0.5%). The most commonly injured organ in penetrating trauma was the small bowel (n = 38, 20.2%), and the least was the duodenum (n = 3, 1.6%). The liver was the most injured in blunt trauma (n = 6, 3.1%), and the pancreas, urinary bladder, and diaphragm were the least injured organs (n = 1 for each, 0.5%) Table 3.

The commonest postoperative complication was wound infection (n = 11, 14.9%), and the least bleeding duodenal ulcer (n = 1, 1.4%) Table 4.

Table 4
The complications in 74 patients with exploratory laparotomy.

Complication	Number	Percentage
Wound infection	11	14.9
Wound dehiscence	3	4.1
Bleeding duodenal ulcer	1	1.4
Total	15	20.3

Around 70 % of the recovered patients (41/59) were discharged in good condition Table 5. Moreover, the cause of death in 80% (12/15) of patients was septicemia Table 6.

Table 5
The state of the discharge of the 59 recovered patients following exploratory laparotomy.

Group	Number	Percentage
Discharge in good condition	41	69.5
Need further care*	18	30.5
Total	59	100
*Care about wound infection, wound dehiscence, and stoma.		

Table 6
The causes of death in the 15 cases with abdominal trauma.

Cause of death	Number	Percentage
Septicemia	8	80
Bleeding	3	20
Total	15	100

Discussion

Abdominal trauma comprises one-third of the whole number of trauma in the emergency setting [9]. It is caused by penetrating (open) or blunt trauma (closed). These two types vary from area to area with more penetrating injuries in civilization regions and more blunt injuries in rural areas [10]. Abdominal trauma in the present study had a prevalence of 6.6% with more penetrating (90%) than blunt injuries. Around 20% of the patients die due to severe bleeding or septicemia.

The prevalence of abdominal trauma in the Middle East ranged from 15–82% [11]. The prevalence rate of the abdominal trauma from the total cases of trauma admitted to the emergency unit in the present study (6.6%) was less than the study by Ibrahim et al. (14.1%) [12]. This may be attributed to that considerable cases were excluded from the current study Fig. 1.

In literature, abdominal trauma occurs mostly in the second and third decades of life [1][4][13][14]. This study shows that the highest prevalence of trauma occurred in patients less than 30 years with a mean age of 26.32 years, which was nearly similar to other studies [1][4][8][15]. This points out that this group is the active group in society. However, in the current study, the mean age was lower than the study by Bordoni et al. who reported that the median age was 34 years [2]. This may be attributed to the difference in the number and type of studied sample between the two studies, Bordoni et al. studied 1888 deaths from abdominal injuries. Besides, Gönültaş et al. reported that the mean age was 36.08 ± 16.1 years which was higher than the mean age of the current study [16].

This study has also shown that the males were more injured than females with a ratio of male to female 9.6 to 1 which agrees with other studies [3][11][16][17][18][12]. This may be attributed to that males are more prevalent in outdoor activities, more found in assaults injuries, and participating in certain jobs like a soldier.

The penetrating trauma is the predominant type in this study, which was similar to other studies [2][8][19]. While in contrast with other studies [4][11][16][18][20] blunt trauma is the major cause of abdominal trauma. This difference of course is the result of the differences in geographical distribution and socio-cultural behaviors. Moreover, the distribution among the causes of abdominal injuries might change from time to time depending on the events that might occur in certain geographical locations.

The type of trauma (penetrating or blunt) and cause of injury (missile, sharp objects, RTA, FFH, etc.) might determine the injured intra-abdominal organs. Solid organs (liver and spleen) are more injured in blunt injury. While penetrating trauma could injure more the hollow organs (small and large bowel). However, the injured organ in penetrating trauma depends on the pathway of the penetrating objects and the cavitation effect of the high velocity penetrating object like a bullet. Our study shows that the frequency of organs injury in penetrating trauma was similar to the result of a previous study in penetrating abdominal trauma in Ramadi City, Iraq [21]. The small bowel was the commonest injured organ in the current study. This finding was in contrast with Smith et al. study who found that solid organs are more injured than hollow ones [18]. Besides, Mehta et al. reported that the spleen was injured in 53% of cases [17].

Abdominal trauma is found in around 20 percent of subjects admitted to the emergency units and carries a high fatality rate of about 20 percent. Early admission, accurate diagnosis, and management in trauma centers are important factors in reducing the mortality rate from abdominal trauma [22][23]. The prevalence of death due to abdominal trauma from many countries ranged from 0%-19.4% [3][4][8][13][15][16][17][12][24][25][26][27][28]. The fatality rate of 20.3% in the current study was higher than the reported in the above-mentioned studies. This may be attributed to the that the penetrating trauma in our

study was more than the blunt injury (penetrating trauma carries high mortality in comparison with blunt trauma) as well as the exclusion cases of patients with the conservative treatment and negative laparotomy of the patients with abdominal trauma. Ntundu et al. reported that the negative predictive value on the fatality rate in patients with abdominal trauma was extra-abdominal associated trauma to the pelvis or head, hospitalization period ≥ 7 days, systolic blood pressure less than 90 mm Hg, anemia, the severity of the injury, and time > 6 hours elapsed from trauma to admission [27]. The present study showed that younger patients, the shorter time elapsed before admission, low mean blood pressure at the time of the presentation, and long hospital stay were a negative impact on the death rate. From the above, we can conclude that the early presentation, hemodynamically stable patients, use of imaging techniques (ultrasound, and CT scans), and the use of laparoscopy rather than open laparotomy whenever it is possible are responsible for early discharge with better outcomes.

Postoperative wound infection was the most common complication (14,9%) in our study. However, most of them were simple and managed conservatively. A similar finding was reported by Mehta et al. [17], but much lower than what was reported by Chalya et al. (27.1%) [4]. The possible causes in these patients were dirty wounds, necrotic tissue, distorted traumas, and delayed presentation in some cases [17]. Laparoscopic management of the abdominal trauma carries less postoperative wound infection than open laparotomy. The study by Lim et al. reported 5 cases of postoperative wound infection in open laparotomy and nil in the laparoscopic treatment of patients with abdominal trauma [24]. The relatively high rate of postoperative wound infection in the current study and the studies by Mehta et al. and Chalya et al. may be attributed to the management by open laparotomy rather than using laparoscopy.

Owing to the lack of experience in diagnostic laparoscopy in blunt abdominal trauma, we didn't use this tool in the current study, and this was one of the limitations of the study. Small sample size, as well as no assessment of the severity of trauma in the study, were considered other limitations.

Conclusion

Abdominal trauma was a common surgical condition in the emergency units with a prevalence of 6.6%. Penetrating trauma outnumbers the blunt injury. The majority of the patients were males and younger age groups. The small bowel was the most involved organ in penetrating injury, while the liver was the commonest injured organ among patients with blunt trauma. The mortality rate was 20.3%. The two identified causes of death were septicemia and bleeding. The youngest age group, the longer time elapsed following trauma, low mean blood pressure at the time of admission, and longer duration of hospitalization harmed the death rate. While the gender, type, and cause of trauma, and the number of the injured intra-abdominal organs had no significant effect on the fatality rate. Postoperative wound infection was the most common complication and mostly they were simple and treated easily.

Declarations

Conflict of Interest

The authors declare that there is no conflict of interest.

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Figures

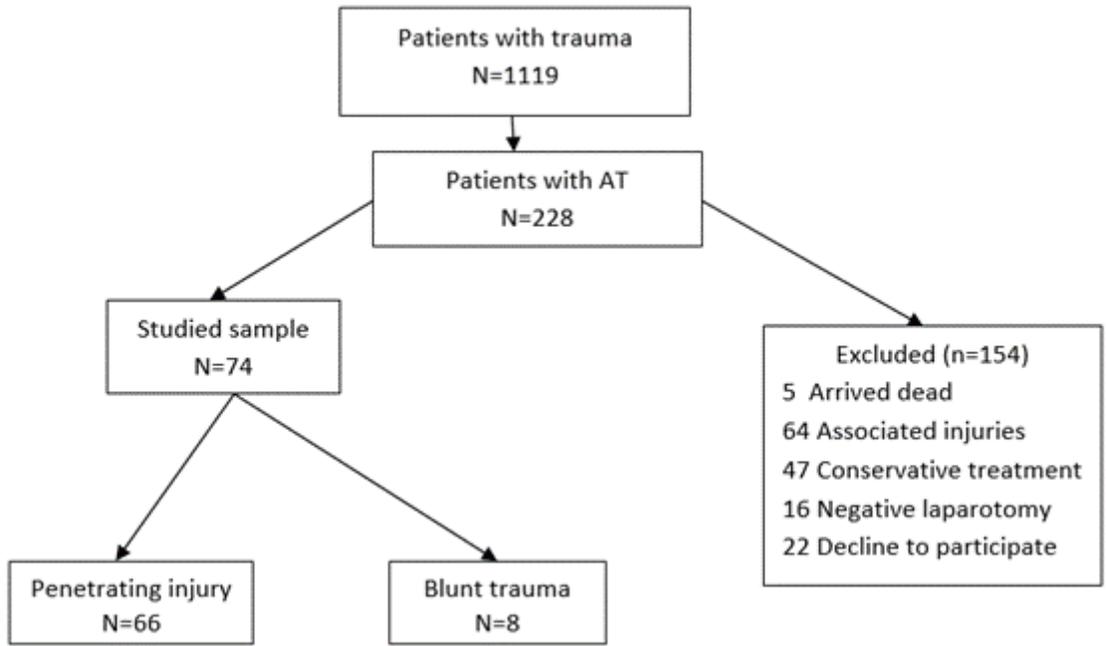


Figure 1

Flow diagram of the studied patients with abdominal trauma, AT=abdominal trauma.