MICROBIOLOGICAL INVESTIGATIONS IN MAXILLARY OSTEITIS

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Abstract

Osteitis is an inflammatory process localized accurately at maxillary bones. The microbiological exams of the biopsy punch fragments obtained by curettage of the post-extraction wound have evidenced the occurrence and the degree of severity of the inflammatory background of the lesion, giving the possibility to reconstruct the dynamics of the inflammatory process in osteitis. Evolution of the healing process could be followed on the biopsy punches taken over from patients who followed a correct treatment. The fragments taken over from patients were fixed for 24 hours in 10% neuter formol and processed according to the classic methodology, for their inclusion in paraffin blocks. The most important conclusions are that osteitis with normal scarring evolution contains a very small number of bacilli and Gram positive cocci, while follow-up of microorganisms and cell elements in osteitis may serve as scientific methods for controlling the evolution toward healing of the inflammatory lesion.

Keywords: osteitis, alveolitis, osteomyelitis

INTRODUCTION

Osteitis, an inflammation of the bone tissue, mainly of traumatic type, decreased in frequency due to the antibiotic therapy. Its etiopathogenicity includes loco-regional and regional factors which favor the infection of alveolar contents and of bone parts: intraoperative traumas, vessel breaking, vasoconstriction, incomplete extraction, apical periodontal infection, reduced immunity. [1]

After clearing the alveola with a sterile curette, the sample material is examined under the microscope in fresh preparations and after colorations, or it is sown on culture media incubated at 37°C for 2 hours, under aerobiosis, microaerophilia, and anaerobiosis. Microscopic examination evidenced micrococci and leucocytes, gram negative bacilli.

Upon isolation, enterococci, staphylococci, species belonging to the enterobacteriaceae family, may be found. The therapy, based on antibiotics applied locally and generally, is selected according to the antibiogram, being completed by immunostimulants, autovaccines etc. [2]

Healing is checked up microbiologically on the samples taken out from the alveola, during and after the treatment. The occurrence of rare leucocytes with phagocytes and rare microorganisms on the swab indicates the evolution towards healing. If the purulent aspect with numerous leucocytes and microorganisms persists, septic alveolitis is still present. [3]

Another way to follow up the evolution of alveolitis is by determining the evolution of serum A-immunoglobulin in dynamics: increased serum IgA indicates evolution toward septic alveolitis, while its returning normal shows the evolution toward healing. For therapy control in odontogeneous infections - abscesses, alveolar osteitis - N.P. Butler recommends determination of the reactive C protein in blood serum. [4]

The conflict may be influenced in favor of the host or of the aggressor by numerous physical chemical, biological agents, as well as by socio-economic and psychological factors. The microorganisms in the oral cavity have become an indispensable topic of study for the progress of dentistry. When teeth have been attacked by dental plaque, the bone and collagen fibers are destroyed. Collagenosis is produced by macrophages stimulated by bacterial endotoxins. [5] Recognition of foreign substances is done by macrophages and immunocompetent lymphocytes, leading to the occurrence of antibodies, lymphocytes, activating substances.

Especially important are some immunological deficiencies of phagocytosis, expressed by the absence of bactericidal capacity of granulocytes. [6] Chronic granulomatosis with painless, long-lasting suppuration is provoked by various
microbial species: staphylococci, yeasts, Klebsiella, coccobacilli. The *Streptococcus mutans* strains play a cariogenic role. The aggressiveness of microorganisms is relative, being manifested only when it is not neutralized by the natural or acquired defense mechanisms: phagocytes, antimicrobial factors in the air and tissues, secretions of substances that prevent invasion, fixation and multiplication in the tissues. [7]

The literature of the field makes mention of 29 microbial species in the oral microcosmos, out of which there have been constantly isolated: streptococci, staphylococci, Veillonella, Spirochetes, filamentous bacteria, fusiforms, vibrions, periplasmas. [2,8] In the oral liquid, the total number of microorganisms was of approximately 43 million up to 5.5 billion / ml (to attain the concentration of microorganisms in the oral cavity, we compared it with the density of microorganisms in a 24-hour culture on a billion, which is of 1 billion per millimeter). In the gingival sulcus, the density of microorganisms is much higher, reaching 250 billion per gram in the dental plaque, represented by staphylococci, streptococci, diphteroids, fusobacteria, vibrions. [2] Just as the periodontal lesions are responsible in many cases for endocarditis after dental extraction, it is sure that pyogenic granuloma and periodontal infections are often continued by suppurated alveolitis. It has been found out that, locally, along with the evolution of the normal scarring process, there appear phagocytes, a small number of microorganisms, especially Gram positive cocci, replaced by Gram positive bacilli and, in some cases, the latter ones – by yeasts. The risk of suppurated alveolitis may be anticipated by observing in the post-extraction wound a large and various number of microorganisms (cocci, vibrions, trichomonas) and leucocytes. [9]

Bacteriemia and septicemia differ by the intensity of the clinical manifestations and concentration of microorganisms in blood. The presence of a high number of various microorganisms and of leucocytosis attests a precocious initiation of inflammatory lesions in the maxillary bones.

The microbiological examinations of the biopsy punch fragments obtained by curettage of the post-extraction wound have evidenced the occurrence and severity of the inflammatory background of the lesion, giving the possibility to reconstruct the dynamics of the inflammatory process in osteitis. [10]

Histopathologically, the wound appears as a pathological anatomy represented by an ulceration which includes the epithelium of the mucosa and part of the corion. The neighbouring epithelium presents dystrophic lesions and, at the bottom and edges of the ulcer, there appear granulomatous inflammatory infiltrates with polymorphous cellularity under partial elimination. At this level, bacterial colonies colored in dark violet (with hematoxylin) and also in dark red appear. In their proximity, there occur inflammatory infiltrates consisting of polymorphonuclear leucocytes, neutrophiles, lymphocytes, macrophages, fibroblasts. Also, in the ulceration area, fibrohematocoric clots appear in the process of detachment while, in the depth of the corion, there appear rich granulomatous inflammatory infiltrates with newly formed vessels. The in-depth extensive character of the chronic inflammatory process is evident, including the whole corion and the neighboring muscle tissue. Inside the granulation tissue, some microbial colonies can be also noticed. At this level, the vessels present turgescent endothelia with consecutive diminishments of the lumen. The newly formed vessels in the granulation tissue present endothelial tumefactions which narrow the marginal lumens up to their disappearance, being characteristic for the process of obliterating vascularitis. Extension of the granulomatous tissue affects the nervous filets, generating perineuritis processes. [2,11-14]

The bone sequestra are surrounded by a granulation tissue, made up of foreign body giant cells, lymphocytes, plasmocytes and collagen fibers, which explains the sclerogenic character of this chronic inflammation.

Under the electronic microscope, the lesional and pathogenic aspects appear amplified. Blood capillaries present turgescent endothelium and modifications of the basal membrane, which evidences frequent vesicles of pinocytosis, pleading for permeability disorders. This fragments the collagen fibers in the edematized corion. In the proximity, partially altered neutrophile polymorphonuclear leucocytes may be observed while, in the proximity of detrituses macrophages occur. [12]
Evolution of the healing process could be followed on the biopsy punches taken over from patients who followed a correct treatment. The wound epithelization process appears by the creation of a stratified pavimentous epithelium which presents, along with hyperplasic papillomatous reactions and dystrophic lesions, acanthoses and parakeratoses. Finally, the coat epithelium may return to its histologically normal aspect, with digitiform papillary proliferations in the in corion, where no inflammatory infiltrates appear, any more. The microbiological research provided a few conclusive images. [2,13]

The fragments taken over from the patients were fixed for 24 hours in 10% neuter formol and processed according to the classic methodology, in order to include them in paraffin blocks. Microbiological investigations, performed at the “Victor Babes” Institute, were led by Mihai Sefer, M.D. Ph.D. 4 blades in different stages of evolution of post-extraction osteitis were selected for exemplification.

**CASE PRESENTATION**

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**Fig. 1 – Post-extraction osteitis, PAS coloration, 100x.** Rich chronic granulomatous inflammatory, depth of the post-extraction ulcer zone, infiltrating the conjunctive structures of the corion and of the neighboring muscle tissue

**Fig. 2 – Numerous bone fragments sequestered in a mass of red blood cells. PAS coloration, 100x.** Bone sequestrae are surrounded by granulation tissue. Expansion of the granulomatous tissue affects the nervous filets

**Fig. 3 – Alveolo-dental ligaments dissociated by polymorphous inflammatory infiltrates – electronic microscope image, 9100x.** The mucosa presents a regenerated, normal aspect, with epithelium invaginations in the absence of inflammatory infiltrates in the corion

**Fig. 4 – Post-extraction alveolitis in a healing stage, HE coloration, remake of the mucosa with papillomatous hyperplasia of the epithelium with acanthotic modifications**
CONCLUSIONS

1. For the prevention and treatment of complications that may appear after tooth extraction or other surgical interventions, the dentist, along with his personal knowledge of microbiology and immunology, should be in a permanent collaboration with the Microbiology-Immunology Laboratory.

2. The lesional and pathogenic aspects of osteitis appear amplified by electronic microscope, blood capillaries showing turgor endothelial and basement membrane changes.

3. Osteitis with normal scarring evolution contains a very small number of bacilli and Gram positive cocci.

4. Follow-up of microorganisms and cell elements in osteitis may appear as a scientific method in the control of the evolution toward healing of the inflammatory lesion. The presence of a higher number of microorganisms, with various species, and of a high number of leucocytes attests initiation of the inflammatory lesion.

References


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