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Anemic syndrome in elderly patients with complicated systemic osteoporosis

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Summary: extension of anemia syndrome was searched in 373 elderly patients with systemic osteoporosis complicated by proximal femoral fracture who received expert care at the Center of emergency medical care of Republican hospital №2. Anemia syndrome is detected in 70.0±2.4% of patients during hospitalization. Reduction of hemoglobin level in dynamics is 19.5±2.0% of the initial level. Anemia syndrome increases lethality level in the next two years of observation.

Keywords: anemia syndrome, complicated osteoporosis, lethality.

Introduction: According to WHO, anemia is detected in adult women with a hemoglobin (Hb) decrease of less than 120 g/l, and men - less than 130 g/l [9]. Some chronic diseases are accompanied by anemia syndrome progress, considered as independent nosological entity that affect the course of the underlying disease. For example, OPTIME research shown 12% increased risk of death or re-hospitalization with Hb less than 120 g/l in patients with chronic heart failure [8].

The most common causes of anemia in the elderly patients are chronic diseases, iron deficiency, malnutrition and metabolic disorder [7]. Latent iron deficiency in the population of Russia is about 30-40%, and 50-60% in some regions (North, North Caucasus, Eastern Siberia) [1, 2].

Anemia prevalence in hospitalized elderly patients is 36-80% [5].

It is known that anemia correction positively affects the course of chronic diseases, improves the patients quality of life [7]. Packed red cells transfusion and iron preparations (oral and parenteral), erythropoietin and their combination are used to treat anemia [7].

Possible complications of packed red cells transfusion limit the use of this method. Under

preoperative anemia and blood loss ≥ 500 ml Hb target level is 85 g/l, hematocrite number (Ht) is 26% according to the "Model Regulations on the Use of Blood Components" [6] made on the basis of the "Rules of the Russian Association of Transfusiologists" approved by the Order of the Board of RAT dated September 3, 2007 No. 10.

Proximal femoral fracture (PFF) is the most frequent and severe of fractures associated with osteoporosis [3]. Mortality caused by PFF during the first year is up to 12-40% [4]. Interstitial blood imbibition caused by PFF lowers the level of Hb.

The aim of this work is to study the prevalence, dynamics and impact of anemia on late fate of elderly patients with systemic osteoporosis complicated by PFF.

Materials and Methods: extension of anemia was searched in 373 elderly patients with systemic osteoporosis complicated by PFF: 1 group – 242 patients (191 women, middle age 74.6±0.4 years old and 51 men, middle age 74.3±0.7 years old) with arterial hypertension (AH) and systemic osteoporosis complicated by PFF. The ratio of men and women among 120 elderly patients was 1:2.75, and 1:5.4 among 122 senile patients. In this group 216 (89.3±2.0%) patients underwent surgery (osteosynthesis of the femoral bone, or total endoprosthesis replacement), 26 (10.7±2.0%) patients were treated conservatively.

The 2d group was consisted of 131 patients (75 women, middle age 76.1±0.9 years old and 56 men, middle age 71.8±0.9 years old) with PFF under systemic osteoporosis without arterial hypertension (63 elderly and 68 senile patients). Male to female ratio was 1.17:1 among elderly patients and 1:2.1 among senile patients. 116 patients of the 2d group were operated (88.5±2.8%), 15 patients were treated conservatively (11.5±2.8%).

Control group (group 3) was consisted of 52 patients (32 women, middle age 73.5±2.0 years old and 20 men, middle age 72.9±1.2 years old) with arterial hypertension without PFF who were treated at the emergency department of the Republican Hospital No. 2. Male to female ratio was 1.0:1.5 among elderly patients and 1:2.5 among senile patients.

General clinical study of red blood was made by the Hospitex Diagnostics Hema Screen 13 automatic analyzer, made in Italy.

Statistical analysis was performed using the STATISTICA 8.0 software package.

Results and Discussion: During examination of blood parameters anemia of several levels of severity was detected in all age groups.

Anemia at admission was diagnosed in 126 (52±3.2%) patients of Group 1: in 9 male (28.1±4.0%) and in 35 (39.8±4.4%) female elderly patients. Mean red cell volume of low level (<0.86) was observed in 4 (3.2%) males and 23 (18.3±3.4%) females. The average volume of red cells (mean corpuscular volume - MCV) of the low level (75mkm^3) was observed in 8 (6.4%)

females. At the same time, mean corpuscular hemoglobin concentration (MCHC) was above normal (41.7±0.9%) in 17 (13.5±3.1%) females. Re-examination (3-4 days after admission) of red blood in patients with anemia showed further declines: male erythrocytes to 2.85±0.05x10^{12}/l, Hb up to 85.5±4.1 g/l, hematocrite number (Ht) to 23.6±1.3%. Hemoglobin (Hb) level compared to level at admission decreased by 21.9 g/l (19%). Female number of erythrocytes decreased to 2.8±0.7Ч10^{12}/l, Hb up to 80.3±1.7 g/l, Ht up to 22.2±0.6%. Reduction in Hb level compared with the level at admission was 27.1 g /l (25.2%).

Anemia (107.5±3.0 g/l) among senile men was detected in 13 (68.4±2.4%) ones. Re-examination after 3-4 days of hospitalization of these patients showed Hb level decreased to 85.2±3.6 g/l, which is 20.7% lower than the initial level.

Among senile women at admission anemia was detected in 59 (57.3±4.9%) patients: the number of red blood cells – 3.38±0.04x10^{12}/l, Hb – 104.3±1.4 g/l, Ht – 25.3±0.6%. Reduced cell color ratio (0.80±0.01) was observed in 41 (39.8±4.9%) patients. Moderate anemia (Hb – 81.2±0.7 g/l) was detected in 5 (4.9±2.1%) women. MCV below 75 mkm^3 (68.9±1.1 mkm^3) is observed in 9 (8.7±2.8%) cases. Increased levels (34.8±0.1 pg) of Hb in red blood cells (mean corpuscular hemoglobin – MCH) was observed in 10 (9.7±2.9%) women. Hb level in women of this age group decreased by 15.3% in the dynamics.

In group 2 anemia at admission was observed in 102 (77.9±2.7%) patients among which 23 (22.5±4.1%) elderly male patients had Hb level of 106.8±4.0 g/l, and 92.0±4.0 g/l in the dynamics with a decrease of 13.9%. Cell color ratio of low level (0.78±0.02) was observed in 13 (12.7±3.3%) patients. At the same time, 6 (5.9±2.3%) male patients of this age group had MCH higher than the upper normal level (37.1±1.3 pg).

Among elderly patients of group 2 anemia was observed in 20 (69.0±8.5%) women. Reduction of Hb after 3-4 days of hospitalization (from 104.5±2.6 g/l to 84.4±2.9 g/l) was 19.2%. Cell color ratio in 10 (34.5±8.9%) women was lower than normal one (0.79±0.01). Increased level of MCH was observed in 2 (6.9±4.7%) female patients of this group. At the same time, 2 (6.9±4.7%) patients had low levels of MCV (65.0±0.7 mkm^3) and MCH (24.7±0.1 pg).

In group 2 at admission 19 (86.0±7.4%) senile men had Hb level lower than 130 g/l (112.5±3.1 g/l). Low cell color ratio (0.80±0.01) was detected in 10 (45.5±.10.6%) of them. Increased levels of MCH (37.5±1.6 pg) was observed in 3 (13.6±7.4%) cases. At the same time, the mean corpuscular volume was normal (82.4±1.8 mkm^3). Re-examination shown that the average Hb level (85.7±3.4 g/l) reduced by 23.8% compared to the initial level.

Anemia at admission with an average Hb 105.1±2.3 g/l was detected in 31 (67.4±6.9%) senile women of group 2. Moderate anemia with Hb 78.5±4.7 g/l was observed in 2 (4.3±2.9%) of

them. Low cell color ratio (0.79±0.01) was observed in 22 (47.8±7.4%) women. MCH of the level above normal one (35.3±0.2 pg) was detected in 2 (4.3±2.9) and of the level below normal one (25.4 pg) - in 1 patient of this group. The level of Hb in the dynamics (88.3±2.4 g/l) decreased by 16%.

In group 3 anemia was observed in 16 (30.8±6.4%) patients (5 men and 11 women). Moderate anemia (Hb <90 g/l) was detected in 3 (5.8±3.3%) of them. MCH of more than 33.3 pg was observed in 3 (5.8±3.3%) cases, and less than 27.0 pg in 5 (9.6±4.2%) cases. MCV was increased (110 $mkm^{3)}$ in 1 (1.9%) patient. The decrease of corpuscular volume was observed in 6 (11.5±4.3%) patients, where the average rate was 60.6±0.8 mkm^3.

The difference of anemia prevalence between two groups is significant: the Kruskal–Wallis one-way analysis of variance - H (2, n=425) = 10.745; p=0.0046.

Anemia clinically diagnosed by weakness, headaches, insomnia, sinus tachycardia and sometimes by arterial hypotension.

The treatment of anemia included packed red cell transfusions, oral iron preparation, folic acid, parenteral administration of cyanocobalamin. The dose and duration of treatment were selected individually.

216 patients of the Group 1 were operated and 26 patients received conservative treatment. Preoperative duration was 4.2±0.2 days. The average hospital stay for patients treated operatively was 7.5±0.2, and for those treated conservatively – 21.6±2.7 days.

Late fate was followed up in 126 patients (116 - after surgery, 10 - after conservatively treatment). 29 of these patients died during the period of observation (23.0±3.4%): 20 people died during a year (18 - after surgery, 2 - after conservatively treatment), 9 people died over the next 2 years.

116 patients of Group 2 underwent the surgical treatment, 15 patients got conservatively treatment. Preoperative duration was 3.8±0.8 days. The average hospital stay for patients treated operatively was 14.8±0.6, and for those treated conservatively – 15.1±4.6 days.

Late fate was followed up in 77 patients of this group. During 2 years of observation 12 (17.9±4.7%) of 67 operated patients, and 3 (30.0±14.5%) of 10 patients who underwent conservatively treatment died. Lethality over 2 years of observation was 19.5±4.5%.

The analysis of contingency shown that Hb level significantly affect the late fate: Hb and lethality over 2 years of observation - $\chi 2 = 9.79$ (df = 3; p=0.021).

While analyzing the impact of anemia on late fate Cochran's Q test was Q=157.37 (df =1; p=0.0001), which confirms the negative impact of anemia on mortality within 2 years of observation.

Conclusion

1) Anemia is diagnosed in 70.0±2.4% of hospitalized elderly and senile age patients with systemic osteoporosis complicated by proximal femoral fracture.

2) Reduction of hemoglobin level in the dynamics is 19.5±2.0% compared to the initial level.

3) The two-year observation showed that anemia significantly increases lethality among elderly and senile patients with proximal femoral fracture under systemic osteoporosis. Adequate treatment of anemia in this group of patients is required to reduce the death rate.

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