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# USE OF PINP AND B-CROSSLAPS IN MONITORING THE TREATMENT OF ACUTE HEMATOGENOUS OSTEOMYELITIS IN CHILDREN

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**Relevance.** Today, acute hematogenous osteomyelitis (AHO) remains a serious problem in childhood. According to the WHO, the annual incidence of AHO among children varies from 2 to 13 cases per 100,000 population, depending on the region, age, and level of medical care. Bone collagen biomarkers represent a new and promising tool in the diagnosis and monitoring of bone pathologies in children. The aim of the study was to determine the levels of bone type I collagen synthesis and degradation biomarkers (PINP and β-CrossLabs) in children with acute hematogenous osteomyelitis.

**Materials and methods of the study.** The study was conducted on the basis of Samarkand Medical University in the surgical department of the children's multidisciplinary hospital. We examined 60 children with OHSS. These patients were divided into 6 groups, and the concentration of amino-terminal procollagen I type propeptide (PINP) and carboxyl-terminal telopeptide of collagen I type (β-CrossLabs) was determined on the first day after admission, on the 7th day after surgery, and in the long-term follow-up period, which was 6 months. Group 1 included sick children aged 0-28 days, group 2: 1-11 months, group 3: 1-4 years, group 4: 5-9 years, group 5: 10-14 years, and group 6: 15-19 years. Children were taken from each study group to form a control group. The enzyme-linked immunosorbent assay (ELISA) method and the biochemical method were used for this study.

**Results and discussion.** The structural and functional integrity of bone tissue is ensured by two opposite processes: bone formation and bone resorption, the intensity of which is determined by the activity of bone cell elements: osteoblasts, osteoclasts, and osteocytes. Osteoblasts are responsible for bone formation, osteoclasts for bone resorption, and osteocytes for maintaining the structural and functional activity of mature bone tissue. The most important biopolymer of osteoid is type 1 collagen, which accounts for more than 90% of the organic matrix of bone and plays a key role in the mineralization of the extracellular matrix of bone tissue, as well as in ensuring the strength of bone. This indicates that changes in the metabolism of bone collagen directly reflect the overall direction of metabolic processes in bone tissue. The balance between the synthesis and degradation of bone collagen is a complex multi-step process that involves both extracellular and intracellular stages. The levels of bone formation or bone degradation can be assessed by analyzing the components of bone collagen that are released into the blood. For example, the amino-terminal propeptide of type 1 procollagen (P1NP) is a marker of type 1 collagen synthesis. Under the influence of catabolic factors, mainly osteoclasts, amino- and carboxyl-terminal telopeptides are cleaved from type 1 collagen molecules, which are known as N-terminal (NTX-1) and C-terminal (CTX-1) telopeptides. At the same time, CTX-1 can have 2 forms: alpha-CTX and beta-CTX. Beta-CTX contains beta-isomerized aspartic acid (beta-CrossLaps, from the English beta- isomerized carboxy-terminal cross-linking region of collagen type 1). This is a beta-isomerized carboxy-terminal fragment of type 1 collagen molecule, which is a specific marker of bone tissue resorption.

Our study showed that on the first day after admission, the PINP level was significantly higher in most patients compared to the control values, indicating an increase in bone tissue synthesis in response to inflammation. PINP values of group 1 -9.58 (control group-6.31) ng/ml, group 2 -13.78 (6.34) ng/ml, group 3-26.92

(2.37) ng/ml, group 4-16.95 (2.62) ng/ml, group 5 -15.21 (4.07) ng/ml, Group 6-13.46 (11.6) ng/ml. The β-CrossLabs values, which indicate collagen destruction, also increased, which confirms the destruction of the bone tissue matrix during the acute inflammatory period. In group 1 - 1,174 (1,115) ng/ml, in group 2 - 1.67 (0.766) ng/ml, in group 3 -1.413 (0.86) ng/ml, in group 4 - 1,321 (1.238)ng/ml, in group 5 - 1,417 (1,138) ng/ml, in 6 group - 1,438 (0.9) ng/ml. On the 7th day after surgical treatment, there was a multidirectional change in the indicators: in some cases, there was a decrease in PINP while β-CrossLabs remained high, indicating ongoing bone resorption processes. The values of PINP and β-CrossLabs on day 7 after surgical treatment were 10.25/1.232 ng/ml in group 1, 16.01/2,878 ng/ml in group 2, 21.91/1,617 ng/ml in group 3, 12.62/1.79 ng/ml in group 4, and 19.47/1,146 ng/ml in group 5. and in group 5, 15.02/3.497 ng/ml.

In the long term (after 6 months) in children with a favorable course of the disease, the PINP and β-CrossLabs indicators corresponded to the age norms. But in patients with a complicated course, there was still an imbalance with a predominance of degradation processes, which indicated the risk of residual deformations.

The PINP and β-CrossLabs values in the long-term period in group 1 were 1.5.77/2.446 ng/ml, in group 2-14.19/1,821 ng/ml, in group 3- 21.91/1.617 ng/ml, in group 4-22.76/6.278 ng/ml, in group 5-22.76/1,701 ng/ml, and in group 6 16.59/9.494 ng/ml.

**Conclusions.** Thus, as a result of the conducted research, we can conclude that the indicators of bone collagen biomarkers have diagnostic value both in early diagnosis, as well as as a tool in monitoring the treatment and predicting the outcome of acute hematogenous osteomyelitis in children.

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