

Anthropogenic Causes of Civilian Wounds During Local Armed Conflict

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Abstract – There is a large number of scientific works devoted to the study of phased treatment of injured soldiers during world wars and local military conflicts in native and world literature. At the same time, data on civilian casualties in the course of local wars is significantly less covered, although the civilian population suffering and the timely provision of appropriate assistance to them is of great importance in saving certain innocent lives. This article presents research data on the results of surgical treatment of gunshot wounds of the civilian population aged between 17 to 30 years in the context of an armed local conflict in the Chechen Republic from 2000 to 2004 with some description of the results of treatment depending on various parameters, including external reference points of injury and the presence of absolute signs of penetrating wounds.

Keywords – armed conflict, gunshot wounds, penetrating wounds, bullet wounds, civilians

I. INTRODUCTION

For known reasons, gunshot wounds during armed conflicts occupy a significant proportion of the severity and frequency of occurrence and, despite their knowledge, these terms of reference leave many questions for study. [1, 3, 8–11]. Basically, gunshot wounds are studied by military surgeons, whose medical tactics is distributed at different stages in time and location. Assistance also depends on the medical situation, on the development of military operations, on the militant situation [2]. Also, the provision of medical care depends on the localization of combat activity. If they

develop in an urban setting, then more and more opportunities take place, when there is a possibility of taking therapeutic measures in the relevant hospitals [7]. Thus, it turns out that the results of treatment depend on a variety of factors and sometimes different researchers' results may not be comparable.

Purpose. To examine the medical aspects of the treatment of bullet gunshot wounds of civilians in a local military conflict.

II. METHODS AND MATERIALS

The study presents the analysis of the provision of surgical care to 120 victims aged from 17 to 30 years old, delivered to inpatient departments of the city hospital No.9 of Grozny from 2000 to 2004.

Inclusion criteria are: gunshot wounds to the chest, abdomen, combined injuries with simultaneous wounds to the chest and abdomen.

Exclusion criteria: children under 17 years old, wounded with combined gunshot wounds to the head, neck and extremities.

The total number of injured men was 109 (90.3 %) people, women – 11 (9.1 %) of injured. The average age was 24,7±6,3 years.

Assessment of the condition of the wounded at time of admission to the hospital was carried out retrospectively according to the disease history on “MFS-COA” (military field surgery-condition on admittance) scale [4]. According to this scale, four degrees of severity were distinguished – these are mild, moderate, severe, and extremely severe.

All injuries were bullets of various calibers.

The data obtained as a result of the study were statistically processed with the calculation of non-parametric and parametric criteria for the reliability of differences in the values of attributes in the compared groups using “Statistica 7.0” program. The correlation coefficient (r) was used to determine the correlation dependence between different variable values of attributes. The value of the correlation coefficient (r) from 0 to ± 0.29 meant a weak degree of interrelation, the value of the correlation coefficient (r) from 0.3 to ± 0.69 meant a moderate degree of interrelation, and a value from 0.7 to 1.0 meant a strong interrelation.

III. RESULTS

Isolated injuries were detected in 57 (47.5 %) cases out of 120 wounded, combined – in 63 (52.5 %) cases. Distribution of the wounded depending on the injury location is presented in Table 1.

TABLE I. DISTRIBUTION OF THE WOUNDED DEPENDING ON THE INJURY LOCATION

| Nature of damage caused by the bullet | Number of injuries | |
|---------------------------------------|--------------------|------|
| | abs. number | % |
| isolated abdominal injury | 34 | 28.3 |
| isolated chest injury | 23 | 19.2 |
| combined chest and abdominal injuries | 63 | 52.5 |
| Total | 120 | 100 |

As can be seen from the data presented in Table 1, the number of wounded with isolated and combined injury was about the same. At the same time, the analysis showed that with isolated abdominal injuries the trauma of only hollow organs was in 12 (10 %) cases, trauma of only parenchymal organs – in 8 (6.6 %) cases, simultaneous trauma of both parenchymal and hollow organs – in 14 (11.6 %) cases. With isolated chest injury at the time of admission open pneumothorax was detected in 12 (10 %) cases, valve pneumothorax in 3 (2.5 %) cases, and signs of continued bleeding due to heart injury were observed in 8 (6.6 %) cases at the time of admission. Among 63 of the wounded with combined injuries, combined injuries with damage to one anatomical region were noted in 12 (10 %) cases; combined injuries with damage to two anatomical areas – in 21 (17.5 %) of the wounded; combined injuries with damage to three or more anatomical areas – in 30 (25 %) cases.

Distribution of the wounded according to the severity of condition at the time of admission with isolated and combined injuries is shown in Fig. 1. As can be seen from the data presented in Fig., the majority of the wounded at the time of admission had severe or extremely severe conditions. Severity is associated with the frequency of combined and multiple injuries of abdominal organs, the volume of blood loss, as well

as the presence of shock. At the same time, the wounded with a moderate degree of severity prevailed in the group with isolated injuries, and with a severe and extremely severe condition – in the group with combined injuries.

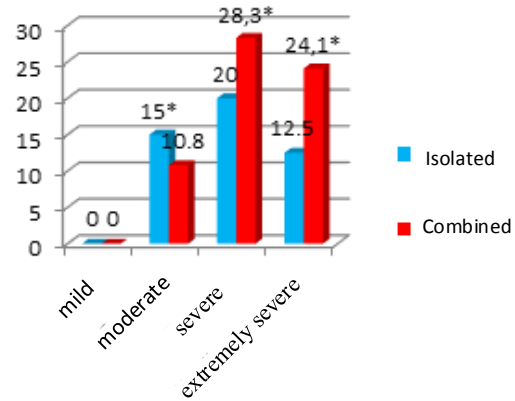


Fig. 1. Distribution of the wounded according to the severity of condition at the time of admission with isolated and combined injuries. Note: * – statistical assurance sign (p < 0.05)

In the absolute majority of cases, the wounded were delivered to the hospital either by relatives or bystanders on passing vehicles, and besides bypassing the reception ward directly to the inpatient unit or surgery block, where the wounded was examined and prepared for surgery. If, evisceration of the intestines or omentum into the wound was detected, or signs of parenchymal bleeding or bleeding associated with damage to the hollow organ, then the issue of emergency surgery was immediately addressed. In the operating room, the entire surface of the body was examined to identify the location of injuries in preparation for the operation. It is necessary to indicate that in conditions of limited diagnostic capabilities, signs of gunshot wounds of the chest and abdomen are of great importance – these are hemoptysis, air absorption through the wound, emphysema, the presence of intestinal contents or stomach contents in the wound, intestinal loops in the wound, local status, etc. These symptoms allow us to quickly determine the penetrating or non-penetrating nature of injuries. Degree of incidence of the main symptoms in the wounded is presented in Table 2.

TABLE II. DEGREE OF INCIDENCE OF THE MAIN SYMPTOMS IN THE WOUNDED

| Symptoms | Degree of incidence | |
|---|---------------------|-------|
| | abs. number | % |
| Hemoptysis | 45 | 37.5* |
| Air absorption through the wound | 19 | 15.8 |
| Cutaneous emphysema | 21 | 17.5 |
| Presence of loops of intestines or omentum in the wound | 28 | 23.3* |
| Selection of pathological contents in the wound | 13 | 9.2 |

^a. Note: * – statistical assurance sign (p < 0.05)

As can be seen from the data presented in Table 2, the presence of reliable signs of a penetrating injury at the time of

admission was detected in 60 (50 %) of injured, 23 (19.1 %) with isolated injuries are among them and 37 (30.8 %) – with combined injuries. The presence of reliable signs of penetrating wounds and unstable hemodynamics were an indication for performing laparotomy and/or thoracotomy without initial surgical debridement (ISD). There were 74 of such wounded (61.6 %), 28 (23.3 %) of whom were with isolated injuries and 46 (38.3 %) – with combined injuries. In other cases, the performance of surgical treatment began with an ISD of wound under local anesthesia.

Thoracotomy was performed in 12 (10 %) cases out of 86 wounded with chest injuries, in 2 (1.6 %) cases with isolated injuries and in 10 (8.3 %) with combined injuries. The indications for performing this type of surgical treatment were signs of heart injury in 8 cases, signs of esophagus injury in 2 cases, and signs of continued bleeding in 2 cases. The following types of surgical treatment were performed: wound closure of heart – in 6 (5 %) cases; wound closure of esophagus – in 2 (1.6 %) cases; atypical resection of lungs – in 2 (1.6 %) cases; in 2 (1.6 %) cases, the conducted thoracotomy can be considered unjustified. The thoracostomy was carried out in the rest 74 (61.6 %) cases.

Development of 38 (31.6 %) complications was recorded in the immediate postoperative period in the wounded of this group. The number of complications in the wounded with gunshot chest injuries in the immediate postoperative period is presented in Table 3.

TABLE III. NUMBER OF COMPLICATIONS IN THE WOUNDED WITH GUNSHOT CHEST INJURIES IN THE IMMEDIATE POSTOPERATIVE PERIOD

| Nature of complication | Number of complications in groups | | | |
|------------------------|-----------------------------------|------|-------------------|------|
| | isolated injuries | | combined injuries | |
| | abs. number | % | abs. number | % |
| pneumonia | 8 | 6.6 | 16 | 13.3 |
| mediastinitis | – | – | 1 | 1.2 |
| exudative pleuritis | 4 | 3.3 | 6 | 5 |
| myocarditis | 2 | 1.6 | 1 | 1.2 |
| Total | 14 | 11.6 | 24 | 20 |

TABLE IV. NUMBER OF FATAL CASES IN THE WOUNDED WITH GUNSHOT CHEST INJURIES IN THE IMMEDIATE POSTOPERATIVE PERIOD

| Cause of the fatal case | Number of fatal cases in groups | | | |
|-------------------------|---------------------------------|-----|-------------------|-----|
| | isolated injuries | | combined injuries | |
| | abs. number | % | abs. number | % |
| hemorrhagic shock | 2 | 1.6 | 2 | 1.6 |
| wound shock | 1 | 1.2 | 4 | 3.3 |
| pneumonia | 4 | 3.3 | 3 | 2.5 |
| sepsis | – | – | 2 | 1.6 |
| Total | 7 | 5.8 | 11 | 9.1 |

As can be seen from the data presented in Table 3, a greater number of complications – 24 (20 %) was registered in the group with combined injuries.

18 (15 %) fatal cases were recorded in the wounded of this group in the immediate postoperative period.

The causes and number of fatal cases are presented in Table 4.

As can be seen from the data given in Table 4, the highest mortality was registered in the group with combined injuries,

which is explained by the fact that more severe wounded men prevailed in this group at the time of admission, and the presence of combined injuries, a greater amount of blood loss, naturally leads to an increase in death.

Inspection of the injured, physical examination of the wounded was carried out with gunshot abdominal injuries in order to diagnose injuries of the abdominal cavity. If necessary, a diagnostic microlaparotomy was performed due to the lack of indications; laparocentesis was not performed to the injured. We did not appeal to additional methods of research in cases where there were clear signs of intra-abdominal bleeding, rupture of hollow or parenchymal organs, which definitely indicated a penetrating wound. Diagnostic microlaparotomy was performed in certain cases when the wound clinic was erased, but there were clear signs of a penetrating wound to the abdomen, such as two wound holes (inlet and outlet) without signs of damage to internal organs, or one inlet. It was possible to identify the presence of pathological content, its nature in this case. The very fact of having such contents in the free abdominal cavity is already a direct sign of a penetrating wound to the abdomen. Emergency surgery is the only correct solution for providing surgical care to patients with a gunshot wound to the abdomen. This intervention pursues the goals of both the diagnosis and treatment process to eliminate damage to internal organs and bleeding. Time is very important in such cases. The time that elapsed from the moment the patient entered the hospital to the laparotomy incision was 18±6 minutes. The most frequent access was median laparotomy, which allowed solving all problems, starting with revision of internal organs and ending with their closure, if necessary, in accordance with all canons of surgery. Distribution of wounds of abdominal internal organs with isolated and combined gunshot injuries is presented in Table 5 (percentage is given of the total number of wounded).

TABLE V. DISTRIBUTION OF WOUNDS OF ABDOMINAL INTERNAL ORGANS WITH ISOLATED AND COMBINED GUNSHOT INJURIES

| Damaged organ | Number of injuries in groups | | | |
|-----------------|------------------------------|------|-------------------|-------|
| | isolated injuries | | combined injuries | |
| | abs. number | % | abs. number | % |
| Stomach | 1 | 0.8 | 7 | 5.8* |
| Small intestine | 12 | 10 | 10 | 8.3 |
| Large intestine | 2 | 1.6 | 5 | 4.1* |
| Liver | 9 | 7.5 | 13 | 10.8* |
| Pancreas gland | – | – | 5 | 4.1 |
| Kidney | – | – | 10 | 8.3* |
| Spleen | 1 | 0.8 | 7 | 5.8* |
| Total | 25 | 20.8 | 57 | 47.5* |

^b Note: * – statistical assurance sign (p < 0.05)

As can be seen from the data presented in Table 5, internal injuries prevailed in the group of wounded with combined injuries. The scope of surgery was individual in nature, if it was possible to preserve the organ, or perform its resection. In case of injury of the hollow organs (stomach, small intestine), they were sutured. If the small intestine was damaged, the corresponding part of the intestine with the “side-to-side” anastomosis was applied in 82 % cases. Stoma had to be imposed in 65 % of patients with large intestine injuries.

Development of 43 (35.8 %) complications was recorded in the immediate postoperative period in this group of wounded, the nature and number of which are presented in Table 6 (of the total number of injured).

TABLE VI. NUMBER OF COMPLICATIONS IN THE WOUNDED WITH GUNSHOT ABDOMINAL INJURIES IN THE IMMEDIATE POSTOPERATIVE PERIOD

| Nature of complication | Number of complications in groups | | | |
|----------------------------------|-----------------------------------|------|-------------------|------|
| | isolated injuries | | combined injuries | |
| | abs. number | % | abs. number | % |
| pneumonia | 6 | 5 | 12 | 10* |
| post-traumatic pancreatonecrosis | – | – | 2 | 1.6 |
| early adhesive obstruction | 1 | 0.8 | 2 | 1.6 |
| peritonitis | 2 | 1.6 | 10 | 8.3* |
| infiltrate of abdominal space | 4 | 3.3 | 4 | 3.3 |
| Total | 13 | 10.8 | 30 | 25* |

^c Note: * – statistical assurance sign (p < 0.05)

As can be seen from the data presented in Table 6, the greatest number of complications – 25 % was developed in the group of wounded with combined injuries. The severity of the condition at admission, the presence of combined injuries, the development of a greater number of complications, undoubtedly, had an impact on fatal case in the immediate postoperative period. In total, the development of 54 (45 %) fatal cases was recorded in this group of wounded. The causes and number of fatal cases are presented in Table 7 (percentage is given of the total number of wounded).

TABLE VII. NUMBER OF FATAL CASES IN THE WOUNDED WITH GUNSHOT ABDOMINAL INJURIES IN THE IMMEDIATE POSTOPERATIVE PERIOD

| Cause of the fatal case | Number of fatal cases in groups | | | |
|----------------------------------|---------------------------------|-----|-------------------|------|
| | isolated injuries | | combined injuries | |
| | abs. number | % | abs. number | % |
| hemorrhagic shock | 6 | 5 | 12 | 10* |
| wound shock | 4 | – | 10 | 8.3* |
| pneumonia | 1 | 0.8 | 8 | 6.6* |
| post-traumatic pancreatonecrosis | – | – | 2 | 1.6 |
| peritonitis | – | – | 4 | 3.3 |
| sepsis | 1 | 0.8 | 6 | 5 |
| Total | 12 | 10 | 42 | 35* |

^d Note: * – statistical assurance sign (p < 0.05)

Thus, the presented study shows that bullet gunshot wounds of the civilian population in a local conflict situation are characterized by multiple and combined injuries, which causes the severity of the condition of the wounded at the time of admission. The course of the immediate postoperative period with such injuries is characterized by high mortality rates and a large number of complications. This does not contradict and is confirmed by previously submitted studies [5, 6, 12].

IV. RESULTS

1. Reference points of injury, severity of the condition, absolute signs of the penetrating nature of injuries are most important when deciding on surgical intervention in case of gunshot injuries of the civilian population in a local conflict.

2. Gunshot wounds of the civilian population in a local military conflict are more often combined. The lack of a proper system of pre-hospital and hospital medical care, entailing a lack of continuity in treatment and post-hospital rehabilitation in combination with insufficiently trained medical staff are the main shortcomings in providing surgical care to patients with appropriate injuries.

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