

# CLINICAL ASPECTS OF DISASTER MEDICINE КЛИНИЧЕСКИЕ АСПЕКТЫ МЕДИЦИНЫ КАТАСТРОФ

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## АНАЛИЗ РЕЗУЛЬТАТОВ ЛЕЧЕНИЯ РАНЕНИЙ МАЛОГО ТАЗА С ПОВРЕЖДЕНИЕМ ОРГАНОВ РЕПРОДУКТИВНОЙ СИСТЕМЫ У ЖЕНЩИН В УСЛОВИЯХ ЛОКАЛЬНОГО ВООРУЖЕННОГО КОНФЛИКТА

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**Резюме.** Цель исследования – проанализировать результаты лечения огнестрельных ранений малого таза с повреждением органов репродуктивной системы у женщин в условиях локального вооруженного конфликта. **Материалы и методы исследования.** Выполнен ретроспективный анализ результатов лечения 86 пациенток с огнестрельными ранениями в области малого таза с повреждением половых органов. Все пациентки – лица из населения. Лечение проходило в городской клинической больнице г. Грозного в 1997–2005 гг. Средний возраст пациенток – (25±7) лет. В исследование были включены пациентки фертильного возраста с огнестрельными ранениями в области малого таза с повреждением органов репродуктивной системы. Исключались из исследования пациентки: моложе 18 и старше 45 лет; с сочетанными повреждениями груди, головы, конечностей и пациентки в агональном состоянии.

**Результаты исследования и их анализ.** Результаты исследования показали, что большинство женщин получили тяжелые повреждения, что привело к развитию кровотечения, болевому синдрому и – как следствие – к шоку. Тяжелые повреждения часто сочетались с повреждениями органов малого таза и требовали выполнения широкой лапаротомии и ревизии органов брюшной полости. Наличие на момент поступления признаков перитонита, обусловленных сопутствующими повреждениями, ограничивало выбор тактики.

В ближайшем послеоперационном периоде в 24,4% случаев имели место осложнения, связанные, главным образом, с гнойно-воспалительными процессами. Умерли 19 пациенток (22,1%). Основные причины летального исхода: шок – 15,1% случаев; гнойно-септические осложнения – 6,9% случаев.

Сделан вывод: тяжелые огнестрельные ранения органов малого таза у женщин, сопровождающиеся повреждением репродуктивной системы, характеризуются тяжелым послеоперационным течением, большим количеством летальных исходов и требуют экстренной госпитализации в многопрофильный стационар.

**Ключевые слова:** женщины, локальный вооруженный конфликт, малый таз, огнестрельные ранения, органы репродуктивной системы

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## ANALYSIS OF THE RESULTS OF TREATMENT OF PELVIC INJURIES WITH REPRODUCTIVE SYSTEM DAMAGE IN WOMEN IN CONDITIONS OF LOCAL ARMED CONFLICT

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**Summary.** The aim of the study was to analyze the results of treatment of pelvic gunshot wounds with damage to the reproductive system organs in women in a local armed conflict.

**Materials and research methods.** A retrospective analysis of the results of treatment of 86 patients with pelvic gunshot wounds with genital damages was performed. All the patients were members of the general population. Treatment was carried out at Grozny City Clinical Hospital in 1997-2005. The mean age of patients was (25±7) years. Female patients of fertile age with gunshot wounds in the pelvic area with damages of reproductive organs were included in the study. The following patients were excluded: patients younger than 18 and older than 45 years; patients with concomitant injuries of the chest, head, limbs, and patients in agonal state.

**Study results and their analysis.** The results of the study showed that most of the women had severe injuries, which resulted in bleeding, pain syndrome and shock as a consequence. Severe injuries were often combined with pelvic injuries and required wide laparotomy and revision of the abdominal cavity organs. The signs of peritonitis due to concomitant injuries at the moment of admission limited the choice of tactics.

In the nearest postoperative period the complications were related mainly to the purulent-inflammatory processes in 24.4% of cases. Nineteen patients died (22.1%). The main causes of lethal outcome were: shock in 15.1% of cases; purulent-septic complications in 6.9% of cases.

It has been concluded that severe gunshot wounds of the pelvic organs in women, accompanied by the reproductive system injuries, are characterized by a severe postoperative course, a great number of lethal outcomes and require urgent hospitalization in a multidisciplinary hospital.

**Key words:** gunshot wounds, local armed conflict, reproductive system organs, small pelvis, women

**Conflict of interest.** The authors declare no conflict of interest

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### Introduction

In local armed conflicts (LAC) not only servicemen are injured but also the population. One of the most severe wounds is the wound in the area of the small pelvis characterized by high lethality rate which reaches 17.2% [1]. To reduce the number of complications and lethal outcomes when this anatomic region is injured, it is necessary to improve the organization of pre-hospital care, to provide primary medical care as quickly as possible, which is not always feasible in the conditions of civil health care during military operations [2]. Anatomically, there are a large number of organs in the pelvis that perform a number of important functions; in women, it is primarily the organs of the reproductive system, damage to which can lead to serious complications associated with the loss of childbearing function. Thus, according to a number of studies, the loss of this function in women leads to the development of a number of severe conditions associated primarily with psychological problems [3-5]. Despite the relevance and complexity of this problem, such issues as the provision of medical care at different stages in pelvic wounds with damage to the reproductive system are insufficiently covered in the current literature.

**The aim of the study** was to analyze the treatment of gunshot wounds of the minor pelvis with damages to the reproductive system in women in a local armed conflict.

**Materials and methods.** Retrospective analysis of treatment of 86 female patients (all populations) with pelvic gunshot wounds with genital damages was performed. The patients were treated at Grozny City Clinical Hospital in 1997-2005. The mean age of the patients was (25±7) years. Patients of fertile age, who were admitted with gunshot wounds in the pelvic area with injuries of reproductive organs, were included in the study. The following patients were excluded from the study: patients younger than 18 and older than 45 years; patients with concomitant injuries of the chest, head, extremities; patients in agonal state. Splinter wounds predominated in 67 cases (77.9%), shrapnel wounds were noted only in 19 cases (22.1%). Isolated injuries of the female genitalia were noted in 57 cases (66.3%), while multiple injuries of the pelvic organs were noted in 29 cases (33.7%). The most frequent concomitant injuries were bladder wounds in 16 cases (18.6%), rectal wounds in 7 cases (8.1%), and sigmoid injuries in 6 cases (6.9%). Twenty-eight women (32.5%) were delivered to a medical institution in a state of shock of varying severity.

ty. Among them, 10 (11.2%) had stage I shock, 12 (13.9%) — stage II, 6 (6.9%) — stage III. With such injuries the period of hospitalization ranged from 20 minutes to 1.5 days. In the overwhelming majority of cases, 73 (84.8%) victims were transported by their relatives by car, and in these cases no first aid was administered. Only in 13 cases (15.1%) the wounded were delivered by medical teams in a specialized vehicle, in these cases they were treated with non-narcotic analgesics, wound treatment, infusion therapy, hemostasis.

All women were divided into two subgroups: the first included 43 women (48.3%) whose time of delivery did not exceed 1.5 h; the second included 43 women (48.3%) whose time of delivery from the moment of injury exceeded the specified period.

Assessment of the severity of the wounded upon admission to a medical facility was done retrospectively using the "VPKh-SP" scale. According to this scale, the condition was considered satisfactory at 12 points, moderate at 13-20 points, severe at 21-31 points, extremely severe at 32-45 points, and terminal at over 45 points [6].

The study was authorized by the local ethical committee of the "Reaviz" Medical University, Minutes № 6, dated 09.01.2021.

For mathematical processing of the results, the study was initially entered into an electronic database. Analysis of the results was carried out using descriptive statistics. The X2 criterion of agreement was used as the criterion. Statistical significance was defined as  $p < 0.05$ . To establish correlation relations we used non-parametric Spearman criterion ( $r$ ). Interpretation of the correlation coefficient was made on the basis of correlation strength level:  $r > 0,01-0,29$  — weak positive relation;  $r > 0,30-0,69$  — moderate positive relation;  $r > 0,70-1,00$  — strong positive relation.

**Results of the study and their analysis.** Given the fact that the medical institution during this period of time was working in combat conditions, this could not but affect its work. First of all, there was a shortage of highly qualified obstetricians and gynecologists, and as a result the surgeries for such injuries were often performed without their involvement. Another important factor was a lack of equipment. Therefore, the medical team had to be guided by a minimal scope of examination, which included examination, palpation, and general blood count (GBC) and urinalysis at the moment of wounded patients' admission. The diagnosis of a pelvic wound without additional methods of examination was made in 39 observations (45.3%), the remaining 47 observations (54.6%) required additional examinations, of which the most frequent were non-invasive methods. Abdominal ultrasonography (US) was performed in 25 observations (29.1%). In 15 observations (17,4%) the abdominal cavity radiography was performed. In the majority of cases (68 cases (79,1%)) the operative intervention, as a rule, began with the primary surgical treatment (PST) of the wound channel under local anesthesia. We refused to perform PST when the wounded person was in a serious condition due to shock, as well as in the presence of reliable signs of penetrating wound of the abdominal cavity, which was observed in 8 cases (9.3%).

The severity of the condition of the patients at the time of their admission to a hospital: satisfactory — in 12 cases (13.9%); moderate severity — in 13 (15.1%); severe — in 34 (39.5%); extremely severe — in 15 (17.4%); terminal condition — in 12 cases (13.9%). Severity of condition in subgroups: in the 1st subgroup: satisfactory condition — 9

cases (10,5%); moderate — 10 (11,6%); severe — 18 (39,5%); extremely severe — 3 (4,5%); terminal condition — 2 cases (2,3%). In the 2nd subgroup: satisfactory in 3 observations (4.5%) — ( $r = 0.85$ ;  $p < 0.05$ ); moderate — in 3 (4.5%) — ( $r = 0.85$ ;  $p < 0.05$ ); severe — in 16 (18.6%) — ( $r = 0.15$ ;  $p > 0.05$ ); extremely severe in 12 (13.9%) — ( $r = 0.84$ ;  $p < 0.05$ ); terminal state in 10 observations (11.6%) — ( $r = 0.87$ ;  $p < 0.05$ ). The data presented show that in the 1st subgroup, the predominant patients were those whose condition at the time of admission was considered satisfactory and of moderate severity — 19 (22.1%) and 6 (6.9%), respectively. In the 2nd subgroup, there were 8 (9.3%) and 22 (25.6%) wounded in an extremely grave and terminal condition, respectively. It should be noted that the number of wounded whose condition was considered severe was approximately the same in both subgroups, 18 (20.9%) and 16 (18.6%), respectively. The severity of state was due to: shock — 21 cases (24.4%); comorbid injuries — 29 (33.7%); peritonitis due to concomitant injuries — 19 cases (22.1%). Shock of varying severity was noted in 18 cases (20.9%) in the 1st subgroup, and in the 2nd group — in 3 cases (3.5%) ( $r = 0.93$ ,  $p < 0.05$ ). It should be noted that in the 1st subgroup, two patients (2.3%) had signs of peritonitis; in the 2nd subgroup, 27 patients (28.1%) had signs of peritonitis ( $r = 0.93$ ,  $p < 0.05$ ). Thus, patients with shock predominated in the 1st subgroup; patients with peritonitis predominated in the 2nd subgroup. Most of the wounded in the 1st and 2nd subgroups, 35 (36.4%) and 41 (42.7%), respectively, required preoperative preparation to stabilize their condition before surgical intervention. Preparation time ranged from 15 min to 2 h, on average, ( $32 \pm 6$ ) min.

There were gunshot wounds of female genitalia in 15 cases (17.4%), in the 1st subgroup — in 8 cases (8.3%), in the 2nd subgroup — in 7 cases (8.1%) ( $r = 0.12$ ;  $p > 0.05$ ). It should be noted that such isolated injuries were noted in 3 observations (3.5%). In all cases in the 1st subgroup such injuries were accompanied by abundant bleeding and resulted in shock. In these cases the surgical tactics was to perform PST of the wound, hemostasis, suturing. Among other gunshot injuries of the genitals we can single out in the 1st subgroup: perineal and vaginal wounds — 13 observations (15.1%), — 9 (10.5%) and in the 2nd group — 4 (4.6%) ( $r = 0.76$ ,  $p < 0.05$ ); uterine appendage wounds — 18 observations (20.9%), in subgroups 10 (11.6%) and 8 (9.3%) respectively ( $r = 0.86$ ,  $p < 0.05$ ); wounds of the uterine body — 21 observations (24.4%): — 9 persons. ( $r = 0.86$ ,  $p < 0.05$ ); uterine ligament apparatus injury — 2 cases (2.3%), all of them in the 1st subgroup. Combined injury of several organs in 11 cases (12.8%), in the 1st subgroup — 8 (9.3%), in the 2nd group — 3 cases (3.5%) ( $r = 0.76$ ,  $p < 0.05$ ). Most of the patients had severe injuries, which led to the development of bleeding, pain syndrome and, as a consequence, to shock. The presence of such severe injuries, which were often combined with damage to the pelvic organs, dictated the need to perform a wide laparotomy and revision of the abdominal cavity organs. As already emphasized, in combat conditions there were not enough obstetricians-gynecologists who could choose an adequate volume. On the other hand, there were signs of peritonitis due to concomitant injuries by the time of admission, which also limited the choice of tactics. Thus, the analysis showed that in two cases (2.3%) of uterine ligament apparatus wounds it was sutured with abdominal cavity drainage. In 18 patients (20.9%) with the uterine appendages injury, abdominal

cavity drainage was performed in all cases. At the same time, an individual approach was required in 10 cases (11.6%) of such wounds, partial resection was performed in 4 cases (4.6%), and ovarian resection was performed in the remaining 6 cases (6.9%). This was due to the fact that in most cases there was tissue crushing, making it impossible to preserve the ovary.

Individual assessment of uterine body wounds was required. Out of 21 cases of such wounds (24.4%), the uterus was saved only in 6 cases (6.9%), all of them being patients of the 1st subgroup. The uterus was amputated in the remaining 15 cases (17.4%). In such cases, the choice of treatment method depends on the nature of the organ wound — if the wound was tangential, not penetrating into the uterine cavity, it was preserved; presence or absence of peritonitis due to concomitant injuries was also taken into account. Even if the uterine wound was small, in the presence of peritonitis, uterine removal was considered to be the operation of choice.

In 13 wounded patients (15.1%) with perineal and vaginal injuries without signs of penetrating wounds into the abdominal cavity and wounds of adjacent organs and the bladder, suturing was performed in all cases.

The most difficult wounds in terms of the choice of tactics were those in which several female genital organs were injured. In 11 patients with such wounds (12.8%), it was impossible to perform organ-preserving surgery in any of the cases: the operation resulted in the removal of the uterus with appendages in all cases.

Among other surgeries for such injuries we should mention: Hartmann's operation performed in 6 cases (6.9%) because of sigmoid wound; colostomy placement in 7 cases (8.1%) because of rectal injury; cystostomy placement in 9 cases (10.5%) because of bladder injury.

The course of the nearest postoperative period showed that complications developed in 21 cases (24.4%). Among the 1st subgroup patients, 9 cases (10.5%); in the 2nd subgroup — 12 cases (13.9%) ( $r = 0.86$ ,  $p < 0.05$ ). The main complications in the subgroups were related to purulent-inflammatory processes — purulence of the postoperative wound — in 3 (3,5%) and 7 cases (8,1%), respectively ( $r = 0,87$ ,  $p < 0,05$ ); in the 2nd subgroup there was flaccid peritonitis in two observations (2,3%), which required elective relaparotomy. Nineteen patients died (22.1%), in the 1st subgroup — 5 (5.8%), in the 2nd group — 14 (16.3%) ( $r = 0.87$ ,  $p < 0.05$ ). The major causes of death were: in 13 cases (15.1%) — shock, in 6 cases (6.9%) — purulent-septic complications. Important factors influencing the course of the immediate postoperative period include: the time interval from the injury until the surgical treatment; the amount of blood loss; the quality of medical care in the pre-hospital period, including the implementation of antishock measures. The analysis showed that the average volume of blood loss in the patients with wounds in this area was  $(800 \pm 20)$  ml. In the 1st subgroup blood loss volume was slightly lower and was  $(400 \pm 50)$  ml, in the 2nd subgroup —  $(700 \pm 100)$  ml. This factor did not have a significant effect on the course and outcome of the immediate postoperative period, which can be explained by the fact that the volume of this blood loss cannot be considered critical. In our opinion, the lack of antishock measures in the pre-hospital period had a great impact. As shown by the results of our studies, antishock measures were carried out only in 13 observations (15.1%), and in all cases such measures were carried out in the 1st subgroup and in-

cluded adequate anesthesia and intravenous infusion. Another factor influencing the development of complications and mortality was the time interval from the injury to the start of surgical treatment. As already mentioned, this interval was: in the 1st subgroup — not more than 1.5 h on average ( $850 \pm 15$ ) min, and in the 2nd subgroup —  $(1200 \pm 13)$  min. It should also be noted that the time of patients' delivery to the hospital before surgical treatment was not more than  $(10 \pm 3)$  minutes in the subgroups.

**Discussion.** The presented data characterize the seriousness of the problem of gunshot wounds to the pelvic area with damage to the reproductive system organs. Such wounds are accompanied by a large number of postoperative complications, the proportion of which reaches 24.4% and 22.1% of lethal outcomes. Such considerable numbers are related to a number of factors — the first of them is the failure to render first aid in the majority of cases, which resulted in the aggravation of the wounded state. The pelvic organs are known to have a good blood supply and even small wounds lead to significant blood loss. The second reason we can point out is the large number of concomitant injuries of the small pelvic organs, which could not but affect the development of pelvic peritonitis, and consequently, the tactics. The third reason is the late call for medical help — 50% of the wounded people sought medical help later than 1.5 h from the moment of injury, often already with signs of peritonitis. Undoubtedly, the problem of treatment tactics for such wounds remains difficult to solve. Taking into account the fact that women of fertile age participated in the study, in a large number of cases the uterus was removed, which affected the psychological state of the woman. However, the choice of this tactic was adequate in the vast majority of cases, which, in turn, was related to the nature of the organ injury, concomitant injuries and peritonitis. It should be noted that despite the fact that the analyzed material is presented in a rather long time frame and many years have passed since the events described, it does not lose its relevance. Undoubtedly, over such a long period of time there have been changes in the diagnosis and treatment of such injuries. In our opinion, based on modern realities, endoscopic diagnostic methods should be introduced more widely, allowing to diagnose more accurately and quickly, and to perform extended volume surgeries. As a result, it is possible to preserve reproductive organs in a large number of women, especially of the reproductive age.

### Conclusion

1. Gunshot wounds of the pelvic organs are accompanied by a great number of postoperative complications, the rate of which reaches 24.4% and the lethal outcome — 22.1%.

2. The number of complications and lethal outcomes is influenced by: failure to render first aid; a large number of concomitant injuries of the small pelvis organs; late medical aid-seeking.

3. Wounds of the uterus lead to a rather high proportion of amputations — 17.4%. In such cases, the choice of treatment method depends on: the nature of the organ wound — if the wound was tangential, not penetrating into the uterine cavity, the uterus was preserved; on the presence or absence of peritonitis due to concomitant injuries. In the presence of peritonitis, even if the uterine wound was small, its removal was considered to be the operation of choice.

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