THE ROLE OF ANTIBIOTHERAPY IN THE ORAL REHABILITATION OF THE PERIODONTAL AFFECTED PATIENT

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ABSTRACT

The periodontal disease is one of the most frequent chronic diseases and one of the most common microbial infections in the adult patient. It appears as a consequence of the interaction between the pathogenic bacteria (periodontal pathogens) with a susceptible host. The main objective of the therapeutic management is to obtain a high standard of oral hygiene and to prevent the loss of periodontal attachment by mechanical and surgical methods. The adjunctive drug therapy demonstrated in time clinical and microbiologic advantages, with an essential role for the antibiotics. The antibiotic intake can present a therapy role when it is addressed to the microorganisms from the red complex maintained in the periodontal tissues after the mechanical debridement or in recurrent sites from localized aggressive periodontal disease. They are also necessary in cases of acute forms of the disease, ANUG or ANUP, aggressive and refractory to the periodontal treatment. The prophylaxis with antibiotics is justified in situations like the ones that require the use of membranes and also to avoid the risk for bacteraemia in patients with systemic impairment. The selection of the type of antibiotic and of the administration method (local or systemic) is performed according to the clinical form and to the type of microorganism, to the antibiogram, to the drug history of the patients and to his systemic status.

Keywords: periodontal disease, therapy management, antibiotics

The periodontal disease is considered to be the most common microbial infection in the adult, the studies from the last decades demonstrating the fact that microorganisms are determinant factors in the aetiology of the periodontal disease [1]. From the more than 500 microbial species present in the sub-gingival biofilm, the highest pathogens were identified: *Porphyromonas gingivalis, Treponema denticola and Tanerella Forsythia*.

They are considered to be the primary aetiologic agents which, when interacting to a susceptible host, can initiate inflammatory and destructive processes of the periodontal structures [2]. The main objective of the therapeutic management is to obtain a high standard of oral hygiene and to prevent the loss of periodontal attachment. This objective is possible by an associated action of the

patient which has to be motivated to obtain a high standard of oral hygiene and of the medic which presents a high area of mechanical and surgical periodontal procedures. The clinical studies demonstrated that, even when an adequate therapy is conducted, the result can be unfavourable in a certain category of patients. Therefore, it was proved the essential role of the host factors in the onset of the periodontal disease, of the unbalanced local immune response of these patients. When associated with such systemic conditions, the pathogeny mechanisms of the major periodontal pathogens are the incriminated factors for the existence of aggressive, severe and refractory clinical forms of disease [3].

Regarding all these aspects, the drug adjunctive therapy imposed itself as an absolute necessity. The antibiotics played a major role in this therapy, justified more by the existence of a remaining flora in the periodontal structures and the presence of co-morbidities in the systemic status of the patient.

The studies demonstrated the efficiency of the antibiotics in the treatment of the periodontal disease by improved clinical and biologic parameters. Reduced inflammation, reduced probing depths (0,2-0,3mm), improved clinical attachment level and low red complex bacteria were demonstrated [4, 5]. Table 1 systematize the indications of the antibiotic treatment:

Table 1. Systemic administration of antibiotics: selection criteria and indications

Selection criteria	Indications
According to the clinical form of periodontal disease	1. ANUP and ANUG with local, regional and systemic complications 2. Aggressive periodontitis 3. Severe chronic periodontitis 4. Refractory periodontitis
According to the systemic status of the patient	Prophylaxis in patients with systemic impairment (in order to prevent bacteraemia)
According to the therapy management	Surgical treatment Non-surgical treatment Membrane use

In order to obtain a favourable therapy response, the selection of the type of the antibiotic is conducted considering the following aspects:

- Factors regarding the antibiotic: action spectrum, type of activity (bactericide or bacteriostatic), pharmacokinetic profile, adverse effects, administration method, proofs of clinical efficiency.
- Patient related factors:
- History of antibiotherapy for the periodontal disease: self-medication, incorrect therapy (period, association with other drugs), antibiotherapy for other diseases, hypersensitivity phenomena.
- The age of the patient: some antibiotics need to be avoided in the period of tissue development (tetracycline accumulates in the bone and tooth tissues in this period).
- High risk co-morbidities, like hepatic and renal maladies; in these cases the lowest toxic level antibiotics are selected, with dose adjustments.
- The presence of certain physiologic conditions – pregnancy imposes to avoid teratogenous risk drugs; the antibiotherapy is conducted only if the situation strictly requires it and it is based also on an inter-disciplinary consult.
- Drug therapies with considerable interactions with antibiotics (Table 2).

From the large variety of antibiotics, the

antibiotics with the maximum efficiency on periodontal tissues were identified by research studies. The main criteria used in the assessment of the antibiotic efficiency involved their antimicrobial activity, defined as a rapport between the maximum concentration in the gingival crevicular fluid (GCFC) and the minimal inhibitory concentration (MIC90), result which is expressed in percentage for each antibiotic and each microorganism. GCFC offers information regarding the maximum levels reached by the antibiotic in the primary ecological site on systemic intake. MIC90 represents an in vitro determination of the concentration which generates an inhibition of 90% of the bacterial development in a single species. Based on this determination, it was demonstrated that the most efficient antibiotic for the treatment of a certain periodontal pathogen is the one where the rapport is ≥100% [4, 6].

Table 3 summarizes the antibiotics and their activity mechanism [7, 8, 9].

Table 2. Interactions between antibiotics with other drug classes

ANTIBIOTIC	OTHER DRUGS	EFFECT
AMOXYCILLIN	PROBENECIDE	It rises the amoxycillin
METRONIDAZOLE	BARBITURICS; HYDANTOIN	It lowers the effect
	ORAL ANTICOAGULANTS	It rises the anticoagulant effect
	ETHANOL	Anti-abuse effect
TETRACYCLINE	Al, Bi, Fe, Mg ANTIACIDS	Lowers the absorbtion level
	BARBITURICS; HYDANTOIN	Lowers the serum concentration
	CARBAMAZEPINE	Lowers the serum concentration
	DIGOXIN	Rises the digoxin level in serum
ERYTHROMICIN AZYTHROMICIN CLARITHROMICINE	CARBAMAZEPINE	It rises the level of carbamazepine in serum with nistagmus, nausea, vomit, ataxia
CPROFLOXACIN	ORAL ANTICOAGULANTS	It rises the anticoagulant effect
	NONSTEROIDAL ANTIINFLAMATORY DRUGS	Rises the risk of CNS obnubilation
	CAFFEINE	Rises the caffeine concentration

Table 3. The administration of antibiotics and their activity mechanism

ANTIBIOTIC	CLINICAL FORM	DOSE	TREATMENT	ACTIVITY MECHANISM
AMOXYCILLIN (bactericide)	Severe chronic periodontitis	500 mg x3/day	8 days	Inhibits the synthesis of cell wall
	Periodontal abscess with local-regional complications		3 days	
	ANUG		7 days	
DOXYCYCLINE	Localized aggressive periodontitis	Ist Day: 100mg x2/day From IInd Day: 100 mg/day	7-14 days	Inhibits the protein synthesis
CLINDAMYCINE (bactericide)	Periodontal abscess with local-regional complications	600 mg x 3 /day	5 days	Inhibits the protein synthesis

	Localized aggressive periodontitis	300 mg x 3 /day or 600 mg x 2 /day	8 days	
CIPROFLOXACIN (bactericide)	Severe chronic periodontitis	500 mg x 3 /day	8 days, 8-14 days in smokers	Inhibits the nucleic acids synthesis
ZINNAT (bactericide)	Severe chronic periodontitis, ANUG, ANUP Periodontal abscess with local-regional complications	250 mg x 2/day	7 days	Inhibits the synthesis of cell wall
RODOGYL (bactericide)	ANUP	4-6 tb /day	5 days	Inhibits the protein synthesis
AUGMENTIN (bactericide)	Severe chronic periodontitis	1g x2/day	8 days	Inhibits the synthesis of cell wall
	ANUP		7-10 days	
METRONIDAZOLE (bactericide)	Severe chronic periodontitis	500mg x 3/day	8 days	Inhibits the nucleic acids synthesis
	Periodontal abscess with local-regional complications		3 days	
	ANUG		3-7 days	
	ANUP		7-10 days	
AZYTHROMYCINE (bactericide)	Localized aggressive periodontitis	250 mg x2-1st day, then 250mg/day	5 days	Interacts with phagocytosis
	Periodontal abscess with local-regional complications	500 mg x 2- Ist day, then 500 mg x 3 /day	4 days	
ROVAMICINE (bactericide)	ANUG	1.500.000 x 3 /zi 3.000.000 x 2 /zi	7 days	Inhibits the protein synthesis
	ANUP	1.500.000 x 3 /zi 3.000.000 x 2 /zi	7-10 days	

Frequently, in the periodontal disease the systemic antibiotherapy uses associations. The advantages of the associations consist in the extension of the microbial range, the prevention/exclusion of bacterial resistance and a decrease of the individual dosage by exploiting the synergic effect. The most frequent association are with metronidazole, except doxycycline [10, 11, 12]. The prophylaxis with antibiotics is recommended in patients with an affected immune response due to other systemic diseases (cardiovascular, diabetes mellitus, immunosupression) (table 4) [13].

Table 4. Prophylaxis with antibiotics in systemic diseases

ANTIBIOTIC	DOSAGE FOR ADULT	DOSAGE FOR CHILDREN
AMOXYCILLIN (oral) AMPICILLIN (parenteral)	2g before the procedure and 1,5g after 6hrs 2g im/iv 30 minutes before the procedure	50mg/kg 1h before 50mg/kg im/iv 30 before

Allergic to penicillins CLINDAMYCINE or AZYTHROMYCINE CLARITROMYCINE (oral) CLINDAMYCINE (parenteral) VANCOMYCINE (parenteral)	600mg 1h before 500mg 1h before 600mg iv 30minutes before 1g 1h before	20mg/kg 1h before 15mg/kg 1h before 20mg/kg iv. 30min before 20mg/kg iv. 1h before
Immediate hypersensibility to penicillins CEPHASOLYN	1g iv. 30min before	25mg/kg 30min before

The systemic therapy with antibiotics presents the following advantages: it is not limited to just one site, exerts an action to all the biologic sites (tonsils, dorsal surface of the tongue, gingival cap of the wisdom molar), the intake is easy (when oral), the extensive antimicrobial action reduces the risk of re-infection, prevents the recidives and it selectively focuses on periodontal tissues (tetracycline is the most potent) [14].

The disadvantages of the systemic therapy with antibiotics consist in secondary effects which can be difficult to deal with (candidosis, gastro-intestinal troubles, allergies, risk of resistant species), high hepatic or renal toxicity for some of the antibiotics, drug interactions and different concentrations for different drugs.

The local antibiotherapy is indicated when there are maximum 3 sites with periodontal pockets deeper than 5-6mm. It presents the advantage that the slow liberation on longer periods does not generate systemic secondary effects but it has the disadvantage that it does not reach all the biologic sites.

Table 5 summarizes the local antibiotic systems.

Table 6 presents the differences between the systemic and local delivery systems of antibiotics.

Table 5. Local antibiotic systems

Presentation form	Drug
Cream	DONTISOLON -neomycin, prednisolon DENTOMICIN - microcyclin 2%
Gel	ATRIGEL - tetracyclin SURGIGEL- tetracyclin ELYZOL- metronidazole 25%
Semi-solid systems	SISTEM EVA- fibers of tetracycline of 0,25 mg/mm, non-degradable ACTISITE- tetracyclin 20% copolimer nonresorbable
Biodegradable systems	PERIOCHIPS-soluble membrane with chlorhexidine, active for 7 days

Table 6. Systemic antibiotherapy versus local antibiotherapy

Results	**Systemic delivery**	**Local delivery**
Distribution	Large distribution	Reduced efficiency range
Concentration	Different levels in different organs and systems	High dosage in situ, low level in the rest of the sites
Therapeutic potential	Can reach a larger variety of distribution for microorganisms	Can exert a better local action
Issues	Systemic adverse effects	Re-infection by untreated sites
Clinical limits	Requires a good patient compliance	Limited infection in the treated site

Diagnosis issues	Identification of pathogens, drug selection	Model of lesion and pathogen distribution, identification of the sites which need to be treated

CONCLUSIONS

The usage of antibiotics in periodontal disease is limited to certain clinical forms which need to be well selected, is individualized according to the history of antibiotic intake of the patient, to the presence of any other systemic diseases and according to the presence of certain physiological conditions (like pregnancy). Their usage is guided by the microbial culture in order to identify the pathogen type and its sensibility to antibiotics.

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