THE STATE OF BONE METABOLISM IN THE DYNAMICS OF TREATMENT OF MANDIBULAR FRACTURES IN CHILDREN USING DIFFERENT IMMOBILIZATION METHODS

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Abstract: *mechanical trauma is a powerful stress factor that causes changes not only in the musculoskeletal system, but also in other organs and tissues. The methods used for the immobilization of fragments also affect the local and general status of the body. The study of blood biochemical parameters in fractures of the lower jaw in children is an urgent problem. The following indicators were studied: levels of parathyroid hormone, calcitonin, osteocalcin, cortisol level, activity of alkaline phosphatase in the blood in children who received treatment for a fracture of the mandible. As a result of the study, it was revealed that immobilization with Tigerstedt splints most negatively affects the state of bone metabolism in the treatment of mandibular fractures in children.*
Keywords: *mandibular fractures, immobilization method, bone metabolism, children.*

СОСТОЯНИЕ КОСТНОГО МЕТАБОЛИЗМА В ДИНАМИКЕ ЛЕЧЕНИЯ ПЕРЕЛОМОВ НИЖНЕЙ ЧЕЛЮСТИ У ДЕТЕЙ РАЗЛИЧНЫМИ МЕТОДАМИ ИММОБИЛИЗАЦИИ

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Аннотация: *механическая травма - мощный стрессовый фактор, вызывающий изменения не только в опорно-двигательном аппарате, но и в других органах и тканях. Методы, используемые для иммобилизации отломков, также влияют на местное и общее состояние организма. Изучение биохимических показателей крови при переломах нижней челюсти у детей является актуальной задачей. Изучены следующие показатели: уровень паратиреоидного гормона, кальцитонина, остеокальцина, уровень кортизола, активность щелочной фосфатазы в*

крови у детей, лечившихся по поводу перелома нижней челюсти. В результате исследования было выявлено, что иммобилизация шинами Тигерстедта наиболее негативно влияет на состояние костного метаболизма при лечении переломов нижней челюсти у детей.
Ключевые слова: *переломы нижней челюсти, метод иммобилизации, костный обмен, дети.*

Relevance. Currently, the treatment of mandibular fractures (MF) in children is an urgent problem in pediatric maxillofacial surgery. This is due to the fact that the choice of the method of immobilization of bone fragments of the lower jaw is the most difficult in childhood. Today, immobilization with the help of Tigerstedt's dental splints (1915) is more often used in practice, although they have a number of disadvantages, the most significant of which are: a negative effect on periodontal tissues, a significant decrease in the level of oral hygiene and the quality of life of children with MF [1,2,8].

Long-term fixation of the ligatures fixing Tigerstedt splints on the teeth in the area of the necks of the teeth can cause the development of an inflammatory process in the periodontal tissues [1], and with an already existing chronic inflammation - its exacerbation [2], which significantly complicates the treatment and prognosis [3,4].

Mechanical trauma is a powerful stress factor that causes changes not only in the musculoskeletal system, but also in other organs and tissues. The study of blood biochemical parameters in MF is an urgent problem [5].

In the processes of reparative regeneration, the endocrine system plays a very important role, which largely determines the rate and nature of the course of osteogenesis. It was found that parathyroid hormone (PTH) and cortisol have the most active effect on the metabolism in bone tissue. In case of fractures of the mandible before treatment, there is an increase in the content of PTH and cortisol in the blood by 2 and 2.5 times, respectively. An increase in the concentration of PTH and cortisol in the blood of patients indicates that the stress response of the endocrine system not only does not contribute to bone regeneration, but stimulates its osteoporosis [6]. PTH reduces the activity of osteoblasts, thereby decreasing the concentration of calcitonin and osteocalcin. An increase in the concentration of cortisol in the blood is a risk factor for the development of dental diseases or contributes to their progression [7].

The study of biochemical markers of bone metabolism is essential for assessing the level of consolidation of the jaw bones, as well as the rate and nature of the course of osteogenesis in fractures of the lower jaw in childhood, predicting the nature of fracture healing and the risk of inflammatory complications, and also for assessing the effectiveness of preventive measures.

The above provisions determined the goal and objectives of this study aimed at studying the level of markers of bone metabolism, as well as hormones that affect blood calcium metabolism in children with MF.

Material and methods. The following indicators were studied: levels of PTH, calcitonin; the content of the bone remodeling marker osteocalcin, the level of cortisol, the activity of alkaline phosphatase (AP) in the blood in children who received treatment in the department of pediatric maxillofacial surgery of the clinic of the Tashkent State Dental Institute in the period 2018-2020. Depending on the method of treatment, all examined patients with MF were divided into 4 groups:

Group 1 - 20 children (immobilization with Tigerstedt tires); Group 2 - 20 children (immobilization with Tigerstedt tires using LISTERINE® Children's rinse and vitamin D); Group 3 - 18 children (immobilization with dental splints, fixed with composite filling materials); Group 4 - 14 children (immobilization using mini screws);

Results. As a result of the study, it was found that in children of 3-5 and 6-12 years old with MF before treatment, AP in the blood serum was higher than in the group of healthy children ($p1 < 0.05$). The content of osteocalcin in children 3-5 and 6-12 years old with PNP was significantly lower than in healthy children of the same age. In general, in children with MF, the serum osteocalcin level was below normal.

Along with this, in the 1st group of patients, the serum level of osteocalcin in children of the older age group (as well as in the group of healthy children) was significantly higher than in children of 3-5 years old ($p < 0.05$).

A biochemical blood test in children with MF on the 14th day of immobilization showed that in patients of groups 2, 3, and 4 (children 3-5 and 6-12 years old), the osteocalcin content in the blood exceeded that in patients of group 1 ($p < 0$, 01). Also, at this stage of treatment, a decrease in the serum concentration of osteocalcin (significant in children of 3-5 years of groups 2, 3 and 4 and in children of 6-12 years of group 1) was found in comparison with the values of this parameter before treatment ($p < 0.05$).

AP in the blood serum of children remained elevated and did not differ between individual groups of patients, as well as in comparison with the stage before treatment.

A biochemical blood test in children with MF on the last day of treatment showed that in patients of groups 2, 3, and 4, the content of osteocalcin in the blood was still higher than that in patients of group 1 ($p<0.01$). Along with this, in children of group 1 it decreased compared to the stage before immobilization, while in the other three groups it did not undergo pronounced deviations relative to the indicated period, but in children 6-12 years old it turned out to be lower than the value of the same indicator on the 14th day of immobilization ($p < 0.01$). AP in blood serum in children of all groups, regardless of age, decreased in comparison with the previous stages, but still remained above the norm.

Thus, in the treatment of MF in children, immobilization methods affect the biochemical parameters of the blood. This is due to the fact that after an injury, the level of PTH and cortisol in the blood increases and, due to this, an

exacerbation of chronic inflammatory diseases, including periodontal tissue diseases, can be observed.

The study of the level of parathyroid hormone, cortisol, calcitonin and osteocalcin confirmed a less pronounced inflammatory response of periodontal tissues and an improvement in the state of bone metabolism with sparing methods of immobilization relative to the traditional method of immobilization of bone fragments. So with sparing immobilization against the background of a decrease in the level of PTH and cortisol, an increase in the concentration of calcitonin and osteocalcin occurs in the dynamics of treatment. On the other hand, when the fragments are fixed with Tigerstedt splints, there is an increase in PTH and a decrease in the concentration of calcitonin and osteocalcin by the time the fixing structures are removed.

The exclusion of traumatism of periodontal tissues during immobilization, as well as a satisfactory state of oral hygiene can contribute not only to reducing treatment complications, but also to reduce the rehabilitation period for patients with MF.

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