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FEATURES OF BIOCHEMICAL ROOT PREPARATION FOR GUM GRAFTING

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Abstract: Plastic periodontal surgery solves quite complex issues of correcting the anatomy of the oral mucosa. The problem of surgical elimination of gum recession is still far from being resolved. Of the total number of periodontal diseases, gum recession accounts for 10%. Gum recession increases with age: occurs in various manifestations from 8% in children, approaching 100% after 50 years. Recession can be a physiological process of aging, as well as the result of progressive inflammatory and destructive processes in periodontal tissues. Various in shape and depth, this periodontal pathology has confronted scientists with the need to develop methods and means that make it possible to most aesthetically eliminate various forms of this periodontal pathology.

Keywords: periodontal surgery, gum recession, multifactorial pathology, smear layer

Relevance. Periodontal disease, although a multifactorial disease, still has a bacterial nature in the form of dental plaque as the primary etiological factor. Bacteria cause the development of the disease in various ways, one of which is the production of endotoxin. These endotoxins (complex lipopolysaccharides) have potential inflammatory agents in the form of bacterial cell wall fragments and can be found in the cementum of tooth roots in untreated periodontal disease. Endotoxins that bind to the cementum of tooth roots do not interfere with the growth of fibroblasts in vitro and have a cytotoxic effect; In vitro, mechanical removal of cementum has been demonstrated, which promotes cell growth on the surface of tooth roots, and it has also been established that in vivo, complete removal of dental cementum is impossible and that traces of endotoxins remain [1].

If the ultimate goal of periodontal therapy is to restore the lost supporting-retaining tissues of the tooth, this is done through complete regeneration or the formation of a new attachment; for this, the surfaces of the tooth roots must be completely cleared of endotoxins that bind to the cement of the tooth roots, which are sitoxins and interfere with regeneration or formation of a new attachment. For this reason, local chemotherapeutic agents for detoxification and creation of conditions for the formation of a new attachment as part of the task of cosmetic gum reconstruction and in the process of bone augmentation. This is also an attempt to overcome the most significant limiting factor for the formation of a new attachment, which is characterized by the rapid proliferation of epithelial cells on the root surface in the apical direction. Historically, the use of acid etching instead of instrumentation to smooth the root surface was first mentioned in the New York Dental Record in 1846, later by Younger and Stewart. These clinicians were looking for a way to stimulate inductive activity on diseased tooth root surfaces. Some of them described

the formation of attachment and induction of bone tissue regeneration in the area of demineralized surfaces of tooth roots [2].

Lemon acid. Register, following the experience of earlier researchers, gave a rational modern explanation for the study of bone induction, which is evidence of the formation of new bone or cementitious substance of the tooth by partially or completely demineralized acid of allogeneic bone or dentin matrix. Register and Burdick указывали, что деминерализованная поверхность зуба способствует образованию зубного цемента и новому присоединению и что лимонная кислота (pH 1.0) была кислотой выбора с оптимальным временем воздействия 2-3 мин. Sterratt и соавт. недавно обнаружили, что оптимальное pH должно быть 1, 42 за пределами которого деминерализация выражена меньшей степени [3].

Garrett, using scanning electron and transmission microscopy, showed that citric acid, although not affecting the untreated tooth root surface, led to demineralization of a 3-5 mm zone on the treated surface. He proposed that failure caused hypermineralization of the affected tooth root surface. Later, Poison et al., using scanning electron microscopy, showed that instrumentation of the root leaves a "smear layer" consisting of from tissue remnants, and in combination with exposure to the treated root surface with citric acid (pH 1.0; 2-3 mm) allows you to remove the smear layer, leaving a "native matted" collagen surface with exposed dental tubules. This demineralized fibrous or reticular surface was further exposed in vitro to provide better conditions for cultured cells to adhere to from the periodontal ligament and gingival fibroblasts. demineralized surface of the tooth root. This is thought to be due to collagen exposure rather than demineralization of the root surface [4].

Tetracycline hydrochloride. Tetracycline hydrochloride is used for acid demineralization because it has the same properties as citric acid: antibacterial effect, exposure of root collagen and opening of dentinal tubules, treatment of the smear layer, demineralization, detoxification of the root surface, attachment by direct adhesion to formation or without cementogenesis. It also has several additional advantages: anti-collagen activity, positive results after placement in a bone graft, independent antibacterial effect from 2 to 14 days, enhances bone repair in the socket after tooth extraction, binds more fibronectin to the demineralized dentin surface.

Ethylenediaminetetraacetic acid. 24% EDTA is a neutral pH (7.0) caustic that is recommended for detoxification and demineralization of the root surface and has the following advantages over low pH (1.0) caustics like citric acid: equally effective in removing grease layer, affects intact collagen bundles, necrosis of periodontal tissue is less pronounced, does not dissolve collagen fibers of the tooth root, the formation of histological attachment is more pronounced and the formation of epithelial attachment is less pronounced. Research has shown, that EDTA promotes biocompatibility of the root surface with a more pronounced exposure of intact collagen bundles, which is more favorable for cell formation and chemotaxis of periodontal fibroblasts without necrosis of surrounding tissues and decomposition of the collagen matrix [5].

Fibronectin. A high molecular weight glycoprotein (molecular weight = 440,000), which is found in the extracellular environment and is the main component

that ensures stabilization of the blood clot. This promotes cell adhesion of collagen and rough root surfaces and has a hemotactic effect on fibroblasts and mesenchymal cells [6]. Periodic application of fibronectin to partially demineralized roots significantly (I) enhances the effects of demineralization on the new attachment and increases cell proliferation from the periodontal ligament and supra-crestal region. The optimal concentration for use is 0.38/ml salt solution. Finally, fibronectin has also been used as a suture substitute and has achieved some positive results in the treatment of intraosseous defects in humans [6].

Goal of the work. Analysis of the problem of biochemical preparation of the root during gum grafting.

Materials and methods. The study was carried out through content analysis of literary data with elements of structural analysis. Object served as data on modern methods of gum plastic surgery.

Research results and discussion. Clinical studies in humans have shown both positive and negative results. Studies have demonstrated that there are strict indications when a positive result can be achieved through the interaction of citric acid with a coronary flap. Various clinical studies have shown that in class II furcation lesions (mandibular buccal and/or lingual; maxillary buccal), the combination of demineralization with citric acid and the placement of a coronary flap with or without ADL leads to a significant increase in bones (66-70% filling of the defect volume; 44-67% shows 100% bone filling). Confirming earlier work by Cole, showed an average increase in new attachment formation when probing 4.5 mm of citric acid demineralized coronary attached areas (as located to 1.7 mm of corona-attached isolating membranes) with histological evidence of new cementum a tooth with functionally included collagen fibers in the mineral fraction in all areas of the use of coronally located flaps with demineralization with citric acid. Based on research, it can be concluded that demineralization with citric acid stimulates new attachment and regeneration by one or more mechanisms: antibacterial effect, root detoxification, exposure of root collagen and opening of dentinal tubules, removal of the smear layer, stabilization of the primary clot, demineralization to cementogenesis, stimulation of growth and stability of fibroblasts, attachment by direct adhesion; or formation of periodontal attachment without cementogenesis, no undesirable effects on the pulp or periodontal tissues.

Conclusions

Root demineralization (citric acid, tetracycline hydrochloride) is recommended for cosmetic reconstruction of the gums before placing a bone implant (citric acid and tetracycline hydrochloride), in intraosseous defects, as an additive to the implant (tetracycline hydrochloride) and as the main method for the treatment of furcation lesions Class II (citric acid) with or without bone implants.

It is important to note that in the Annals of Periodontology, both the reviewer and the consensus participants agreed that "the use of citric acid, tetracycline, or EDTA on the root surface does not provide clinical benefit to the patient in terms of reducing probing depth or achieving clinical attachment."

Root demineralization with citric acid, although strongly supported by research for use in humans, is still a fairly effective procedure that cannot be achieved by

scaling or root scraping alone. This ensures that the root is detoxified, the smear layer is removed and regeneration is achieved. Tetracycline hydrochloride may enhance these benefits. EDTA is biocompatible (pH 7.0). Citric acid and tetracycline hydrochloride provide surface formation for future protein modifier use.

In the future, periodontal regeneration will combine root detoxification and a combination of synthetically "biological" protein modifiers that artificially stimulate tissue regeneration. Amelogenins are just the first step in this process.

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