Analysis of 175 Cases Underwent Surgical Treatment in Our Hospital After Having Abdominal Wounding by Firearm in the War at Syria

Suriye'deki Savaşta Ateşli Silahla Abdominal Yaralanma Geçirdikten Sonra Hastanemizde Cerrahi Tedavi Gören 175 Olgunun Analizi

Ateşli Silah ile Karın Yaralanması / Abdominal Injury by Firearms

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Özet

Amaç: Suriye'deki savaşta ateşli silah nedeniyle abdomen yaralanması geçirerek hastanemizde cerrahi tedavi görmüş olan hastaları retrospektif olarak analiz etmeyi amaçladık. Gereç ve Yöntem: 2011 ile 2014 yılları arasında Harran Üniversitesi Tıp Fakültesi Acil Servisine ateşli silah yaralanması ile başvuran ve abdominal yaralanma nedeniyle Genel Cerrahi kliniğine yatırılarak ameliyat edilen Suriyeli hastaların dosyaları retrospektif olarak incelendi. Bulgular: Ateşli silah nedeniyle abdominal yaralanma geçiren 175 Suriyeli hasta genel cerrahi kliniğimizde ameliyat edildi. Hastaların % 99.4 (n=174)'ü erkek, % 0.6 (n=1)'i kadındı. Tüm olguların travma-hastane kabul süresi 6 saat ≥ idi. Hastaların % 62.8'i (n= 110) izole abdominal yaralanma, % 37.1 (n= 65)'si iki ve daha fazla sistem yaralanmalı hasta idi. En sık yaralanan intraabdominal organlar kolon, ince barsak ve karaciğerdi. Abdominal yaralanmalarda birden fazla organ yaralanması görülme sıklığı % 44.5 (n=78) ve en sık görülen komplikasyon yara enfeksiyonu idi (%10). Negatif laparoskopi % 2.8 (n= 5), yoğun bakım desteği % 38.2 (n= 67), ortalama yoğun bakım kalış süresi 5.57 gün, mortalite % 9.7 (n= 17) idi. Tartışma: Çalışmamızda ateşli silahla abdominal yaralanma nedeniyle hastanemize başvuran hastaların, özellikle gastrointestinal sistem perforasyonu olanlar, travma-hastane kabul süresi 6 saat ≥ ise enfeksiyon kaynaklı morbiditesi ve mortalitesi artmaktadır. Bu da bize gastrointestinal traktı perfore eden yaralanmalara erken müdahalenin morbidite ve mortaliteyi azaltmada önemli bir faktör olduğunu göstermektedir.

Anahtar Kelimeler

Ateşli Silah Yaralanması; Abdominal Yaralanma; Mortalite

Abstract

Aim: We aimed at analysing the patients, who underwent surgical treatment in our hospital after having abdominal wounding by firearm in the war at Syria, retrospectively. Material and Method: The files of Syrian patients, who applied to Emergency Service of Harran University Medical Faculty because of gunshot wounds and had operation after being hospitalized in General Surgery Clinic due to abdominal injuries between the years of 2011 and 2014, were analysed retrospectively. Results: 175 Syrian patients, who had abdominal injuries by firearms, underwent operation in our general surgery clinic. 99.4% (n=174) of the patients were male, and 0.6% (n=1) were female. Trauma-admission to hospital times of all cases were ≥ 6 hours. 62.8% (n=110) of the patients had isolated abdominal injuries, and 37.1% (n=65) had two or more system injuries. The frequency of more than one organ injuries in abdominal region was 44.5% (n=78) and the most frequent complication was wound infection (10%). Negative laparoscopy was 2.8% (n=5), support for intensive care was 38.2% (n=67), average duration of intensive care unit stay was 5.57 days and mortality was 9.7% (n=17). Discussion: In our study, it was seen that infectious morbidity and mortality increased for the patients, who applied to our hospital because of abdominal injuries by firearm, particularly the ones with gastrointestinal perforation, if trauma-admission to hospital times were ≥ 6 hours. And this shows us that the early intervention to injuries that perforate gastrointestinal tract was an important factor for decreasing morbidity and mortality.

Keywords

Gunshot Wound; Abdominal Injury; Mortality; Morbidity

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Introduction

Syria is a country neighbouring on Lebanon, Israel, Jordan, Iraq and Turkey in the Middle East, with an approximate population of 22 million (2009). The civil war in Syria caused to deaths and injuries of a great number of people since the year 2011. The Syrian patients, injured by firearms, receive treatment in our hospital, because it is close to the war territory geographically. Abdominal injuries are one of the most important surgical emergencies at war and in non-combatant times. Firearm, stab and blunt traumatic injuries increase at war times. The newly developed high energy weapons increase wounding severity and personal and collective injuries. Multiple system and multiple organ injuries occur usually with gunshot wounds. Because of their ballistic efficiencies and deflexion features, bullets not only devastate the organ they hit, but also cause damage in adjacent organs beside the tissues they entered. For this reason, it may be deceptive making diagnosis and planning treatment only by considering bullet holes [1, 2].

Gunshot wounds are the injuries with high morbidity and mortality in our country and the world. They comprise 25% of traumatic deaths in the USA. Mortality in abdominal injuries by firearms is between 3-35 % (15% on average). Deaths based on gunshot wounds are generally between the ages of 1-45. We are in a period, when wars and regional conflicts continue in tens of regions of the world, particularly in the Middle East, and the number of physical injuries increases gradually. Early and right diagnosis of such injuries enables appropriate intervention and planning treatments by estimating possible complications, and decreases mortality [1-3].

In this study, our aim is sharing the data of Syrian patients, who were injured in their abdomens by firearms since the beginning of the civil war in Syria and treated in our hospital, and contributing to the experience in this respect.

Material and Method

175 patients with gunshot injuries applied to the emergency service of our hospital in the civil war in Syria between the years of 2011-2014, were hospitalized and treated in our General Surgery Clinic because of abdominal injury. Injured patients taking first-aid support in border regions was brought to the hospital. The files of these patients were analysed retrospectively. It was received local ethics committee permission from our University before the study. After the evaluation of the general situations and vital signs of the patients through multi-disciplinary approach, their laboratory analyses were carried out. Digital rectal examinations were carried out and urethral foley catheters were placed to all patients. In addition, patients were monitorized after being given prophylactic tetanus vaccine, antibiotic (1st Generation cephalosporin and/or metronidazole) and intravenous isotonic solution. Emergency laparotomy was implemented to patients with unstable hemodynamically (systolic blood pressure of <90 mmHg), evisceration and peritonitis. After the completion of emergency examinations of stable patients, elective laparotomy was implemented. Ages and genders of patients, firearm type causing to injury, time elapsed between wounding and admission to hospital, abdominal organs injured and their number, number of extra abdominal organs injured, surgical procedures implemented, lengths of intensive care unit, need of blood transfusion, developing complications and mortalities were recorded. Patients with isolated abdominal injuries and the ones with extra-abdominal injuries, who underwent laparotomy, were included in our study.

Patients without abdominal injuries, patients brought to hospital arrested and patients to the records of who could not be accessed were excluded from the study.

All statistical analyses were performed by using SPSS for Windows version 17.0 (SPSS, Chicago, IL, USA). Descriptive statistics were performed and the data were expressed as mean ± Standard deviations, minimum, maximum, and percentiles.

Results

99.4% (n=174) of the patients included in the study were male and 0.6% (n=1) were female and the age average was 30.6 (16-65). 12% (n=21) of 175 patients had shrapnel and 88% (n=154) had gunshot wounds. Trauma-admission to hospital times of all cases were ≥ 6 hours. 62.8% of the patients had isolated abdominal, 20.5% had abdominal-extremity, 9.7% had abdominal-thorax, 0.6% had abdominal-head and 6.4% had multiple system (more than two systems) injuries (Table 1). 52.6% of abdominal injuries had intra-abdominal single organ injury, 27.4% had two organ injuries, 14.9% had three organ injuries, 2.3% had intra-abdominal ≥4 organ injuries. And any intra-abdominal organ injury was not determined at 2.8% of the patients (Table 2). 28(16.0%) of the patients were hemodynamically unstable.

Table 1. Clinical features of the patients

Injured region	Patient N (%)	NIC N (%)	LAIC Day	Mortality N (%)
Isolated Abdomen	110(62.8)	29(26.3)	4.53	8(7.2)
Abdomen-Extremity	36(20.5)	14(38.8)	4.30	5(13.8)
Abdomen-Thorax	17(9.7)	13(76.5)	4.85	2(11.8)
Abdomen-Head	1(0.6)	1(100)	5.00	0(0)
More than two systems	11(6.4)	10(91)	9.20	2(18.2)
Total	175(100)	67(38.2)	5.57	17(9.7)

NIC = Need of intensive care LAIC = Length average of intensive care unit

Table 2. Number of injured organs, need of intensive care and blood transfusion, mortality.

Number of Injured Organs	PATIENT N (%)	NIC N (%)	ALIC Day	BTA Unit	CMP N (%)	MRT N (%)
0	5(2.8)	0(0)	0	0	0(0)	0(0)
1	92(52.6)	23(25)	3.60	3.6	15(16.3)	3(3.26)
2	48(27.4)	24(50)	4.17	4.17	11(22.9)	7(14.6)
3	26(14.9)	16(61.5)	6.68	6.7	12(46.1)	6(23)
4≥	4(2.3)	4(100)	7.6	7.3	4(100)	1(25)

NIC: Need of intensive care, ALIC: Average length of intensive care unit, CMP: Complication BTA: Blood transfusion average, MRT: Mortality

Blood transfusion was needed for 38% of the patients and the average need per patient was 4.8 units erythrocyte suspension. Intensive care follow-up was required for 38.2% of the patients and length of intensive care unit was 5.57 days on the average (Table 1). Complications developed at 42 (24%) of patients. They were wound infections in 18 (10%), pulmonary complications (4 atelectasias, 2 pneumonias, 1 embolism) in

7(4%), anastomotic leak in 3(1.8%), evisceration in 2 (1.2%), bleeding in 3(1.8%), intra-abdominal abscess in 4(2.3%) and urinary fistula in 5(2.9%) of the patients. Intra-abdominal injured organ distribution and the treatments implemented were given in Table 3. 15(88.3%) of 17 dying patients were under 50 years old and 2 (11.7%) of them were over 50 years.5 (29%) of 17 patients died of hemorrhagic shock and 12 (%71) died of sepsis. Mortality was 3.2% for patients with intra-abdominal single organ injury, 14.6% for the ones with two organ injuries, 23% for the ones with three organ injuries and 33.3% for 4≥ organ injuries (Table 2). 9 of 17 patients who died had colon, 3 had duodenum, 3 had liver and 2 % had vessel injuries.

Table 3. Intra-abdominal injured Organ Distribution and The Treatments Implemented.

Injured Organ	(n, %)	Treatments Implemented	(n, %)
Liver	25(8.8)	Primary repair	16(64)
		Packing	7(27)
		Non-operative	2(9)
Stomach	4(1.4)	Primary repair	4(100)
Duodenum	8(2.8)	Primary repair	8(100)
Small Bowel (jejunum and/ or ileum)	66(23.5)	Primary repair	40(60)
		Resection + anastomose	21(32)
		Jejunostomy or ileostomy	5(8)
Colon	89(31.5)	Primary repair	22(24.7)
		Resection + anastomose	12(13.5)
		Colostomy	53(59.5)
		Primary repair + ileostomy or rez-anst.+ileostomy	2(2.3)
Rectum	9(3.1)	Primary repair	3(33.3)
		Primary repair + colostomy	6(66.7)
Spleen	17(6)	Splenectomy	11(65)
		Splenorraphy	6(35)
Diaphragma	19(6.7)	Primary repair	19(100)
Gall bladder	5(1.7)	Cholecystectomy	5(100)
Choledoch	1(0.4)	Primary repair	1(100)
Pancreas	2(0.8)	Non-operative	2(100)
Major Abdominal Vessels	4(1.6)	Primary repair	4(100)
Kidney	10(3.5)	Nephrorrhaphy	7(70)
		Total nephrectomy	3(30)
Ureter	9(3.1)	Primary repair	9(100)
Bladder	13(4.5)	Primary repair	13(100)
Femoral Venous	1(0.3)	Primary repair	1(100)
Penis	1(0.3)	Primary repair	1(100)
TOTAL	283(100)		

Discussion

Our study is an important serie in terms of containing the data that exhibit the points of abdominal injury, organ damages, treatment strategies and mortality numbers of the patients, who were transported to a 3rd level hospital after they have taken the first intervention in the border regions. After Gunshot wounds are an important problem in places, where violence, terror and particularly wars continue. Given the regions throughout the world, where wars continue, particularly the Middle East, it can be understood how big problem it is. People will encounter increasingly with this type of wounding. While abdominal region body surface area is 11%, the rate of abdominal injuries varies between 8-9.4 % [4]. it was determined in a higher rate of 10.1% (175/1721) in our study. Moreover, abdominal injuries increased gradually in wars since the 2nd World War [4]. The rate of multiple organ injuries reach up to 90% in abdominal injuries by firearm [2, 5]. And this rate was found 44.6% (n=78) in our study.

The intra-abdominal organs of liver, small bowel and colon are the organs injured most in injuries by firearm in the literature [2-7]. The injured intra-abdominal organs in our cases were 31.5% colon, 23.5% small bowel and 8.8% liver injuries similarly with the literature.

Complication is one of the important problems in injuries by firearm and it is known that the trauma-appeal time longer than 6 hours, existence of shock during appeal, operation lengths of more than 6 hours, existence of abdominal organ injuries more than 2, existence of extra-abdominal organ injuries more than 2 and multiple blood transfusion increased complication rates [7-9]. We observed that complications affected these factors in our serie as well. It was encountered with complications in 24% of the cases. The most frequently seen complications were the wound site injection, bleeding and pulmonary complications [2-6]. In addition, intra-abdominal abscess developed in 4 patients and all of them were cured successfully through percutaneous drainage.

In the literature, while the cause of death of the patients with abdominal injuries by firearms was bleeding in early period, it is seen that it was infection related sepsis in next periods [2, 3]. While the most frequent cause of death was haemorrhagic shock in previous series [1, 2, 10-13], 12 of the cases in our study died of sepsis and 5 died of haemorrhagic shock. So we observed that the deaths of sepsis were higher for the patients with colon and small bowel injuries, who were intervened 6 hours after wounding, and that wound site infections were higher than normal. And this makes us think that injuries perforating gastrointestinal system should be treated more carefully, due to the fact that they could progress toward sepsis. It was seen that abdominal aortas were affected in 2, and thorax, pelvis and lower extremity, which are non-abdominal body regions, were affected in 3 of the patients died of hemorrhagic shock; and the tendency to hemorrhagic shock increased in these organ and tissue injuries and treatment should be planned in accordance to that.

In the literature, mortality increases up to 45% in injuries by firearm [10-13]. One of the factors affecting these results is the time to reach from the site of injury to the hospital. This time is short in Kuwait, Korea and Vietnam war so that mortality rate is short; but in the Afghanistan war, mortality rate is high because it took few days to reach a hospital (16.7%) [7,11,12].

And in our study, the rate of mortality was found as 9.7%. We think that the mortality rate to be lower in our study is dependent on patients to have hemodynamic stability to endure more than 6 hours time elapsed during transportation from the wounding site to our hospital and the possible deaths of seriously wounded patients during this transportation. In addition, we associate liver injuries to be third in our serie to that, where hemorrhagic shock is frequently seen.

Many factors can have influence on mortality in injuries by firearm. And two of these factors are multiple organ and multiple

system injuries [14]. In our study, mortality was found as 13.8% for patients with more than one system injuries, and as 18% for patients with more than one organ injuries. It was determined that the increase in number of injured intra-abdominal organs and injured systems raised the rate of mortality.

One of the important factors that affects mortality is advanced age and the rate mortality is higher for the patients over the age of 50 [1]. However, in our study, only 2 of 17 patients died were over the age of 50. The reason for this can be shown as crusaders attending to war to be young people below the age of 50.

Diagnosis of intra-abdominal penetration existence is hard for tangential and thoraco-abdominal injuries by firearm. This may cause negative laparoscopies [5]. The diagnostic accuracy of laparoscopy was excellent for retroperitoneal hematomas, hemoperitoneum, solid organ injuries and diaphragmatic lacerations [15,16]. In our study, it was hesitated in determining intra-abdominal penetration in 21 cases. Diagnostic laparoscopy was implemented to all cases. It was determined that intra-abdominal organ injuries existed in 16 and did not exist in 5 of these cases. Negative laparoscopy was determined as 2.9% by us in our study [2, 3].

Conclusions

Abdominal injuries by firearm are the injuries with high morbidity and mortality. If these injuries occur as multiple organ and multiple system injuries, than morbidity and mortality become higher. Besides, intensive care support, length of intensive care unit and the need for blood transfusion increase in such cases. If treatment is started in patients with abdominal injuries by firearm later than 6 hours, the number of infection related complications and mortality increase. Due to the injuries occurring in war times are mostly multiple system and multiple organ injuries, early, fast and efficient intervention in a full-fledged hospital with an experienced staff can decrease morbidity and mortality significantly.

Ethical standard

The study was approved from the Regional Ethics Committee (136/28.08.2014).

Competing interests

The authors declare that they have no competing interests.

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