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Ways to improve the results of treatment of severe combined pelvic injuries in modern conditions

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Objective. To analyze the treatment of victims with severe combined pelvic trauma in the conditions of the existing trauma care system in Ukraine and to identify ways to improve the results of treatment of such injuries. *Methods.* The work was based on a study of the results of treatment of 406 victims with unstable pelvic injuries in polytrauma (UPIP) ($ISS \geq 17$ points). Of these, 249 (61.3 %) patients died in different periods of traumatic illness (TI). Two clinical groups were formed: the first — 137 (33.7 %) patients, in whom differential surgical treatment tactics were performed based on the developed scales for assessing the severity of injury, the prognosis of the course of TI depending on its periods, as well as the proposed modern methods of diagnosis and surgical treatment of injuries of the pelvis and other anatomical areas, the second — 269 (66.3 %) patients, in whom generally accepted surgical treatment tactics were used. *Results.* Active surgical tactics using a differential approach allowed to increase the number of internal (combined) metal osteosynthesis in this category of victims from 40.4 to 72.1 %, to reduce the proportion of conservative treatment from 53.7 to 30.6%, and the active implementation of an improved protocol scheme for surgical treatment of victims with NUTP during hospitalization allowed to reduce mortality in the acute period of TC (up to 48 hours) from 77.7 to 63.9 %, $p < 0.05$, overall mortality from 69.9 to 44.5% ($p < 0.01$). *Conclusions.* The timing of delivery of a victim with a severe combined pelvic injury to a specialized trauma department is crucial at the prehospital stage of saving the patient's life. The tactics of surgical interventions for injuries of extrapelvic localization, unstable pelvic fractures, pelvic organ trauma in the acute period of TI should be based on urgent indications, aimed primarily at stopping intrapelvic bleeding, the possibility of conducting single-stage or sequential emergency external fixation of the pelvic ring.

Мета. Проаналізувати лікування постраждалих із тяжкою поєднаною травмою таза в умовах існуючої системи надання травматологічної допомоги в Україні та визначити шляхи покращення результатів. *Методи.* Досліджено результати лікування 406 постраждалих із нестабільними ушкодженнями таза в разі політравми (НУТП) ($ISS \geq 17$ балів). Із них 249 (61,3 %) пацієнтів померли в різні періоди травматичної хвороби (ТХ). Сформовано дві клінічні групи: перша — 137 (33,7 %) осіб, у яких проводилась диференційна тактика операційних втручань на основі розроблених шкал оцінки тяжкості травми, прогнозу перебігу ТХ залежно від її періодів, а також запропонованих сучасних методів діагностики і хірургічного лікування ушкоджень таза й інших анатомічних ділянок; друга — 269 (66,3 %) пацієнтів, яким застосовували загальноприйняті втручання. *Результати.* Активна оперативна тактика з використанням диференційного підходу дозволила збільшити кількість внутрішнього (комбінованого) металоостеосинтезу в цій категорії постраждалих з 40,4 до 72,1 %, зменшити питому вагу консервативного лікування з 53,7 до 30,6 %, а активне впровадження удосконаленої протокової схеми втручань в осіб із НУТП під час госпіталізації дозволило знизити летальність у гострому періоді ТХ (до 48 годин) з 77,7 до 63,9 % ($p < 0,05$), загальну летальність із 69,9 до 44,5 %, ($p < 0,01$). *Висновки.* Термін доставлення постраждалого з тяжкою поєднаною травмою таза до спеціалізованого травматологічного відділення має вирішальне значення на догоспітальному етапі для збереження його життя. Тактика операційних втручань у разі ушкоджень позатазової локалізації, нестабільних переломів таза, травми тазових органів у гострому періоді ТХ повинна ґрунтуватися на невідкладних показаннях, направлених на зупинку внутрішньотазової кровотечі, із можливістю проведення одномоментної або послідовної екстреної зовнішньої фіксації тазового кільця. *Ключові слова.* Політравма, нестабільний таз, хірургічне лікування.

Keywords. Polytrauma, unstable pelvis, surgical treatment

Introduction

In the context of polytrauma, pelvic injuries constitute approximately 11.6 % to 15.3 % of cases [5, 10]. Modern injuries of this location are mainly (in 60–70 % of cases) severe multiple and combined. The quality of medical care organization at the incident scene is crucial during treatment. According to the German trauma registry, injuries to the abdomen and pelvic bones are observed in 25–35 % of all cases in patients with polytrauma with a mortality rate of up to 55 % [5]. Irreversible blood loss due to intrapelvic bleeding is the main cause of mortality in the acute period of injury in 10–58 % of cases [4]. The average hospitalization time of patients with polytrauma in Germany and the USA is from 18 to 46 minutes [5], with the majority using aeromedical evacuation (helicopters). At the same time, more than 90 % of cases in Ukraine are delivered by ambulance.

The quality of treatment at the hospital stage largely depends on the equipment of the hospital, the availability of specialists (surgeon, anesthesiologist, traumatologist, neurosurgeon), knowledge and practical skills in the basic treatment and tactical algorithms for unstable pelvic injuries and trauma to other anatomical areas, which, in turn, is determined by the presence in the country of institutions (trauma centers) for the development of schemes (guidelines, protocols) and practical training of specialists for different levels of medical care (district, city, regional hospitals). In most developed countries, regional trauma systems have been created to transport patients from the place of injury to specialized trauma centers (TCs) of various levels. At the same time, the type of ambulance transport and the level of TCs are determined by the severity of the patient's injury. Rapid transportation of patients with severe combined trauma to level 1 trauma centers can be achieved if there is the necessary number, completeness of territorial coverage and transport accessibility of these trauma centers. For example, in Germany in 2006, there were 108 level 1 trauma centers, 209 level 2, and 431 level 3–4 centers [5].

Purpose: to conduct an analysis and identify ways to improve the results of treatment of patients with severe combined pelvic trauma in the existing trauma care system in Ukraine.

Material and methods

The study materials were reviewed and approved by the Bioethics Committee (protocol No. 70 dated 25.03.2024). All patients gave informed consent.

The study was based on an assessment of the treatment outcomes (prehospital and hospital stages)

of 406 patients with unstable pelvic injuries in case of polytrauma (UIP) (ISS ≥ 17 points), undergoing inpatient treatment in the polytrauma department of Kyiv City Clinical Hospital of Emergency Medical Care (“KCC HEMC”). Of these, 249 (61.3 %) patients died at different periods of traumatic condition. To establish directions for improving the treatment outcomes of patients with severe combined pelvic injuries in the conditions of the existing trauma care system in Ukraine, two clinical groups were formed using the example of “KCC HEMC”. The first (main) group included 137 (33.7 %) subjects who underwent differential surgical intervention tactics based on the developed scales for assessing the severity of trauma, the prognosis of the course of traumatic condition (TC) depending on its periods, as well as the proposed modern methods of diagnosis and surgical treatment of pelvic injuries and other anatomical areas (AA). The second (comparison) group consisted of 269 (66.3 %) patients who were treated with surgical tactics in accordance with the “Temporary Industry Unified Standards of Medical Technologies for the Diagnostic and Treatment Process of Inpatient Care for the Adult Population in the Hospitals of Ukraine”, approved by the Order of the Ministry of Health of Ukraine No. 226 dated 27.07.1998. All the patients were hospitalized to the “KCC HEMC” in the acute period of TC (up to 48 hours). To objectify the obtained data, the main group and the comparison group were formed in such a way that they did not differ in gender, age of patients, type of trauma and mechanism of injury, number and severity of injured AA, severity of damage and traumatic shock, nature of injuries of the pelvic ring and pelvic organs. A retrospective analysis revealed that over half (51.9 %) of patients with combined pelvic trauma had unstable fractures. Of these, 303 cases (74.6 %) were rotationally unstable (type B), with type VI representing 84.8 % of these cases. At the same time, vertically unstable injuries (type C) were observed in 103 (25.4 %) patients, among which type SI was 61.2 %. It should be noted that, along with unstable pelvic bone injuries, 48 (11.8 %) individuals had hip fractures. Combined pelvic organ injuries (bladder, urethra, rectum) were observed in 98 (24.1 %) patients.

The severity of anatomical injuries in both groups was assessed using the ATS scale developed by us [3]. K. C. Pape et al. have suggested categorizing patients into groups according to the ISS scale, as illustrated in Table 1 [2].

In general, 33 % of the patients were in stable and borderline condition, 38.9 % in unstable, and 28.1 % in critical condition. The majority of patients (67 %)

Table 1

Distribution of patients by severity of anatomical injuries according to the ISS/ATS scale in the study groups

Status (ISS) points	Anatomical injury severity (ATS) points	Group		Chi-square test
		main (n = 137)	comparison (n = 269)	
Stable, borderline 17–25	Mild trauma ≤ 24	43 (31.38 %)	91 (33.83 %)	0.245
Unstable 26–40	Severe trauma 25–41	57 (41.61 %)	101 (37.55 %)	0.629
Critical > 40	Extremely severe trauma ≥ 42	37 (27.01 %)	77 (28.62 %)	0.118

Note: the differences between the indicators of the main and comparison groups are not statistically significant ($p > 0.05$).

required urgent decisions to determine the scope and sequence of operations.

Results and Discussion

Our prehospital study showed that the average time to deliver a patient with severe combined pelvic trauma was (52.1 ± 2.6) min, ranging from 10 min to 2 h 20 min. According to the literature [8, 10], if this time is more than 15–20 min, then only a specialized team or, best of all, aeromedical evacuation can prevent the negative consequences of the injury. Therefore, the time to deliver the patient to a specialized hospital plays a crucial role in saving life.

Diagnostic measures were determined by the hemodynamic stability of the patient and fully included CT, radiological data, ultrasound (FAST protocol), minimally only radiological (multi-projection oblique radiographs) and ultrasound in an abbreviated version with the clarification of the direct correlation between the volume and localization of the intrapelvic hematoma with the type of pelvic ring instability, which allowed in 67.9 % of cases to establish a reliable diagnosis. In an emergency, CT was performed only in hemodynamically stable patients without inotropic support in case of suspected damage to the posterior pelvic structures.

UPIP patients, during hospitalization in a hospital for surgical hemostasis, underwent emergency external fixation of the pelvic ring in 134 (33 %) cases: in 75 (54.7 %) subjects of the main group and 59 (21.9 %) of the comparison group ($p < 0.01$; $\chi^2 = 44.195$). In the majority of cases (89.6 %), an external fixation device (EFD) was applied using various versions of the anterior frame. In 14 patients (10.5 %), stabilization of the pelvis was achieved with Ganz forceps. Additionally, in 10 patients (7.5 %), a combination of the anterior frame and forceps was utilized. Among the deceased patients of both groups, emergency external fixation was used during admission in only 48 (19.3 %) cases, which was due to both the severity of the injury (which led to minimal diagnostic work) and insufficient organization of the work of urgent

surgical teams. In 62 (82.7 %) patients of the main group and 26 (44.1 %) of the comparison group, pelvic stabilization was performed in the first 3 hours after admission ($p < 0.01$; $\chi^2 = 21.824$). In individuals with a stable, borderline or unstable condition, there was a statistically significant ($p < 0.05$) increase in systolic blood pressure (BP) by 10–15 mm Hg. As early as 1–3 hours after performing emergency external fixation and adequate intensive care, in the case of extremely severe trauma (critical condition), systolic blood pressure was at a critically acceptable level (not lower than 90 mm Hg) for up to 8–10 hours because of emergency surgical hemostasis.

In hemodynamically unstable patients of the main group (systolic blood pressure less than 90 mm Hg for 2 hours, despite emergency external fixation of the pelvis and exclusion of further bleeding in other BP), tamponade of the pelvic cavity was performed for the purpose of hemostasis in 5 (3.7 %) cases. At the same time, all pelvic injuries were type C: in 4 cases, a ventral frame and Ganz forceps were applied, vascular ligation (*a. iliaca interna* — 1, *a. et v. iliaca interna* — 2, *v. v. iliaca externa et interna* — 1) with extraperitoneal pelvic tamponade was performed; in 1 person, due to damage to the veins of the presacral plexus, pelvic stabilization with a ventral frame, argon-plasma coagulation of the bleeding zone, and tamponade were performed. Four out of five patients died. Some authors [8, 9] believe that during the provision of specialized surgical care, it is necessary to use more widely endovascular techniques for stopping intrapelvic bleeding (REBOA — resuscitation endovascular balloon occlusion of the aorta) in critical patients with the involvement of vascular surgeons, if necessary and when indicated, to conduct angiographic studies. In 17–45 % of such cases, it is necessary to perform sequential angiography with vessel embolization and final hemostasis, especially in the case of arterial bleeding [10]. This article addresses the challenges of performing minimally invasive interventions during the acute phase for stable and borderline patients (ISS 17–25 points).

Specifically, it focuses on the fixation of the posterior pelvis through methods such as percutaneous sacroiliac fixation using cannulated screws, and percutaneous posterior bridging transiliac fixation with a transpedicular system [11]. For patients in unstable and critical conditions (ISS 26–40 and > 40 points) for the acute period, according to many doctors, the most optimal are Ganz forceps on the posterior structures (vertical displacement of half of the pelvis), the anterior frame in a simple modification or their combination together with extraperitoneal pelvic tamponade [6, 7].

Depending on the localization and severity of the extrapelvic injury, we have proposed schemes of actions of the surgical team in the acute period of TC for severe and extremely severe injuries.

Fixation of the unstable pelvic ring in the case of pelvic-craniocerebral trauma was performed simultaneously with EFD or Ganz forceps (9 cases), in pelvic-thoracic trauma sequentially after emergency operations on the chest organs (CO) (13 patients), in pelvic-abdominal trauma with a vertically unstable pelvic ring (type C) sequentially before interventions on the abdominal organs (AO), or after performing abdominal tamponade in compression of parenchymal organs and significant blood loss (6 patients), for rotationally unstable injuries sequentially, after emergency operations on the AO, in pelvic-skeletal trauma, fixation of the unstable pelvic ring was performed first.

Active implementation of an improved protocol scheme for surgical treatment of UPIP patients upon admission with determination of the severity of the injury, sequence and priority of surgical interventions, use of “damage control” principles for unstable and critical patients (ISS 26–40, > 40 points); implementation of protocols of actions of surgical teams depending on the localization and severity of extrapelvic injury allowed to reduce mortality among patients with TC (up to 48 hours) from 77.7 to 63.9 %, $p < 0.05$, overall mortality from 69.9 to 44.5 % ($p < 0.01$).

Active surgical tactics in the II, III, IV periods of TC using a differential approach allowed to increase the number of internal (combined) metal osteosynthesis (MOS) in this category of patients from 40.4 to 72.1 %, and to reduce the proportion of conservative treatment from 53.7 to 30.6 %.

In order to establish criteria for choosing surgical tactics in UPIP patients in the II, III, IV periods of TC, an analysis of the further treatment of 221 (54.4 %) subjects from both groups, 98 (71.5 %) of the main group and 123 (45.7 %) of the compar-

ison group who did not die in the acute period was conducted. The severity of the injury, the prognosis of the clinical course of TC, the type of pelvic instability, the presence of concomitant injuries of pelvic and extrapelvic localization, and the method of treatment of unstable pelvic ring fractures were taken into account.

Surgical treatment of unstable pelvic ring injuries, which included EFD in various modifications as the final treatment method, internal MOS (primary internal, replacement of EFD with internal fixation), combined MOS, was performed in 68 (69.4 %) of the injured in the main group and in 57 (46.3 %) in the comparison group, ($p < 0.01$; $\chi^2 = 11.791$). Conservative treatment took place in 30 (30.6 %) of the patients in the main group and 66 (53.7 %) in the comparison group, which was primarily due to both the severity of the injury and the late diagnosis of unstable pelvic injuries. Characteristics of surgical treatment methods for unstable pelvic ring depending on the type of fracture are given in Table 2.

Our approach to the selection of methods, timing, invasiveness and volume of operations aimed at correcting pelvic ring injuries in the main group of victims was individual depending on the type of pelvic instability and the prognosis of the clinical course of TC.

The most optimal were considered to be invasive interventions (internal MOS, combined MOS) in the early and late periods of TC up to 21 days after injury. According to our data, in the main group, invasive operations on the pelvic bones in 2.9 % of cases (MOS of the ventral pelvis during interventions on the pelvic organs) were performed on the first day after injury, in 51.5 % up to 21 days after injury, in 20.6 % in periods of more than 21 days. For the comparison group, there is a statistically significant decrease in the number of invasive interventions within 21 days after the injury of 10.5 % ($p < 0.01$; $\chi^2 = 23.584$), and an increase in their number within 21 days to 29.8 % (the difference with the main group is not statistically significant, $p > 0.05$; $\chi^2 = 1.418$). A detailed analysis of the timing of surgical interventions depending on the type of pelvic fracture in the study groups is given in Tables 3, 4. The S. A. Majeed scale was used to analyze the functional results of treatment [1]. The use of only a conservative method for unstable pelvic injuries leads to unsatisfactory results in 35–66.7 % or to unsatisfactory and satisfactory results together in 72.8–85 % [5]. The analysis of functional outcomes of treatment of patients with UPIP was performed in 121 (77.1 %) patients out of 157 who survived and underwent both

surgical correction and conservative treatment of unstable pelvic ring.

In rotationally unstable fractures (type B), 6 months after the injury, the number of excellent and good results increased almost 2-fold from 37.2 to 78.1 %, $p < 0.01$; $\chi^2 = 14.294$; unsatisfactory results decreased 3-fold from 25.6 to 7.3 %, $p < 0.05$; $\chi^2 = 14.294$ due to the following:

– an increase in the number of internal MOS together with the combined EFD MOS in relation to the external MOS from 27.9 to 58.5 %, $p < 0.05$; $\chi^2 = 4.253$;

– increase in pelvic bone surgeries performed 3–21 days after injury, taking into account its severity and concomitant injuries of extrapelvic localization from 33.3 to 83.3 %, $p < 0.01$; $\chi^2 = 9.000$;

Table 2

Methods of surgical treatment of unstable pelvic ring depending on the type of fracture in the II, III, IV periods of TC

Intervention	Group				Total
	main (n = 98)		comparison (n = 123)		
	type B	type C	type B	type C	
EFD, as a final option	16 (32 %)	3 (16.7 %)	29 (59.2 %)	5 (62.5 %)	53 (42.4 %)
Replacement of MOS	17 (34 %)	9 (50 %)	8 (16.4 %)	3 (37.5 %)	37 (29.6 %)
Primary internal MOS	14 (28 %)	4 (22.2 %)	6 (12.2 %)	—	24 (19.2 %)
Combined MOS	3 (6 %)	2 (11.1 %)	6 (12.2 %)	—	11 (8.8 %)
Total	50 (51 %)	18 (18.4 %)	49 (39.8 %)	8 (6.5%)	125 (100 %)

Note: n is the number of patients who survived the acute period of TC; the difference between the indicators is statistically significant: for type B injuries — $p < 0.01$; $\chi^2 = 7.605$; C — $p < 0.05$; $\chi^2 = 6.286$.

Table 3

Timing of surgical interventions for unstable pelvic ring injuries of type B in patients in the study groups

Method	Group				Total
	main (n = 50)		comparison (n = 49)		
	day 3–21	day > 21	day 3–21	day > 21	
Replacement of MOS	12 (48.0 %)	5 (55.56 %)	2 (4.08 %)	6 (12.24 %)	25 (46.30 %)
Primary internal MOS	10 (40.0 %)	4 (44.44 %)	2 (4.08 %)	4 (8.16 %)	20 (37.04 %)
Combined MOS	3 (12.0 %)	—	2 (4.08 %)	4 (8.16 %)	9 (16.67 %)
Total	25 (50.0 %)	9 (18.0 %)	6 (12.24 %)	14 (28.57 %)	54 (100 %)

Note: the difference between the indicators of the main group and the comparison group is statistically significant: replacement of MOS — $p < 0.05$; $\chi^2 = 4.588$; by total number (replacement of MOS + primary internal MOS + combined MOS) — $p < 0.01$; $\chi^2 = 7.436$; statistically insignificant: primary internal MOS — $p > 0.05$; $\chi^2 = 2.540$; combined MOS — $p > 0.05$; $\chi^2 = 3.600$.

Table 4

Timing of surgical interventions for unstable type C pelvic ring injuries in patients in the study groups

Method	Group				Total
	main (n = 18)		comparison (n = 8)		
	day 3–21	day > 21	day 3–21	day > 21	
Replacement of MOS	4 (22.22 %)	5 (27.78 %)	—	3 (37.50 %)	12 (66.67 %)
Primary internal MOS	4 (22.22 %)	—	—	—	4 (22.22 %)
Combined MOS	2 (11.11 %)	—	—	—	2 (11.11 %)
Total	10 (55.55 %)	5 (27.78 %)	—	3 (37.50 %)	18 (100 %)

Note: the difference between the indicators of the main group and the comparison group is statistically significant: replacement of MOS — $p < 0.05$; $\chi^2 = 4.588$; by total number (replacement of MOS + primary internal MOS + combined MOS) — $p < 0.01$; $\chi^2 = 7.436$.

- decrease in conservative treatment methods from 37.2 to 17.1 %, $p < 0.05$; $\chi^2 = 4.280$;

- in the case of final treatment with external MOS, remounting of the EFD with its modification for closed reduction of pelvic injuries from 20 to 80 %.

In the case of vertically unstable injuries (type C), 6 months after injury, no statistically significant difference in functional treatment results was found, and after 12 (18) months, the number of good results increased from 10.5 to 44.4 % (50 %), $p < 0.05$; $\chi^2 = 5.392$ ($p < 0.01$; $\chi^2 = 6.894$) and unsatisfactory decreased from 47.4 (42.1 %) to 11.1 %, $p < 0.05$; $\chi^2 = 5.816$ ($\chi^2 = 4.502$). All these changes were achieved due to:

- increasing the share of internal MOS together with combined in relation to external MOS by 2.5 times ($p < 0.05$; $\chi^2 = 4.500$);

- performing most operations (80 %) on the 3rd–21st day after the injury ($p < 0.05$; $\chi^2 = 4.800$);

- reducing conservative treatment methods from 68.4 to 33.3 % ($p < 0.05$; $\chi^2 = 4.555$).

The analysis of the conclusions of forensic medical examinations of 249 UPIP patients who died showed that in the main group the total mortality was 61 (44.5 %) cases, with 188 (69.9 %) in the comparison group. Among UPIP patients who died in both groups, no statistically significant difference was found in the number of injured AAs or in the types of pelvic ring instability, which gives grounds to consider the severity of anatomical injuries at the time of admission as the main objective criterion for choosing the correct predicted differential surgical tactics for treating injuries of both pelvic and extrapelvic localization. In general, in 149 (59.8 %) patients who died, injuries to other AAs were usually of a competing and sometimes dominant nature, in the other 100 (40.2 %) pelvic injury was dominant and it played a leading role in thanatogenesis.

According to the data obtained, in the case of mild trauma ($ATS \leq 24$ points) in the main group, the mortality rate was 25.6 % compared to 49.5 % in the comparison group ($p < 0.01$; $\chi^2 = 6.839$); for severe trauma ($ATS 25–41$ points) it significantly increased, in the main group it was 50.9, with 83.2 % ($p < 0.01$; $\chi^2 = 21.995$) in the comparison group; for extremely severe trauma ($ATS \geq 42$ points) it remained at a high level in both study groups, with 56.8 in the main group, and 76.6 %, $p < 0.05$; $\chi^2 = 4.713$ in the comparison group, which indicates the effectiveness of the differential surgical tactics we proposed for the treatment of victims of NUTP.

The largest number of deaths occurred in the acute period of TC — 185 (74.3 %) patients, 63.9 in the main group, 77.7 % in the comparison group

($p < 0.05$; $\chi^2 = 4.543$). The main causes were traumatic shock and blood loss. In the early period of TC, 21.4 % of patients died from complications (increasing multiorgan failure). The analysis of the results obtained corresponds to literary sources [9, 10], where the overall mortality in the acute period of TC was 63.6 %, of which 22.7 % during the first 3 days.

It should be noted that in 72 (28.9 %) cases the conclusion of the forensic medical examination did not coincide with the final diagnosis in determining the severity of pelvic ring damage in the direction of its simplification, which significantly affected the quality of trauma care. The largest number of discrepancies in intraday mortality — 45 (39.5 %) cases (in the main group 33.3 vs. 40.9 % in the comparison group, $p > 0.05$; $\chi^2 = 0.406$), in the case of a fatal outcome on the 2nd–7th day — 8.6 and 25.9 %, $p < 0.05$; $\chi^2 = 4.486$, respectively, which is associated with more accurate diagnostics of pelvic injuries, in the main group with a mortality period of more than 7 days there were no discrepancies with the conclusions of the forensic medical examination.

Conclusions

The timing of delivery of patients with a severe combined pelvic injury to a specialized trauma department is crucial at the prehospital stage for saving the patient's life.

The scheme of radiological diagnostics of unstable pelvic injuries in severe and extremely severe cases with hemodynamic instability, which includes pelvic radiography in multi-projection oblique projections with ultrasound in a shortened version with the establishment of a direct correlation between the volume and localization of intrapelvic hematoma with the type of pelvic ring instability, allowed to establish a reliable diagnosis in 67.9 % of cases.

Tactics of surgical interventions in case of injuries of extrapelvic localization, unstable pelvic fractures, injuries of pelvic organs in the acute period of traumatic disease should be based on urgent indications, with observance of the principles of “damage control”, aimed primarily at stopping intrapelvic bleeding (EFD, REBOA, pelvic tamponade, angiography with embolization), with the possibility of performing single-stage or sequential emergency external fixation of the pelvic ring.

Active surgical tactics in the early and late periods of traumatic disease using a differential approach allowed to increase the number of internal (combined) MOS of unstable pelvic injuries from 40.4 to 72.1 %, to reduce the proportion of conservative treatment from 53.7 to 30.6 %.

The implementation of an improved treatment regimen for patients with polytrauma and unstable pelvic injuries during hospitalization using protocol actions of surgical teams depending on the severity and localization of extrapelvic injury, the use of differential surgical tactics allowed to significantly reduce both mortality in the acute period of traumatic illness (up to 48 hours) from 77.7 to 63.9 %, and overall mortality from 69.9 to 44.5 %.

Conflict of interest. The authors declare the absence of a conflict of interest.

Prospects for further research. The proposed tactics of surgical treatment of unstable pelvic ring injuries depending on the periods of traumatic illness can be implemented in the work of traumatology departments of Ukraine with an assessment of its effectiveness and determination of further steps to reduce mortality and improve functional treatment results.

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Authors' contributions. Burluka V. V. — substantiated the feasibility of the study, developed its methodology, conducted the study, analyzed the results, drafted 80 % of the text of the article; Dorosh V. M. — participated in the analysis of the study results and in the formulation and drafting of the conclusions of the work, formed the list of references.

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WAYS TO IMPROVE THE RESULTS OF TREATMENT OF SEVERE COMBINED PELVIC INJURIES IN MODERN CONDITIONS

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