The healing of fracture of mandible against the chronic nitrate intoxication.

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Introduction.

Damages of bones of facial skeleton lay down 8% from all damages, fractures of mandible are 85-90% from it. There are a lot of factors, that make worse the process of reparative regeneration of bone. Using of nitric fertilizers lead to heighten earning of nitric oxide into organism. It makes negative influence on reparative regeneration of bones.

The proposes of this study were to examine the effect of chronic nitric intoxication on the healing of fractures of mandible in different terms after trauma.

Materials and methods.

In this research we used 40 white rats, line Vistar mass 140-190 gr, they formed 2 groups: 1 – control group (modeling of fracture of mandible, n=20), 2 – experimental group (modeling of fracture of mandible against chronic nitric intoxication, n=20). Animals were decapitated at 14-th, 21-th, 28-th and 35-th days after modeling a fracture.

Chronic nitric intoxication – the sodium nitrate was given at dose 200 mg/kg in aqueous solution for 60 days (everyday). This method helps to make the chronic nitric intoxication.

Fractures of mandible – it was make an incision of gingiva in oral cavity lateral to left incisor, skeleted the mandible, partial fracture were formed as visual diastases around 2 mm medial to the first molar.

Results.

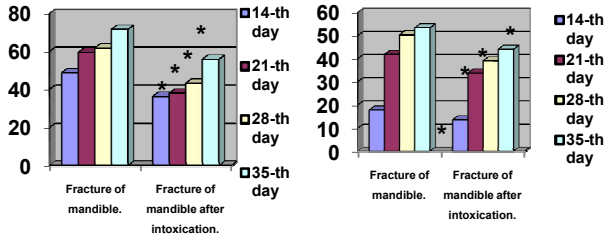
At microscopic examination the line of fracture site was filled with connective tissue, which included existing cellular elements and the fibrillar component, which was represented by relatively thin collagen fibers with uniform orientation on the 14th day after experimental fracture of mandible. The greatest density of cellular elements was observed near the bone fragments. The majority of cells was located according to the orientation of collagen fibrils. In the connective tissue that fills the fracture area was observed a large number of newly formed thin-walled microvessels in the lumen of which blood elements were available almost always. A large density of cellular elements was observed around the bone fragments, where they took part in the formation of the external callus. The average density of cellular elements in the area of callus reached 48,75 ± 1,463 in mkm2, and the relative number of osteoblasts was 17,80 ± 0,430 from all cells of callus.

At the 21st day at microscopic examination of regenerate fibrillar and fiber components were defined. Collagen fibers were mainly longitudinal everywhere orientation and the same thickness. Between the fibers were arranged cellular elements, which also had longitudinal orientation in most cases. The average relative density of cellular elements was located significantly increased by 22.1%. Also among the cell of regenerate signs of osteogenic differentiation of cellular elements were observed of the series. Overall, the number of osteoblasts was 1.34 greater than the previous time of observation. Virtually all microvessels were relatively wide lumen, which were identified elements of blood in large quantities. Significantly increased and total number of microvessels, resulting in their relative total area was 4.5 5.0%.

At microscopic examination the formation of primary bone trabeculaes was observed at the area of regenerate, this process had focal character at 28-th day. Collagen fibers were arranged along the bone trabeculaes, which were longitudinal targeted against them in most cases. Still a significant amount of blood microvessels were showed in the area regenerate.

After 35 days after the experimental modeling of fracture of the mandible in the area of regenerate microscopically an increase of number of primary bone trabeculaes was observed. This significant change in the structure of the circulatory microvascular channel didn't note. There was a decrease in the relative amount of collagen fibers and subsequent maturation of cellular elements, while the number of osteoblasts didn't increase significantly compared to the previous period of reparative process.

On the 14-th day after experimental fracture after chronic nitric intoxication it was determined young connective tissue with many blood microvessels and a moderate amount of fibrillar structures. The average density of cellular elements in the area of callus was significantly lower than the same period of reparative regeneration in the control group by 25.6%, and the relative number of osteoblasts - by 23.6%. Fibrillar component of regenerate was introduced by the few thin collagen fibers. Everywhere in the region of the fracture phenomena of resorption of bone fragments was observed. Newly formed blood microvessels, whose number was higher on the edge of the bone fragments were characterized by a relatively thin wall and their presence in the lumen of blood elements.



The density of cellular elements. The relative number of osteoblasts

On the 21-th day after experimental fracture of mandible after chronic nitric intoxication the density of cellular elements compared with the previous term regeneration process did not change significantly, but relative to control was significantly lower at 36.1%. It should be noted substantial qualitative changes of cells regenerate. Relative number of osteoblasts by 19.2% was significantly lower than the corresponding period of reparative regeneration in the control group animals. At the same time, compared to the previously described period, this figure is likely to increase 1.48 times.

On 28th day after experimental fracture against the previous 60-day nitrate intoxication microscopically regenerate was characterized by polymorphisms and was represented by fibrous connective and bone tissues. Rarely phenomena of bone resorption was observed.

The density of cellular elements in the area of callus increased significantly by 13.7% relative to the 21th day of reparative osteogenesis, but control remained relatively significantly lower by 30.0%. Number of osteoblasts increased by 15.6%, but the relative amount of which was still significantly lower by 22.4% than the corresponding term of reparative regeneration. Collagen fibers of connective tissue tended to form oriented longitudinal beams. Sometimes in the regenerate bone were available primary beam, whose number was significantly lower compared with the control group. Total area of microvessels was on average 5.0-6.0%. Most of them had relatively wide lumen and thin walls.

On the 35th day after the simulation of fracture mandible against chronic nitrate intoxication the relative number of osteoblasts continued to grow in callus (12.8%), but was significantly less than in the control group of animals (17.4%). The density of cellular elements was significantly increased by 29.2% compared to the previous period of reparative process, but was significantly lower than the control at 22.1%.

Number of collagen fibers with the correct longitudinal orientation increased. The number of bone trabeculaes increased slightly. However, the process of its formation in the experimental group of animals expressed significantly weaker compared with the control. There were no significant changes in the quantitative and qualitative of characterization of circulatory microvasculature, the total area of microvessels was about 6%.

Conclusions.

The chronic nitric intoxication slows down the course of regenerator processes of experimental fracture of mandible. It is characterized by slower dynamic of differentiation of cellular elements and micro vessels even at later terms of reparative osteogenesis and delay of forming of trabeculaes of bone.