

The scale of assessment the severity of injuries of the patients with the polytrauma suffering from obesity

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Abstract

Topicality. During the recent years, in the general structure of traumas the relative share of multiple and combined injuries essentially increased. However, neither of the currently existing scales in case of the polytraumas takes account of the obesity, as a factor which is probably the most essential when determining the condition of the victim, as obesity is not only the existing comorbidity, but the whole complex of symptoms" influencing the biomechanics of injuries and progress of the traumatic disease.

The thesis objective. Elaborate the scale of assessing the injuries severity in case of polytrauma of people suffering from the obesity based on the comparison of injuries of the anatomical body parts, obesity level with the quantitative presentation of injury gravity index and with the following prediction of the traumatic disease progress.

Materials and methods. Clinical material is comprised by 47 patients with the polytrauma hospitalized during 2007-2017.

Results and discussion. For the anatomic structuring in case of the polytrauma we applied the principle S. P. Baker Injury Severity Score (1976, USA), which provided for the primary division of body into separate parts: head injury, chest injury, abdominal cavity injury, skeleton injury. For interpreting the obvious injuries we provided for the three-stage assessment scale within each anatomic segment.

Determination of the victims' condition gravity was conducted through summing up the values of indexes of each anatomic segment and obesity level,

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with the following prediction of the disease progress based on the determination of the lethality rate in each of sub-groups depending upon the level of the victims' condition gravity. Accordingly, the elaborated principle of the combined trauma detailed diagnosis formulation, according to our classification, provided for the fixation of the verified injuries within each injured anatomic segment in the form of the list of ciphers with the indexes, indicated in brackets after traditionally formulated diagnosis with regard to the obesity level.

Conclusions. The suggested scale of assessing the injuries gravity in case of polytrauma with regard to the obesity level, provides for the primary division into separate anatomic segments, complex evaluation of injuries within separate segments and its quantitative representation in the absolute units (points) with the possible prediction of the traumatic disease progress.

Topicality

During the recent years, in the general structure of traumas the relative share of multiple and combined injuries essentially increased. [1,2]. However, in the clinical practical activity the traditional injuries gravity gradation is still applied, which is based on the doctor's subjective experience, which is expressed in the formal categories: minor, moderate, severe and critical injury [3,4]. However, the application of the said subjective gradation increasingly complicates the discussion of the scholarly problems connected with the combined injury in the context of objective evaluation of the victims' condition gravity, efficiency of the developed new treatment methods and predicting the disease progress [5].

The universal diagnosis "Combined trauma" a priori makes impossible both the progress prediction and the injury consequences, and conducting the precision medical and social assessment [5,7]. Thus, out of the suggested ways of the injury gravity assessment, the methods may be determined which state the injury gravity, depending upon the victims condition and methods, which, apart from the injuries gravity, take account of the nature and localization of injuries, and sometimes even the parameters of the patients' functional status [8,11].

It is known that the basic concept of building the scales of injuries gravity assessment in case of the polytrauma, is built not only on the enumeration the anatomic segments injuries, but also on the common response of the body to the injuries, i.e.

its resistance and reactivity. However, neither of the modern scales in case of the polytrauma takes account of the obesity as a factor which is probably the most essential in determining the victim's condition gravity, as obesity is not only the obvious comorbidity but also the whole complex of symptoms which influence the injuries biomechanics and the progress of the traumatic disease [9]. Most probably, this is partially conditioned by the fact that the obese people have quite lower threshold of biological structures physiological resistance and, correspondingly, in case of equal injury mechanisms, the morphological damage will be higher for them as compared to the people with a normal body weight [9,10].

The said drawbacks of the traditional polytrauma interpreting, to our point of view, determine the necessity of grounded scholarly elaboration of the problem of the injury gravity assessment for the patients against the obesity background with regard to the anatomic segments injuries, depending upon the body mass index (BMI).

The Thesis objective

To elaborate the scale of the injuries gravity assessment in case of the polytrauma of people with obesity based on the comparison of injuries of the anatomic body segments, obesity level with the quantitative representation of the injuries gravity index and with the following prediction of the disease progress.

Materials and methods

Clinical material is composed of 47 patients with the polytrauma hospitalized by the Surgical Department of 8th Communal Municipal Clinical Hospital of Lviv during 2007-2017. The age of patients varied within 19 through 81 (middle age – 43.1 ± 2.3 p.). 19 women (40.4 %), 28 men (59.6 %), persons of working age – 38 (80.9 %). The patients had the injuries of different localization and gravity.

The scale was elaborated in three stages. At the I stage the structuring of the body anatomic sectors was conducted; separate indications for each sector were introduced; the qualitative assessment of the injury gravity was predicted for each body segment. At the II stage the victims were subdivided into groups depending upon the Body Mass Index (IMT). At III stage the clinical approbation of the elaborated scale was conducted and the prediction as to the traumatic disease progress was formulated with regard to the obesity level.

The patients with polytrauma were diagnosed and treated according to the commonly accepted and local protocols which included the complaints analysis, anamnesis of the disease and life, clinical picture at different stages of the patient treatment (pre-hospital and hospital етапи та стаціонари), peculiarities of the traumatizing factor.

Results and their discussion

Today the assessment of the condition of patients with the polytrauma is frequently based on the subjective interpretation of the doctor and comes down to the generally accepted gradation as moderate, minor and severe. With regard to this and to key drawbacks of the traditional diagnosis formulation in case of the combined injury connected with the generalized enumeration of the injured body parts, and organs, our elaboration of scale was based on the principles of the primary subdivision of body into the separate anatomic segments, determination of the Body Mass Index and development of the injuries complex assessment system within separate body segment with the following summing up of the

points and presentation of the figure, as an objective prediction criterion of the traumatic disease.

For the anatomic structuring in case of the polytrauma we applied the principle S. P. Baker Injury Severity Score (1976, USA) [1], which provided for the primary body subdivision into separate parts: head injury, chest injury, abdominal cavity injury, skeleton injury. For the purpose of the diagnosis coding and assessing the severity of the victims' condition, the anatomic segments were designated with the first letters of their English name: H (head), Th (thorax), A (abdomen), S (skeleton). As the obesity is an important factor influencing the disease progress, the obesity level was introduced into the formula through coding the last as "O (obesity)".

The system of the injuries severity complex assessment was based on the classical diagnostic approaches and provided for the verification and qualitative reflection of injuries within separate anatomic segment.

For the purpose of facilitating the recording of each of the said parameters, we elaborated the system of their indexation. For interpreting the existing injuries we provided for the three-stage scale of assessment within each anatomic segment. When coding the obesity the digital representation reflected its level. The injuries indexation system depending upon the injuries origin with regard to the peculiarities of the pathogenic mechanism of the traumatic disease and the obesity level is shown in the table 1.

Determining the gravity of the victims' condition was conducted through summing up the values of indexes of each anatomic segment and the obesity level, with the following prediction of the disease progress based on the determination of the lethality rate in each group, depending upon the victims' gravity condition. Correspondingly, the elaborated principles of formulating the detailed diagnosis of the combined injury, according to our classification, provided for the fixation of the verified injuries within each injured anatomic segment in the form of list of the codes with indexes in brackets after the traditionally formulated diagnosis with regard to the obesity level.

Depending upon the received amount of points the result was interpreted as follows (table 2).

Table 1.

Indexation system of the injuries severity and obesity level

	H (head)	Th (thotax)	A (abdomen)	S (Skelrton)	O (obesity)
1	Soft tissue bruises; brain concussion	Soft tissue bruises	Soft tissue bruises	Soft tissue bruises; Upper extremity bone fracture; Shin and foot bones fractures	I stage BMI 30.0-34.9 kg/m ²
2	Skull fractures Minor and moderate brain contusion	Rib frame fractures without pleural and pulmonary complications	Injuries of the abdominal cavity organs	Hip fracture	II stage BMI 35.0-39.9 kg/m ²
3	Severe brain contusion; presence of epi-subdural hematomas	Rib frame fractures with hemopneumothorax; Pulmonary contusion, mediastinal organs contusion	Injury of one and more organs	Pelvic fracture	III stage BMI more than 40.0 kg/m ²

Table 2.

Classification of the gradations of the patients condition gravity

Points	Condition gravity	Prediction
under 6	Moderate	Lethality rate of about 5 %
7-11	Severe	Lethality rate 50-75 %*
over 12	Very severe	Lethality rate more than 75 %**

*Statistically significant indicator ($p > 0,05$)**Statistically significant indicator ($p > 0,03$)

The approbation of the elaborated methodology with different clinical variants of the polytrauma testified to the fact that the latter allows precise evaluation of the combined injury of the body and clearly formulate the detailed diagnosis which reflects the localization and all essential injury characteristics and, what is most important, determine the victim condition severity. In its turn, it allows for grounded and timely selection of the adequate diagnostic and tactical solutions, clearly predict the progress of the traumatic disease, if necessary, conduct the unbiased medical and social inspection.

Based on the results of the approbation, we complemented the uniform diagnoses of the severe combined trauma, assessed the trauma severity and formulated the progress prediction, which is exemplified by the following clinical observation. The patient P,

42 years old was hospitalized with the diagnosis "Severe combined body trauma. Closed craniocerebral injury. Brain concussion. Closed chest injury. Multiple fractures of left ribs. Left lung laceration. Sinistral hemo - pneumatothorax. Closed abdominal trauma with the spleen injur. Intra-abdominal bleeding. Closed fracture of the left hip. II st. obesity." According to our methodology, it can be transformed as follows: H (1) + Th (3) + A (2) + S (2) + O (2) = 10 points. According to the result obtained, general condition of the patient was interpreted as severe with quite high lethality risk.

The only temporal inconvenience was the necessity of the doctors' adaptation to the indexation system at the primary stages of its application which was quickly subdued with the experience accumulation.

All in all, the elaborated injuries severity assessment in case of the polytrauma with regard to the obesity level is not complicated, its application does not cause the inconveniences to the patients and does not require any additional means, and, thus, it may be widely applied in practical and scholarly activity of medical institutions.

In the available medical literature different scales are suggested of the injuries severity assessment in case of the polytrauma, however, neither of them takes into account the obesity which has an essential impact on the disease progress and determines the diagnostic and treatment approaches in this group of victims.

Conclusions

The scale was suggested of the injuries severity assessment in case of the polytrauma with regard to the obesity index which provides for the primary division of the body into separate anatomic segments, complex injuries assessment within separate segment and its quantitative representation in the absolute units (point) is very important for the prediction of the traumatic disease progress.

Clinical approbation testified to the fact that the suggested scale allows the precise assessment of the severity of combined trauma with regard to the BMI, qualitative accomplishment and specification of the diagnosis and selection of the grounded and timely adequate diagnostic and tactical solution, conduct the prediction and expert appraisal of the polytrauma.

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