

ANATOMO-CLINICAL CORRELATIONS REGARDING HEALING OF POSTEXTRACTIONAL ALVEOLAR OSTEITIS IN THE PRESENCE OF SOME THERAPEUTIC AGENTS

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Abstract: If for the majority of patients tooth extraction seems a simple and quick maneuver, for dentists and oral and maxillofacial surgeons it represents a surgical procedure that involves local and/or general risks and therefore requires a set of important precautions and practical knowledge. Even today it is still unclear why only certain patients develop alveolar osteitis in selected alveoli, despite abidance by the rules of asepsy and antisepsy, the correct surgical techniques and subsequent care. Anatomic-pathological examination in alveolar osteitis reveals a number of extremely important morphological issues.

INTRODUCTION

The best intra-alveolar dressing is the normal blood clot, therefore empirical formulas for prophylaxis and treatment of alveolar osteitis are not appropriate, because there is not a single material or a drug combination that can be applied universally, with good results.(1)

Alveolar osteitis is a multifactorial complication that occurs after dental extractions; thus practitioners have used various techniques for prevention and treatment of this extremely painful complication, resulting in discomfort for both the patient and the physician.(2)

In this context there have been used various methods for prevention and/or treatment of alveolar osteitis, starting with the management of disturbances in the fibrinolytic activity of the alveolar clot, following with oral rinsing with antiseptic solutions and the use of intra-alveolar antibiotics in the form of cones, pastes, powders and other substances with antiseptic and especially cicatrization effect (polylactic acid grains, gelatin sponges, collagen paste, acid tranexamic, etc.). Regarding intra-alveolar administration of antibiotics, documented theories suggest various classes of antibiotics to reduce the occurrence of alveolar osteitis.(3)

When systemic therapy is used it is difficult to achieve a bacteriostatic or bactericidal concentration of antibiotic in postextractional alveoli without a call for doses that produce side effects(4). This is the reason for which the use of antibiotics in the form of alveolar cones is the preferred treatment for moist alveolar osteitis.

Studies using topic tetracycline for treatment of alveolar osteitis showed an incidence of 0-14,6% in patients who have received this antibiotic and 9.2-33.5% in the control group. Usage of clyndamicine resulted in 0%, 0.39%, 0.65% and 1.2% incidence values compared to 1.54-31% in the control batch(5).

In a study conducted in 1982 on a batch of 45 patients with bilateral inclusions of lower third molar, unilateral use of parralelopipedic gelatin sponges impregnated with 1mL ophthalmic suspension of a corticosteroid and oxitetraciline(6) resulted in a 6.6% incidence of alveolar osteitis on the side on which the substances were applied and 28.8% on the untreated side. These results concur with the observations of another study using tetracycline, in which the incidence of alveolar osteitis was 7%. This data suggested an insignificant efficiency of topic steroids.⁷

Although unable to provide complete prevention of alveolar osteitis, tetracycline in the form of salt in a gelatin sponge may significantly reduce its occurrence, but it can also be used as a tent imbued with tetracycline after extraction of included lower third molar. Bacteria play an important role in the dry socket phenomenon, though the exact mechanisms involved are not fully known. Studies on the replacement of tetracycline with clyndamicine better efficiency of the latter.(8,9)

Other than the propensity of researchers for penicillins, there were also studies of postextractional local usage of metronidazole. Topical appliance of metronidazole in all postextractional alveoli resulted in a reduction of alveolar osteitis incidence from 3% to 0.6% in a group of 62 patients and from 3.4% to 1.7% in another group of 51 patients.(10)

Intra-alveolar cones are solid, sterile formulations which have a conical prism shape, with a base diameter of 4/2 mm, height of about 8mm and weight of 0,04-0,05 g. They may contain various bioactive substances in the oral cavity:

- antibiotics and local anesthetics
- antiseptics, homogenously dispersed in a hydrosoluble mass, which is released by dissolution in the biological fluid, or by melting at the temperature from the infected site, where they exert their bacteriostatic and bactericidal action.

The cone shape of these products offer the advantage of a wide applicability, allowing their use as topical applications in postextractional wounds to avoid the occurrence of complications, as well as after all dental procedures, which may result in general or regional complications.

Currently three sterile products are known to be used as intra-alveolar cones with antibiotics and local anesthetics:

- NEOCONES - tablets for dental use, SEPTODENT company, France
- NEGASOLON - dental cones, Microproduction laboratory of the Faculty of Pharmacy, U.M.F "Gr T. Popa" Iasi

At present new alveocones products containing substances with antimicrobial, analgesic and anti-inflammatory properties were developed. Among these we recommend one specific product developed by the Department of Pharmaceutical Technology of UMF "GR.T.POPA" Iasi. It is based on benzydamine in combination with two antimicrobial agents indicated in oral pathology: metronidazole and ciprofloxacin. These substances were dispersed in an lipophilic excipient named kemkao CE-34 (table.1).

Our reasoning to recommend alveocones as a therapeutic method is justified by the fact that in the local therapy of alveolar osteitis bioactive substances should be allowed to penetrate deep into the postextractional sites and to maintain sustained bacteriostatic or bactericide levels in order to sustain their therapeutic action and prevent the development of microbial resistance.

BIOACTIVE SUBSTANCE (0,06 g/per con)	BENZYDAMINE HYDROCHLORIDE	METRONIDAZOLE 4%	CIPROFLOXACIN HYDROCHLORIDE 4%	KEMKAO CE-34
FORMULA	1,5mg	0,025mg	0,025mg	0,064mg

MATERIAL AND METHOD

In order to continue our previous work on the study of postextractional alveolar osteitis(11), we focused on the correlations between anatomico-clinical forms and the therapeutic agents used to treat this complication of dental extraction.

The study was conducted on two "targeted" groups and a control batch, totalizing 15 patients. Alveolar osteitis both in the control and the "targeted" groups, were at mandibular molar 3 and 2, occurring after extraction of radicular remnants, chronic marginal periodontitis and pulpal gangrene. Our study focused on the appreciation of morphological aspects of the healing process, as the tooth extraction was followed by the development of moist alveolar osteitis. The control batch was investigated in comparison with the other 2 groups, in which we applied anti-inflammatory and pro-cicatrizant substances at the postextractional sites.

GROUP I (control): 5 patients with postextractional alveolar osteitis, in which the postoperative treatment followed a classic surgical protocol.

GROUP II: 5 patients with postextractional alveolar osteitis, in which the treatment included the introduction of ALVOPENGHA in the alveola.

GROUP III: 5 cases of postextractional alveolar osteitis, analyzed clinically and anatomico-pathologically, in which the postoperative protocol included of introduction of cones with antibiotic and anti-inflammatory agents in the alveola.

The method of investigation consisted of anatomico-pathological examination of fragments of alveola taken after dental extraction, which allowed assessment of changes in cells and tissue. Biopsies were performed at 5, 15 and 30 days after dental extraction.

RESULTS AND DISCUSSION

Research undertaken by us has sought to establish a number of correlations, opposite to the anatomico-pathological aspects found in respect to postextractional wound healing in the presence of substances with therapeutic action in alveolar osteitis. Our study focused on the appreciation of the morphological aspects of the healing process when the extraction was followed by development of fibrinolytic alveolitis. We have performed a comparative analysis of the study groups in order to underline the efficiency of intra-alveolar appliance of antibiotic and anti-inflammatory agents.

↳ **Alvopengha cones (anti-inflammatory agent made of marine algae filaments + iodophorm):**

1. 5 days after dental extraction

- presence of hemorrhagic infiltrate (figure 1)
- persistent acute inflammatory infiltration in the vicinity of blood clot (figure 2)
- presence of Alveolar filaments in different areas, compactly organized within the inflammatory infiltrate (figure.3)
- presence of very small areas of new connective tissue in the acute inflammatory infiltrate (figure 4)

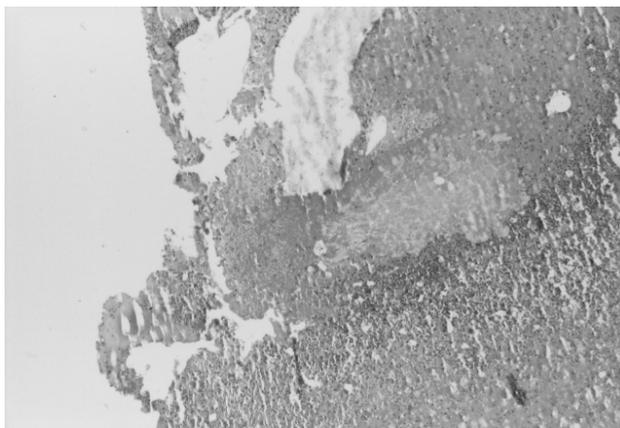


Figure 1. The presence of hemorrhagic infiltrate

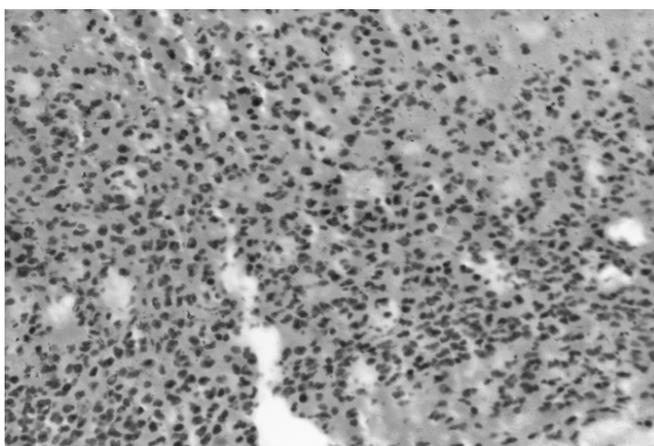


Figure 2. Persistent acute inflammatory infiltrate in the vicinity of the blood clot

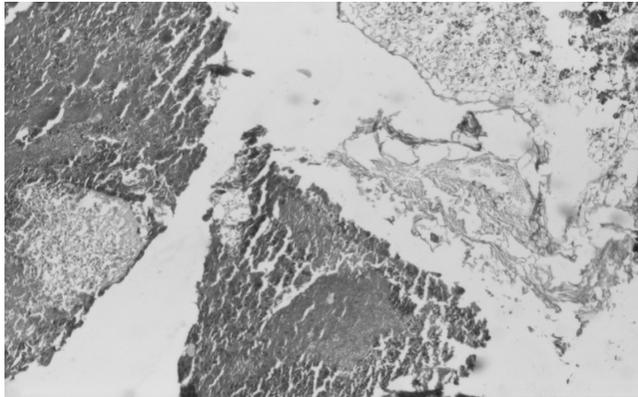


Figure 3. The presence of Alvopengha filaments in different areas, compactly organized within the inflammatory infiltrate

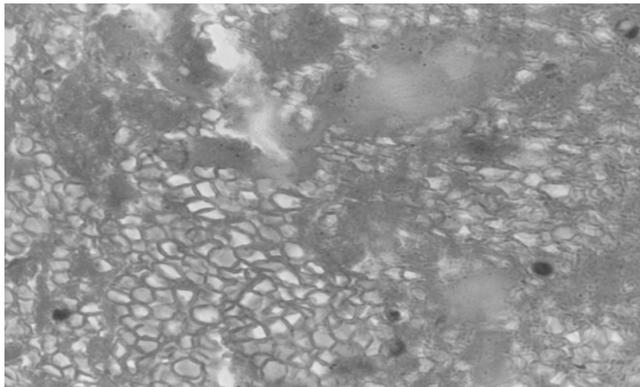


Figure 4. The presence of very small areas of new connective tissue within the acute inflammatory infiltrate

2. 15 days after dental extraction

- presence of Alvopengha filaments in different areas, surrounded by chronic inflammatory infiltrate (figure 5) and organization of granulation tissue, elements that suggest an ongoing healing process (figure 6).

3. 30 days after dental extraction

Clinical and anatomico-pathological examination reveals the restoration of the gingival mucosa, integrity of the stratified pavementous epithelium with full keratinization (ortokeratinization) and partial keratinization (parakeratinization) and intense collagenized, fibrous subjacent lamina (figure.7).

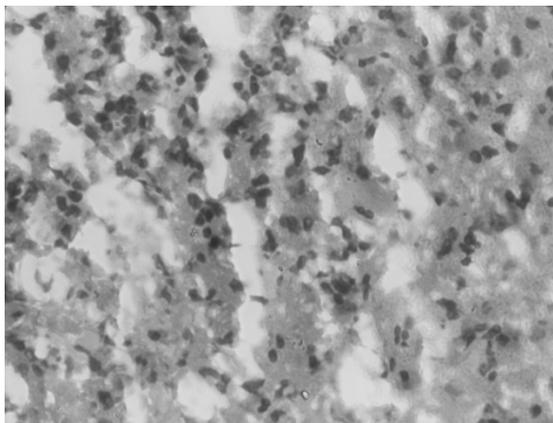


Figure 5. The presence of Alvpengha filaments in different areas, surrounded by chronic inflammatory infiltrate

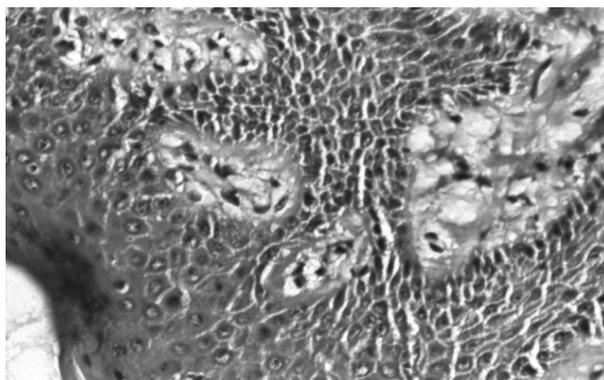


Figure 6. Organization of granulation tissue, suggesting an ongoing healing process.

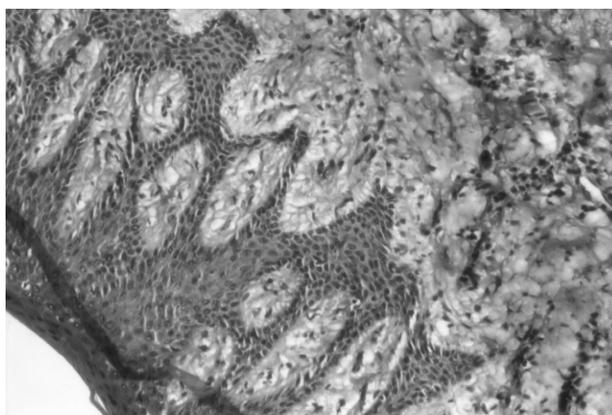


Figure 7. Restoration of the gingival mucosa, integrity of the stratified pavementous epithelium with full keratinization (ortokeratinization) and partial keratinization (parakeratinization) and intense collagenized, fibrous subjacent lamina

↳ **Antibiotics and anti-inflammatory cones (metronidazole, ciprofloxacin and benzydamine):**

1. 5 days after dental extraction

- chronic inflammation with rare, persistent acute type cells (figure 8)
- connective tissue in the process of organization (figure 9)

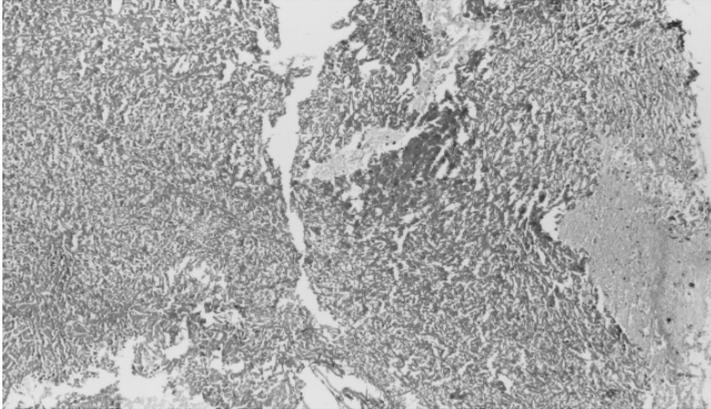


Figure 8. Chronic inflammation with rare, persistent acute type cells

2. 15 days after dental extraction

- yellow-brown, homogeneous, amorphous material, present in condensed straps among the inflammatory elements and within the connective tissue - possibly component material of the cones, which was not resolved (figure 10)
- lised bone lamellae surrounded by inflammatory infiltrate (figure 11)

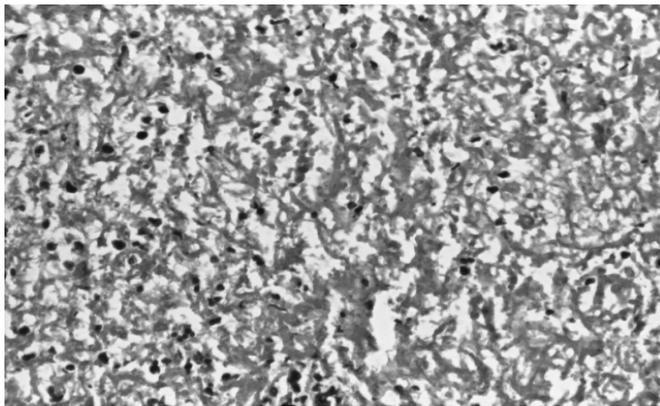


Figure 9. Connective tissue in the process of organization

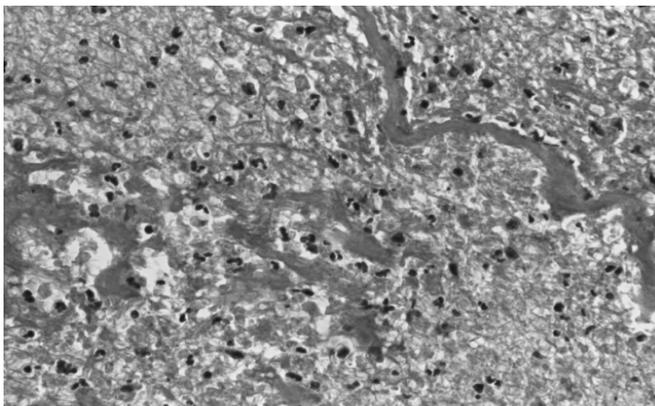


Figure 10. Homogeneous, amorphous material present in condensed straps among the inflammatory elements and within the connective tissue - possibly component material of the cones, which was not resolved

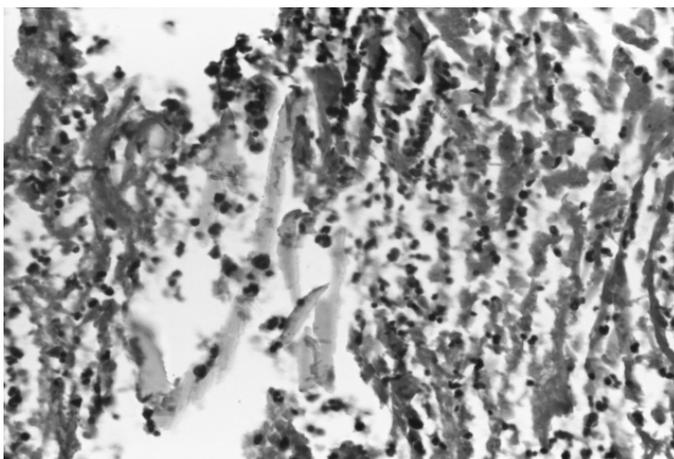


Figure 11. Lised bone lamellae surrounded by inflammatory infiltrate

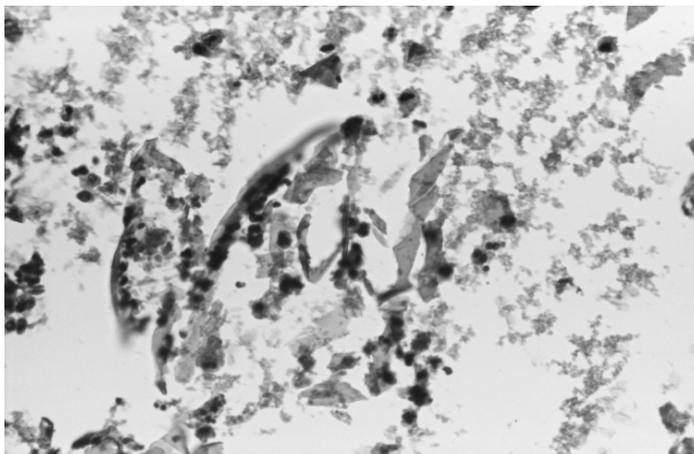


Figure 12. Morphological elements of epithelial and connective tissue integrity

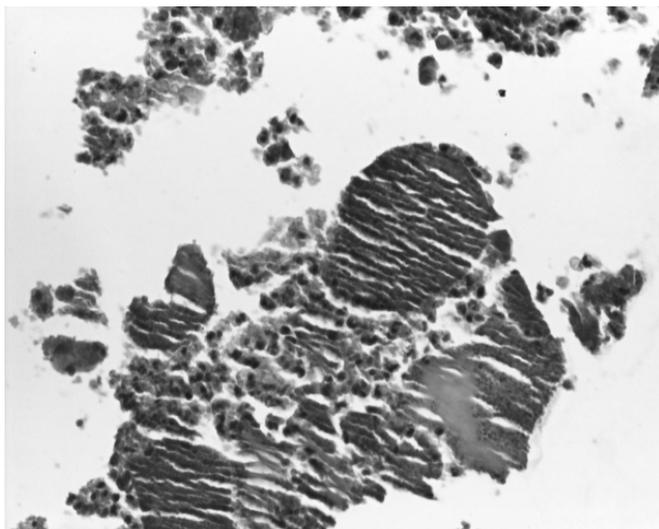


Figure 13. Organization of the connective tissue and reduced chronic inflammation

3. 30 days after dental extraction

- the same morphological elements of gingival mucosa epithelial and connective tissue integrity (figure 12)

- In patients who received cones with antibiotic and anti-inflammatory agents the healing process was faster: the organization of the connective tissue began from day 5 and chronic inflammation was reduced. (figure 13)

Patients have returned for clinical evaluation regularly (weekly) presenting an extremely favorable clinical evolution. At 30 days postextraction an evaluation biopsy was performed, revealing the same elements of morphological integrity of the epithelial and connective tissue of the gingival mucosa.

CONCLUSIONS

In conclusion, we can say with certainty that anatomo-pathological examination in alveolar osteitis in the presence of antiinflammatory and/or antibiotic substances revealed a series of morphological aspects different from those found in the anatomo-pathological examination characteristic for the alveolar osteitis in a developing state.

Our study showed a positive effect of ALVOPENGHA cones, as well as of antibiotic and anti-inflammatory cones.

The clinical and anatomo-pathological aspects of postextractional wound healing (especially alveolar osteitis) revealed in early stages, allowed the application of the appropriate treatment, leading to a favourable evolution of the healing process.

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