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Modern Treatment Options for Acute Odontogenic Osteomyetitis in Children

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Abstract

Background: *Currently, the most effective treatment strategy for children with various forms of inflammatory diseases of the maxillofacial region is differentiated treatment, which takes into account the nosology and stage of the disease, age, premorbid background, aetiology of the process, the child's body's immunobiological reactivity, and genetic predisposition.*

Keywords*: - Chronic Odontogenic Osteomyelitis, Acute Odontogenic Osteomyelitis, Antibiotic*

INTRODUCTION

A collection of clinical facts, particularly the severity of the disease, the nature and location of the inflammatory process, determines the tactics of therapeutic measures and the order in which they are implemented. Patients are admitted to a specialist maxillofacial department or, as an exception, to a general surgical department of a hospital with a dentist-surgeon. Observations reveal that the sooner these people are taken to the hospital, the faster they heal and the less frequently the acute process becomes chronic. Active surgical intervention in the early stages of the disease is critical for the removal of a purulent-inflammatory focus in the bone and surrounding tissues in acute osteomyelitis [1].

The prompt removal of the "causal" tooth is critical for practical reasons. All temporary and multi-rooted permanent, and occasionally single-rooted (premolars) permanent teeth on the lower jaw that are the origin of the disease, must be removed

in acute odontogenic osteomyelitis. By removing a tooth, the underlying reason that originated and maintained the suppurative process in the bone is removed, and favourable conditions for the evacuation of pus from the focus to the bone are created [2].

Treatment should be thorough, aiming to eliminate both the source of infection and the disease's principal symptoms. Acute odontogenic osteomyelitis should be treated in a hospital environment, regardless of the child's age. A youngster with acute odontogenic osteomyelitis should be hospitalised very away. Hospitalization is allowed to clarify the diagnosis and to perform an emergency volume of surgical intervention in accordance with the diagnosis. The treatment process starts with emergency surgery under general anaesthesia. In extreme situations, the kid must be concurrently prepped for surgery and detoxification therapy by intravenous fluids, and body temperature must be reduced by intramuscular infusion of antipyretic medicines. This preparation, though, should not take long. The kid requires immediate thorough surgical care, which includes removing the "causal" tooth and opening all abscesses (subperiosteal, in soft tissues - adenophlegmon, peri-maxillary phlegmon), as well as sowing pus to test the sensitivity of microbiota to antibiotics. The wounds are drained once the purulent foci are opened until the purulent flow is totally ceased [3].

THE MAIN FINDINGS AND RESULTS

Chronic odontogenic osteomyelitis of the jaws is observed most often in children aged 3-12 years, which corresponds to the period of eruption, change and loss of teeth, active growth of the jaws. The peak incidence occurs at 5 years. Most often, destroyed milk molars and the first permanent molar become the “entrance gate” of infection [4].

A group of authors [5] propose to prescribe antibiotics in combination with other antibacterial agents for odontogenic inflammatory diseases of the ChLO (53.1% of observations). Combinations of antibiotics, including complex drugs, should be used in patients with primary chronic productive inflammatory processes of the lower jaw (27.2%) in generally higher dosages than in non-odontogenic diseases.The replacement of antibiotics and their combinations was carried out in 23 patients due to the lack of dynamics in the clinical picture of the

disease (hematogenous and odontogenic osteomyelitis, inflammatory infiltrate) and in 27 patients 1-2 days after receiving data on the sensitivity of the dominant association bacteria to antibiotics. In the case of odontogenic inflammatory diseases in the group of children 4-6 years old, group I was used - lincomycin, rulid, and in the group of children 7-12 years old - lincomycin, lincocin, clindamycin.In case of negative dynamics of the course of inflammatory diseases, a reserve group was prescribed - spiramycin, cephalosporins III-IV generation in combination with imidazoles. Inflammatory diseases of the PMO in children caused by aerobic flora for local drug treatment, it is necessary to use a composition of two polymers: polisept and PEG, as well as a composition - fogucid and PEG.With regard to anaerobic bacteria, the most effective are compositions of poly sept with PVP, fogucid with PEG, dioxidine with PVA, which contribute to the rapid cleansing of the wound from necrotic tissues, stop suppuration, reduce the concentration of bacteria in the purulent focus, tissue infiltration and shorten the time of tissue regeneration.

As replacement drugs, the group of antibiotics of the first stage - augmentin, cephalexin, as well as a reserve group - cephalosporins (III-IV generations), ceftriaxone, fuzidin, dalacin, dalacin C. (Zhanalina B.S. and 2014) to study the clinical and pharmacoeconomic effectiveness of complex treatment by the traditional method and by the method of regional lymphotropic antibiotic therapy, a clinical examination of 104 children with acute odontogenic osteomyelitis of the mandible was carried out.Patients in the groups were matched by sex, age, duration of the disease and clinical signs. All patients, depending on the applied method of therapy, were divided into 2 groups. The main group consisted of 54 children, who included regional lymphotropic administration of antibiotics in their complex treatment. The compared group consisted of 50 children, whose complex treatment included intramuscular administration of antibiotics. As a criterion for the pharmacoeconomic effectiveness of therapy, we used an assessment of the effectiveness of treatment in the compared groups, taking into account clinical research methods. This indicator when using the traditional method of treatment is 41.4%, and lymphotropic regional therapy - 77.9%.

The authors from Bashkiria suggest [6] to use a developed dental gel containing

sanguirithrin and an oil extract from calendula flowers for the treatment of inflammatory dental diseases in children and yarrow herb, in children aged 6 to 15 years with chronic catarrhal gingivitis and chronic periodontitis, in contrast to the reference drug, has a pronounced anti-inflammatory effect and affects the microflora of periodontal spaces.

The experience of a scientist from Uzbekistan is interesting (Khasanov A. 2010). The author investigated the effect of narrow-spectrum infrared rays on the microflora of purulent wounds in the complex therapy of acute odontogenic osteomyelitis of the lower jaw in children. It was found that when using narrow-spectrum infrared rays in the complex treatment of a purulent wound of acute odontogenic osteomyelitis of the lower jaw in children by the 7-8th day of treatment, pathogenic and opportunistic bacteria are completely eliminated from the wound, the general condition of the patient improves and local clinical signs of the acute process decrease .

Ukrainian colleagues from Poltava in the treatment of odontogenic osteomyelitis in children [7], the article presents the results of examination of 10 children with acute odontogenic osteomyelitis of the mandibular body, who were additionally injected with polyoxidonium in the protocol treatment. It was found to have a pronounced positive effect on the clinical manifestation of the disease and a significant immunomodulatory effect on the cytokine status at the level of the body and the oral cavity, which was manifested by a decrease in the level of pro-inflammatory and an increase in anti-inflammatory interleukins in the oral fluid and blood serum at the time of clinical recovery.

Data on 24 pediatric patients treated for acute bacterial osteomyelitis are presented by the authors from Children's Hospital, Singapore. [8] Analyzed the treatment of 14 boys and 10 girls (mean age 9.4 years) Treatment included antibiotics and supportive care. Surgery was indicated when the largest fluid collection was> 1 cm. Of 24 patients, Staphylococcus aureus was isolated in 18, group D salmonella in 3 and absent in 3. The mean time from admission to diagnosis was 1.87 days. For those treated with surgery, the median time from diagnosis to surgery was 1.19 days, and the median time from admission to surgery was 2.86 days.Four patients underwent multiple surgeries, 2 of which developed chronic osteomyelitis as well as negative culture and delayed surgery> 10

days ago. No other patient had complications. The authors eventually came to the conclusion that early surgery for acute bacterial osteomyelitis in children increased the diagnostic yield with cultures. For patients with a fluid collection <1 cm in greatest size, only medical treatment was effective. Patients with complications were characterized by negative culture, multiple surgeries and delayed surgeries.

In case of inflammatory diseases of the maxillofacial region, Transbaikalian scientists suggest using bioregulators (thymalin, thymogen, vilon, epithalamin, cortexin) to be included in the treatment of patients with a chronic purulent process at the age of 7 to 17 years. When prescribing the drug, take into account the age of the patients, the stage and prevalence of the inflammatory process, the presence of concomitant pathology. (Pimnelis I.S. etal. 2019)

T.K. Supiev [2012], along with traditional general and local treatment, used intramuscular thymalin in children with osteomyelitis of the jaws and extensive phlegmons of the maxillofacial region for 5-7 days. The indication for its use was a sharp suppression of immunity in severe and extremely severe disease, massive antibiotic therapy. Thymalin treatment indicated its stimulating and regulating effect on the T and B systems of the immune system.The modulating effect of the drug was detected as early as 5-7 days after the start of treatment, and a pronounced effect was noted 2-3 weeks after the end of the course of therapy. During these periods, the activation of reparative processes in the area of the focus of inflammation was observed: the formation of granulation tissue, a decrease and then cessation of the release of pus, rapid healing of a purulent wound, closure of fistulas, and growth of newly formed bone tissue. In addition, the protective effect of thymalin was established when using massive doses of antibiotics.

In children with acute odontogenic purulent osteomyelitis of the lower jaw, the endolymphatic route of thymogen administration was used. As a result, the patients' indices of peripheral blood and immunological reactivity normalized, and the clinic of the local inflammatory process acquired a favorable course. Children were 2 times less in hospital, they had no complications and prevented the development of destruction of bone tissue [Makovetskaya E.A. 2005].

Clinical observations of children with inflammatory processes in the maxillofacial area allowed V.V. Roginsky and N.N. Korinskaya (2011) to conclude that early diagnosis, the appointment of rational and adequate complex treatment with the inclusion of thymogen, reduce the time of treatment and rehabilitation, and restore the body's defenses. In patients aged 21 to 57 years with odontogenic abscess and phlegmon, immediately after opening the abscess, thymalin was used intramuscularly 2 times a day for 5-12 days, and with chronic odontogenic osteomyelitis of the jaws - before surgery to accelerate the formation of sequesters. Analysis of the dynamics of clinical manifestations revealed a clear positive effect in 80% of patients.

Bioregulators (thymalin, thymogen, cortexin and epithalamin) have also been successfully used for the treatment of inflammatory complications (suppuration of a bone wound, periostitis, hematoma suppuration, traumatic osteomyelitis) in patients with a fracture of the mandible aged 18 to 55 years. The positive effect was expressed in the improvement of the general condition, the cessation or significant reduction of suppuration from the wound, the appearance of signs of its granulation and subsequent epithelialization. In 20% of them, the inflammation was stopped without surgery, and in 13%, the suppuration of the inert wound turned into traumatic osteomyelitis, which was of a limited nature and tended to quickly stop. X-ray observations revealed the first signs of osteomyelitis (increasing expansion of the fracture line, osteoporosis of the marginal areas of the jaw fragments) on average on day 9, the beginning of the formation of sequesters - on day 19, and their complete rejection - on day 28 after injury. The terms of inpatient treatment averaged 20.6 + 0.5 days, and the total incapacity for work - 24.0 + 2.5 days. (Pinelis I.S. et al. 2019) Authors from Samarkand (Shadiev S.S., FozylovaD.Kh. 2016) report on the successful treatment of osteomyelitis of the lower jaw in children using ozone therapy. When performing therapeutic actions of 29 children aged from 2 to 16 years with phlegmons of the PMO with local and general ozone therapy, positive results were obtained. In patients with jaw ostemyelitis, the content of palmitic and palmitoleic acid decreased, the total oleic acid and the content of unsaturated fatty acids increased. The proposed by the authors method of ozone therapy for osteomyelitis reduces the treatment time for children.

The available modern methods of therapy, including the use of drugs with various pharmacological effects, do not allow for the complete absence of pyoinflammatory complications. A number of scientists believe that the main reason for the low efficiency of traditional treatment regimens is the emergence of resistance of microorganisms to the action of antimicrobial drugs, which can be explained by the frequent and irrational use of antibacterial drugs in the treatment of various diseases and the pronounced adaptive ability of pathogenic strains.

Currently, domestic and foreign scientists have made a significant contribution to solving the problem of prevention and treatment of purulent-inflammatory diseases of the dentoalveolar system, which did not reduce the relevance of the described problem.

Undoubtedly, the processes of free radical oxidation are of great importance in the life of cells and the development of pathology, which is explained by the fact that the reaction of free radical oxidation is a necessary stage of metabolic processes in the human body, and an increase in the intensity of free radical oxidation is a consequence or cause of pathological changes in cells and fabrics.

CONCLUSION

Based on the preceding, the key aim is to look for fundamentally novel approaches to influence the course and duration of the inflammatory process in craniofacial tissues. One method is to utilise a synthetic analogue of the pineal gland hormone melatonin - the medication "Melaxen" - in complicated treatment. At the moment, the most powerful natural antioxidant is melatonin, which acts as a "trap" for free radicals while also functioning as an inducer of antioxidant enzymes. It is now first in terms of inductive capacities, ahead of known antioxidants, and free radicals may be neutralised by direct contact with them without the participation of particular melatonin receptors of cell membranes. When a dental disease arises, the aforementioned phenomena under the effect of melatonin, even when used locally, are manifested at both the local and systemic levels. Melatonin, as a natural immunomodulator, has a good influence on immune system function despite a lack of precise information on the clinical testing of melaxen in the treatment of maxillofacial pyoinflammatory illnesses [10].

Preventing odontogenic osteomyelitis entails preventing caries development,

treating caries in milk molars to prevent its complications - pulpitis and periodontitis, clinical examination of children with chronic pulpitis and periodontitis, and timely removal of milk teeth - the most common source of bone infection. The results of chronic pulpitis and periodontitis therapy should be closely monitored throughout the first 6-12 months following treatment. In the lack of favourable therapeutic outcomes during these times, milk teeth must be removed, regardless of the child's age or the time of tooth change. This is the most effective strategy to avoid more serious odontogenic inflammatory illnesses, such as acute and chronic osteomyelitis and odontogenic inflammatory cysts.

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