Efficiency of Combined Use of Cryopreserved Human Placenta Tissue and Calcium Citrate on Metabolism In Bone Tissue of Rats With Mandible Fracture on Background of Osteoporosis

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Stimulation of reparative osteogenesis in the experimental traumas (fractures) of the mandible, including those complicated with osteoporosis, is necessary to eliminate inflammatory and vascular responses, biochemical changes and disordered systemic and local immune homeostasis. The research aim was to evaluate the effect of cryopreserved human placenta tissue and calcium citrate on bone tissue metabolism in different terms of reparative osteogenesis in rats with the mandible open fracture complicated with osteoporosis.

The correcting agents for mentioned biological and immunological disorders were the cryopreserved human placenta product Platex-Placental (Interdepartmental Center of Cryobiology and Cryomedicine of the National Academy of Sciences of Ukraine, Ministry of Health Care of Ukraine, Academy of Medical Sciences of Ukraine), and calcium citrate (OJSC Farmak, Ukraine).

Three groups of animals were used: 1st group (control) represented the rats with an experimental open fracture of the mandible complicated with osteoporosis; group 2 were the rats with experimental pathology which were treated with cryopreserved human placenta tissue implantation; group 3 consisted of the rats with experimental pathology which along with the implantation of cryopreserved human placenta tissue were also injected with calcium citrate according to the corresponding protocol. Biochemical and immunoassay tests were performed on the 7th, 14th, 21st, 30th and 45th days after the implantation of cryopreserved placenta fragments.

The results testify to the osteoprotective effect of cryopreserved human placenta tissue under experimental pathology, which was manifested by the intensification of collagen formation processes (maximum to day 21 the content of peptide-bound oxyproline in groups 2 and 3 significantly exceeded by 21.4 and 32.5 % vs. the control), mineralization of bone tissue (to day 14 in groups 2 and 3, the mineralization index significantly exceeded by 31.7 and 55.3% the control values), as well as the inhibiting effect on osteodestructive processes (maximum to day 14 in groups 2 and 3 the activity of acid phosphatase in serum was significantly lower by 12.7 and 22.8%, respectively, as compared to the control) and collagen catabolism (maximum at days 14 and 21 the free oxyproline level in serum was lower by 41.8 and 26.3% respectively (group 2), as well as by 51.8 and 29.5% (group 3) compared to the control).

The combined use of cryopreserved placental tissue and calcium citrate preparation has been established to have more powerful osteoprotective effect, found at earlier stages of the experiment if compared with therapy without calcium citrate.