

Experience In The Treatment Of The Elderly And Additional Patients With Fractures Of The Femoral Neck With Account Of Comorbidal Pathology

Valiev Erkin Yuldashevich¹, Valiev Odil Erkinovich², Azizov Abror Mirxakimovich³,
Tilyakov Hasan Azizovich⁴

¹MD, S.N.S., Republican Scientific Center for Emergency Medical Aid.

²orthopedist-traumatologist, junior researcher, Republican Specialized Scientific and
Practical Center of Traumatology and Orthopedics.

³PhD, Head of department Republican Specialized Scientific and Practical Center of
Traumatology and Orthopedics.

⁴Assistant of the Department of Traumatology and Orthopedics, Samarkand State Medical
Institute

E-mail: ¹Valiyeverkin1964@gmail.com, ⁴tiliakov@bk.ru.

Abstract: *Damage to the bone structures in the area of the hip joint refers to severe injuries of the musculoskeletal system for the elderly and senile, usually leading to an unfavorable outcome. One of the important problems of geriatric practice is comorbidity, which affects the prognosis for life, increases the likelihood of death. The aim of the work was to study the factors influencing the choice of tactics and methods of treatment of fractures of the femoral neck in elderly and senile people, taking into account the level and severity of comorbid pathology. The analysis of the incidence and level of comorbidity in 201 patients with fractures of the femoral neck was carried out, the mean age was 71.4 ± 7.1 g. The results of evaluating the comorbidity indices revealed its high rates, for example, the Charleston index averaged 9.12 ± 1.05 points, the CIRS index was 16.2 ± 3.9 points. The main contingent of treated patients - 147 (73.1%) - were people with a high level of physical activity.*

Key words: *hip fracture, older age group, comorbid pathology, osteosynthesis, endoprosthetics.*

1. INTRODUCTION

Damage to bone structures in the area of the hip joint refers to severe injuries of the musculoskeletal system, the features of which are long-term disability, a high percentage of disability, prolonged bedridden for elderly and senile people with the development of complications, usually leading to unfavorable the outcome. According to various researchers, the structure of injuries of the musculoskeletal system accounts for 15 to 45% of fractures of the femur, among them fractures of the femoral neck account for 50 to 55% [1]. Such a large proportion of femoral neck fractures is due to an increase in the number of elderly people. One of the important problems of geriatric practice is polymorbidity (comorbidity) - the presence of several diseases in one patient. Age is a strong risk factor for numerous chronic diseases, therefore, elderly and especially senile patients are characterized by high comorbidity, the prevalence of which reaches 62% among people 65-74 years old and 82% among people ≥ 85 years old [2,3,4,5, 6,7]. Comorbidity affects the prognosis for life,

increases the likelihood of death. The presence of comorbid diseases contributes to an increase in bed-days, increases disability, prevents rehabilitation, increases the number of complications after surgery, and increases the likelihood of falls in the elderly [9,12,13,14]. The analysis showed a direct dependence of the choice of tactics and methods of treatment on age, somatic status, degree of comorbidity indices, level of physical activity, level of operational risk according to ASA, as well as dependence on the type of fractures according to Garden's classification. Depending on the tactics of treatment, the patients were divided into three groups: conservative treatment - 54 (26.9%); operative (osteosynthesis) - 81 (40.3%) and total hip arthroplasty - 66 (32.8%).

Thus, the presence of comorbidity should be taken into account when choosing a diagnostic algorithm and treatment regimen for a particular disease. It should also be remembered that it leads to polypharmacy, that is, the simultaneous prescription of a large number of drugs, which makes it impossible to control the effectiveness of therapy, increases the material costs of patients, and therefore reduces their compliance (adherence to treatment). In addition, polypharmacy, especially in elderly and senile patients, contributes to a sharp increase in the likelihood of developing local and systemic unwanted side effects of drugs. These side effects are not always taken into account by doctors, since they are regarded as a manifestation of one of the comorbidity factors and entail the appointment of even more drugs, closing the "vicious circle". At the same time, it is absolutely clear that the presence of a comorbid pathology leads to higher economic costs than in the treatment of a single nosology [8,10,11]. All of the above shows the need to pay great attention to the comorbid pathology of surgical patients.

The aim of the work was to study the factors influencing the choice of tactics and methods of treatment of fractures of the femoral neck in elderly and senile people, taking into account the level and severity of comorbid pathology.

2. MATERIAL AND RESEARCH METHODS

The analysis of the frequency and level of comorbidity in elderly and senile patients with a fracture of the femoral neck for the period 2016–2018, who were treated in the department of adult orthopedics of the Republican Scientific and Practical Center of Traumatology and Orthopedics (RSPCTiO) and the department of adult traumatology of the Republican Scientific Center for Emergency Medical Aid (RSCEMP). Anamnestic, clinical and instrumental data were taken into account, the profile of concomitant somatic pathology was also studied. The study of comorbidity in patients with fractures of the femoral neck was carried out in order to determine the influence of concomitant diseases on the choice of tactics and treatment methods - conservative, osteosynthesis or total hip arthroplasty.

201 case histories were analyzed, males made up 82 (40.8%), women - 119 (59.2%), whose age ranged from 60 to 93 years (average age - 71.4 ± 7.1 years) ... Almost all treated patients had fractures of the femoral neck resulting from minimal trauma. When detailing injuries to the proximal femur, we used Garden's classification (1961), which, in our opinion, most fully reflects the pathogenetic, morphological, prognostic nature of injuries and was of great importance in choosing treatment tactics. Depending on the type of fractures, the patients were distributed as follows: type I - 67 (33.3%); type II - 43 (21.4%); type III - 35 (17.4%) and type IV - 56 (27.9%). Depending on the tactics of treatment, the patients were divided into three groups: conservative treatment - 54 (26.9%); operative (osteosynthesis) - 81 (40.3%) and total hip arthroplasty - 66 (32.8%).

Among the concomitant diseases, the presence, first of all, of cardiovascular diseases and their complications, in the form of a past myocardial infarction and acute cerebrovascular accident (ACVI), cerebral atherosclerosis (CAS) with the development of dementia, pathology of the bronchopulmonary system, digestive tract, kidneys, was assessed. the

presence of diabetes mellitus. Comorbidity was assessed using special comorbidity indices - the Charlson index, proposed for assessing the long-term prognosis of patients [16], and the CIRS index (Cumulative Illness Rating Scale).

The Charlson Index was a scoring system (from 0 to 40) for the presence of certain comorbidities using a prediction of mortality. When calculating it, the points corresponding to comorbidities were summed up, and one point was added for every ten years of life when the patient was over forty years old. This index, taking into account the age of the patients, made it possible to predict the mortality of patients in the next ten-year period. The CIRS index implied a separate summary assessment of the state of each organ system: "0" corresponded to the absence of diseases of the selected system, "1" - slight deviations from the norm or past diseases, "2" - diseases requiring the appointment of drug therapy, "3" - diseases that caused disability, and "4" - severe organ failure, requiring urgent therapy. The CIRS system assessed comorbidity on a score that ranged from 0 to 56 points. According to its developers, its maximum results corresponded to the state of patients incompatible with life [15]. The CIRS system made it possible to assess the number and severity of chronic diseases in the structure of comorbid status, based on the obtained coefficient

3. RESULTS

When evaluating the comorbidity indices, it was found to be high, since the average age of patients included in the study was 71.4 ± 7.1 years, the maximum reached 93 years. Concomitant diseases that developed before the injury occurred in all patients, we took into account only the pathology that required medical correction and influenced the severity of the patient's condition, the choice of treatment tactics, the degree of physical activity, as well as the quality of life before the injury (table number 1.).

Table 1

The nature and frequency of identified concomitant somatic pathology (n = 201)

The nature of somatic pathology	Total	%
Cardiovascular pathology	302	44,5
Pulmonary pathology	79	11,7
Diabetes	49	7,2
Senile dementia	28	4,2
Gastrointestinal pathology	73	10,8
Pathology of the urinary system	51	8,7
Oncology	15	2,2
Other	72	10,7
Total	676	100

As can be seen from the above table, in our material, in patients with the older age group, 676 concomitant diseases were detected, on average, there were 3.4 pathologies per patient, the largest number of observations - 302 (44.5%) - was pathology from the cardiovascular system (hypertension, coronary artery disease, CHF, atherosclerosis, the consequences of a previous stroke, venous insufficiency, etc.), followed by pulmonary pathology (COPD, bronchial asthma) - 79 (11.7%) and gastrointestinal pathology (gastric ulcer and / or 12 duodenal ulcer, liver cirrhosis) - 73 (10.8%). Others - 72 (10.7%) cases included blood diseases, collagen diseases, sensory diseases, osteoarthritis and one case of AIDS. Thus, the Charleston comorbidity index averaged 9.12 ± 1.05 points. To facilitate the interpretation of the data obtained by us, the indicators of comorbidity, depending on the amount of points, were divided into three levels: low (up to 4 points) - 45 (22.4%); average (5-10 points) - 97 (48.3%); high (more than 11 points) - 59 (29.3%) observations.

Evaluation of comorbidity using the CIRS index made it possible to assess not only the presence of concomitant pathology, but also its severity. On average, the CIRS comorbidity

index among the patients included in the survey was 16.2 ± 3.9 points. To interpret the CIRS comorbidity index, we also used the division into three levels: low (up to 10 points) - 51 (25.4%); average (11-20 points) - 86 (42.8%); high (more than 21 points) - 64 (31.8%) observations.

One of the important factors in determining the tactics of treatment is the degree of motor activity of patients in the period before the injury, we took a 5-point scale as a basis [1]. High level of physical activity (4 points) - the patient introduced an active lifestyle, periodically or constantly performed physical work, was engaged in physical culture and sports, did not notice any disabilities in working capacity, was engaged in public affairs, etc. The average level (3 points) - the patient did not play sports, led a sedentary lifestyle, however, he walked along the street without restrictions, including, if necessary, over long distances, the patients did not need outside care. Limited level of activity (2 points) - the patient left the house, took care of himself, however, loads, transferring insignificant severity was carried out with difficulty, often used a cane.

Low level of activity (1 point) - the patient did not leave the house at all or almost did not leave the house, however, he moved around the apartment on his own, served himself or, with little help, used aids to get around. Extremely low level (0 points) - the patient did not get out of bed, he could not serve himself on his own. As can be seen from the above table No. 2, the main contingent of treated patients - 147 (73.1%) consisted of persons with relatively favorable indicators (high (45), medium (57) and limited (44)) level of physical activity, which mattered when choosing an active surgical tactics of treatment.

Table 2
 Assessment of the level of physical activity of patients before the injury (according to anamnesis)

Physical activity level (PHA)	total	%
High (4 points); PHA -4	45	22,3
Average (3 points); PHA -3	57	28,3
Limited (2 points); PHA -2	44	22,3
Low (1 point); PHA - 1	30	14,8
Extremely low (0 points); PHA -0	25	12,3
Total	201	100
average score	2,46	

In addition to standard clinical and instrumental examination methods, and examination of related specialists, all hospitalized patients, regardless of the forthcoming treatment tactics, were examined by an anesthesiologist. When determining the operational and anesthetic risk, specialists took into account three main criteria: the general condition of the patient at the time of hospitalization, the volume and nature of the forthcoming operation, and the nature of anesthesia. For this purpose, we in the clinic used the classification of the physical condition of patients by the American Society of Anesthesiologists (ASA), according to which all patients are divided into five classes: I - normal healthy patients; II - patients with moderately severe systemic pathology; III - patients with severe systemic pathology, limited activity, but without disability; IV - patients with severe systemic pathology, disability, requiring constant treatment; V - dying patients who, if there are indications for surgery, can die within 24 hours.

In our clinical material, according to the classification, ASA severe V class patients were not observed, the main contingent of patients - 140 (69.6%) were assigned to I; II; III classes of the level of anesthetic and operational risk, in which there were no significant restrictions in the choice of methods of surgical correction of injuries

As an illustration, here is a clinical example:

Patient N., 72 years old, i./b. No. 1255, delivered to the clinic by the ambulance line. Low-energy injury, 3 hours before treatment, fell on his left side at home, from the height of his own growth. On clinical examination, a relative shortening of the left lower limb by 3 cm was noted, the position of the limb in external rotation. Activation is difficult due to severe pain syndrome. X-ray examination revealed a transcervical fracture of the femoral neck with displacement of bone fragments, which, according to Garden's classification, was classified as type III (Fig. 1A, B.). Anamnesis: ischemic heart disease, hypertension for 20 years, 5 years ago, suffered an ischemic stroke, now the movement is fully restored. For 5 years he has been suffering from diabetes. The level of physical activity (PA) - the patient leaves the house, takes care of himself, he can hardly endure the load, often uses a cane. Taking into account the age of the victim, according to the standard, additional clinical and instrumental studies were carried out to assess the concomitant pathology and examined by related specialists.

4. DIAGNOSIS

Closed transcervical fracture of the left femoral neck (type III) with displacement of bone fragments. Sop. Ischemic heart disease. Stable exertional angina, FCIII. Essential hypertension III, LVH. Risk 4. Consequence of ONMK (from 2015). Diabetes mellitus type II, moderate-severe course, in the stage of subcompensation. FA -2. Taking into account the age of the patient, the presence of concomitant pathology, we calculated the indices of comorbidity. The Charlson comorbidity index was 6 points, taking into account the age coefficient an additional 3 points, the total was 9 points out of 40. The CIRS comorbidity index was 11 points out of 56. Both indicators corresponded to the moderate severity of comorbidity. The level of operational and anesthetic risk according to ASAIII.

After the preoperative preparation, on day 3, the patient underwent surgery under spinal anesthesia, total arthroplasty of the left hip joint, with Irene endoprosthesis (Fig. 1B). The postoperative course is smooth. Activation, walking with a walker for 4-5 days. The patient was in a stable condition for 14 days, discharged for outpatient treatment. Examined after 6 months, the patient can move independently, using a cane, the limb support ability is preserved, there is no pain syndrome.

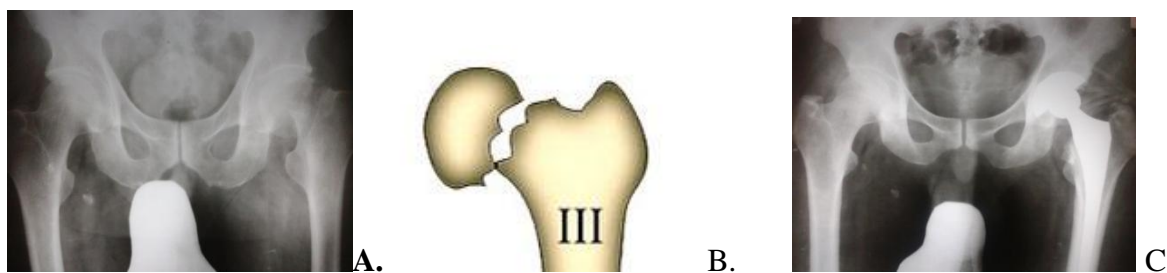


Figure: 1. X-ray of patient N., 72 years old.

A. before surgery, transcervical fracture of the left femoral neck with displacement of bone fragments;

B. scheme according to the classification of Garden, corresponds to type III;

C. condition after total hip replacement surgery.

5. DISCUSSION

In a retrospective analysis of the case histories of patients with fractures of the femoral neck of the older age group, the dependence of the choice of tactics and methods of treatment depending on age, somatic status, degree of comorbidity indices, level of physical activity

level of operational risk according to ASA, as well as dependence on the type of fractures according to Gardena classification.

As stated above, depending on the tactics of treatment, the patients were divided into three groups: conservative treatment - 54 (26.9%); operative (osteosynthesis) - 81 (40.3%) and total hip arthroplasty - 66 (32.8%). The choice of treatment tactics, taking into account the level of comorbidity, are presented in Table 3.

Table 3
Justification of treatment tactics based on comorbidity indices

Treatment tactics	Charlson Index (score)			CIRS Index (score)			Total, abs. (%)
	<4	5-10	11<	<10	11-20	21<	
Conservative	4	18	32	3	16	35	54 (26,9%)
Osteosynthesis	22	33	26	25	28	28	81 (40,3%)
Endoprosthesis	19	46	1	23	42	1	66 (32,8%)
Total %	45 22,4	97 48,3	59 29,3	51 25,4	86 42,8	64 31,8	201 (100%)

As shown in the table, the conservative method of treatment in patients was justified by a high comorbidity index and an unfavorable prognosis of survival, so the Charlson index over 11 points was noted in 32 (59.3%), and the CIRS index, over 21 points in 35 (64.8%) sick. Comorbidity indicators in the group of patients who underwent surgical interventions - osteosynthesis using minimally invasive technologies was significantly better, high rates of Charlson and CIRS indices were noted in 26 (32.1%) and 28 (34.6%) cases. At that time, in patients who underwent total hip replacement, the high level of comorbidity was at the minimum level - 1 (1.5%).

The influence of the level of comorbidity on the choice of treatment tactics is clearly shown in the diagrams (Fig. 2, 3).

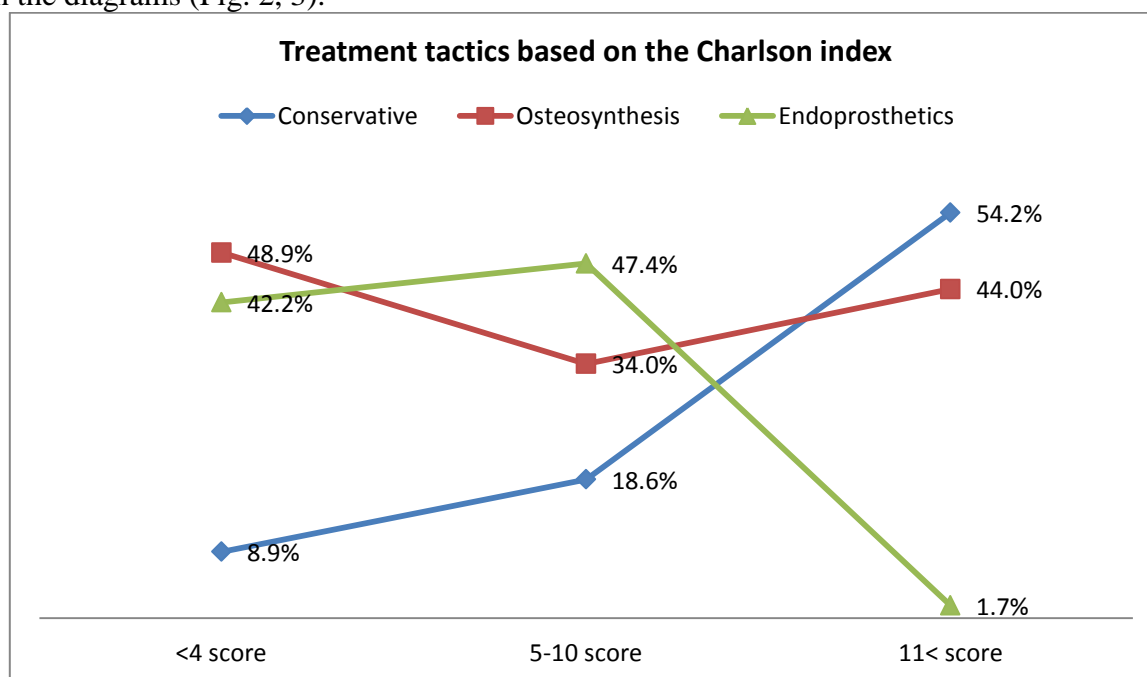


Figure: 2. The choice of treatment tactics, taking into account the Charlson index.

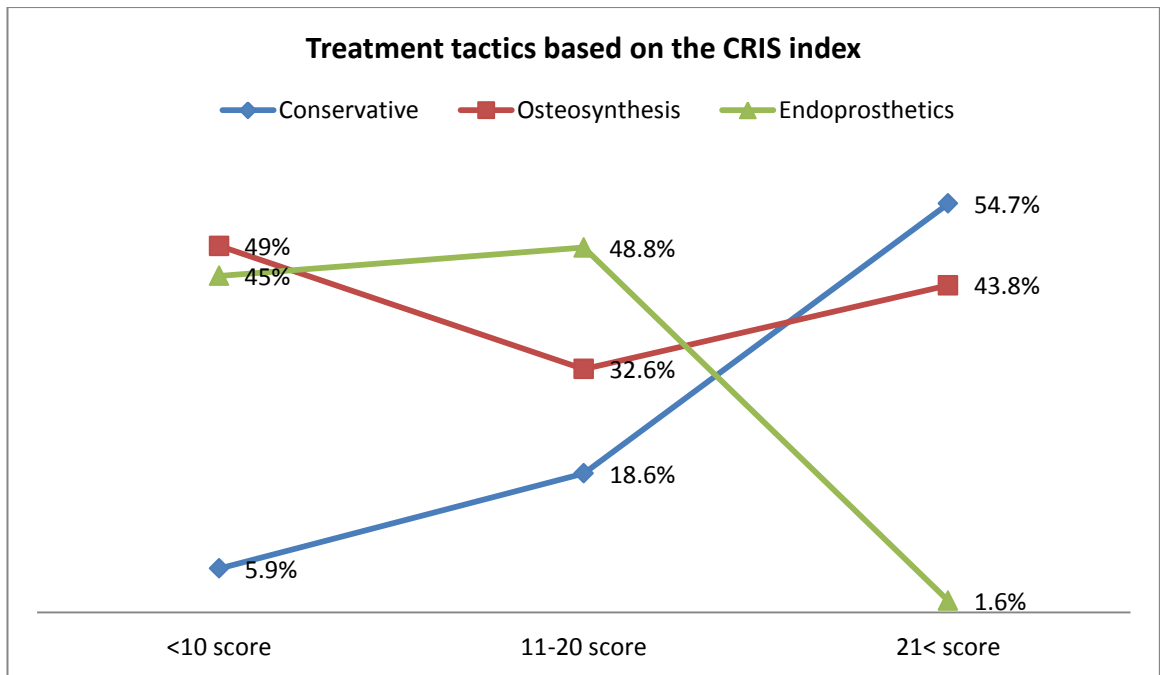


Fig. 3. The choice of treatment tactics based on the CIRS index.

When analyzing the data presented in the diagrams, the dependence of the choice of treatment method was traced, taking into account the level of comorbidity. With a high level of comorbidity, the most obvious connection was revealed between the choice of the method of endoprosthesis of the hip joint (1.7; 1.6%) and conservative management (54.2; 54.7%). When providing assistance to a heavy contingent of patients with a high level of comorbidity, taking into account the use of minimally invasive technologies in the clinic, the indications for performing osteosynthesis were expanded, which amounted to 44.0 and 43.8%, respectively.

High levels of comorbidity corresponded to indicators of the physical condition of patients at the time of hospitalization. When assessing the level of operational and anesthetic risk according to the classification of the American Society of Anesthesiologists (ASA), high operational risk IV was observed in the group of patients with high values of the comorbidity index who underwent conservative therapy - 36 (66.6%).

We have traced the relationship between the level of comorbidity and the degree of anesthetic risk according to ASA (Table 4). High anesthetic risk IV was observed in 66.6% of patients in the conservative treatment group, which corresponded to a high level of comorbidity in this group and served as a rationale for choosing this type of treatment. Anamnestic data on the level of physical activity (Table 5) revealed that low and extremely low levels of physical activity were observed in the group of patients who received conservative treatment.

Thus, in patients with low and medium levels of comorbidity, i.e. group with a positive prognosis of survival, there was an opportunity for active surgical tactics of treatment.

Table 4
Justification of treatment tactics, taking into account the level of anesthetic
ASA risk

Treatment tactics	Operational risk by ASA			Total abs. (%)
	I-II	III	IV	
Conservative	6	12	36	54 (26,9)
Osteosynthesis	41	21	19	81 (40,3)
Endoprosthetics	29	31	6	66 (32,8)
Total,%	76 37,8	64 31,8	61 30,4	201 (100)

Table 5
Justification of treatment tactics, taking into account the level of physical activity

Treatment tactics	Physical activity level PHA - score					Total abs. (%)
	4	3	2	1	0	
Conservative	-	-	-	29	25	54 (26,9%)
Osteosynthesis	16	39	25	1	-	81 (40,3%)
Endoprosthetics	29	18	19	-	-	66 (32,8%)
Total,%	45 22,3	57 28,3	44 22,3	30 14,8	25 12,3	201 (100%)

Along with the somatic status of patients, when choosing a treatment strategy, we took into account the nature of the fracture, while we used the Garden's classification (Table 6).

Table 6
Justification of treatment tactics taking into account the type of fracture according to Garden's
classification

Treatment tactics	Fracture type				Total abs. (%)
	I	II	III	IV	
Conservative	33	11	1	9	54 (26,9%)
Osteosynthesis	26	21	13	21	81 (40,3%)
Endoprosthetics	8	11	21	26	66 (32,8%)
Total,%	67 33,3	43 21,4	35 17,4	56 27,9	201 (100%)

The analysis showed that a conservative treatment option - an orthopedic regimen with a deratting boot was used in 54 (26.9%) patients, the reason for choosing a tactic was concomitant severe somatic pathology, low physical activity of orthopedic plan type I fractures. Osteosynthesis was performed in 81 (40.3%) patients, of them in 63 (77.7%) cases, closed cortical osteosynthesis with canulated screws was used, most of them with type I and II fractures. In 18 (32.3%) cases, we used the method of closed intramedular osteosynthesis with the blocking system "Gamma". Total hip replacement was performed in 66 (32.8%) patients, mainly with type III and IV fractures. Thus, comorbidity affects almost all patients, the level of which increases with age and becomes one of the leading problems in the provision of specialized trauma care for fractures of the femoral neck. When choosing

treatment tactics, it is always necessary to take into account the high risk of developing adverse complications at all stages of treatment.

We fully agree with the opinion of specialists that in order to increase the effectiveness of treatment, it seems appropriate to single out the following stages of managing a comorbid patient:

- a thorough collection of complaints and anamnesis for all diseases, accounting and assessment of risk factors, assessment of the stage of evolution of comorbidity;
- isolation in the formulation of the diagnosis of the underlying disease, concomitant diseases and associated conditions; consultations or joint examinations with specialist doctors (cardiologist, gastroenterologist, pulmonologist, urologist, endocrinologist, surgeon and others according to indications);
- identification of changes in systems and organs caused by diseases, for which it is necessary to carry out diagnostic measures;
- development of treatment tactics and dispensary observation of the patient [10,11].

Summing up, it should be emphasized that practicing traumatologists should take into account the comorbid background in patients and strictly individualize approaches when choosing treatment tactics. However, it should be noted that today there is no single mechanism and methodology for a comprehensive assessment of polymorbidity. The existing scales have disadvantages, they are scattered and narrowly directed. Thus, the CIRS index does not take into account the age of patients, the specifics of diseases of the elderly, the Charlson index does not take into account the severity of many diseases, and a number of prognostically important diseases are absent. Attention is drawn to the fact that most of the techniques do not take into account the patient's gender, which certainly affects both the specificity of the incidence and course of diseases, and the prognosis. In this connection, it is necessary to conduct in-depth studies to create highly effective methods for assessing comorbidity

6. CONCLUSIONS

1. In patients in the older age group with injuries of the femoral neck, concomitant pathology was detected in all cases, on average there were 3.4 pathologies per patient, the largest number of observations, 44.5%, was cardiovascular pathology. A high level of comorbidity was noted in more than 30% of patients, which, accordingly, was reflected in the level of operational risk according to the ASA and created certain difficulties in choosing tactics and methods of treatment.
2. When determining the prognosis and choosing the optimal tactics and methods of treatment, it is necessary to take into account the age of the victim, the level of comorbidity, the degree of physical activity before the injury, the degree of surgical and anesthetic risk and the type of fracture.
3. In case of fractures of the femoral neck in the elderly, early activation serves as a key to improving the quality of life of patients, conservative methods are ineffective, an alternative method is performing early osteosynthesis using minimally invasive technologies that are feasible in patients with a high level of comorbidity
3. At the present stage of development of traumatology, the most promising method of treating victims with fractures of the femoral neck in elderly and senile patients is hip arthroplasty. The latter should be performed with adequate technical equipment, after preliminary preparation of patients and at the earliest possible date, before complications develop.

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