

Role of Systemic Antibiotics in the Management of Periodontal Diseases

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ABSTRACT

Periodontal diseases are polymicrobial diseases resulting in inflammation of the supporting structures of the teeth. The removal of the plaque biofilm by mechanical therapy not always results in total resolution of the lesion. Frequently adjuvant administration of antibiotics is required for better results. This article overview the factors to be considered while administering systemic antibiotics as an adjunct to mechanical debridement.

Key words: periodontitis; Systemic antibiotics; Amoxicillin

INTRODUCTION

The word antibiotic derives its name from two Greek words *anti* and *bios* meaning against life. In the present scenario antibiotics are the most commonly prescribed, mostly in an inappropriate situation.

The basic premise behind the use of antibiotic therapy as an adjuvant to mechanical debridement were unfavorable anatomy of the tooth structure, intra oral translocation of bacteria, presence of tissue invasive organisms, bacterial invasion into dentinal tubules and inability of mechanical therapy to remove all the organisms, especially those that are tissue residing.¹ Hence an adequate knowledge about the host, bacterial and drug factors are essential before prescribing systemic antibiotics. Hence, this review presents the basic rationale and the factors to be considered behind prescribing systemic administration of antibiotics in the treatment of periodontal diseases.

Drug related factors

The following factors are to be considered

before using antibiotics as an adjuvant to periodontal therapy.

Factor I : Dosing Principles

Minimum Inhibitory Concentration (MIC)

Antibiotic concentration must be atleast 2-3 times above MIC of organism and higher dose for shorter duration can be followed.

Post antibiotic effect

Certain drugs like azithromycin possess post antibiotic effect and enhance the activity of cells like leukocytes. This should be taken into consideration while prescribing these drugs.

Loading Dose

Loading dose is used when a delay of 12 hrs or greater to achieve therapeutic blood levels is unacceptable.

Factor II : Bio availability

Plasma protein binding

Some drugs bind to plasma proteins making their bioavailability low. This factor is more important in treating patients with hepatic or renal

insufficiency. The plasma protein binding of commonly prescribed drugs is given below.

1. Clindamycin , Doxycycline – 80-96%
2. Penicillin,Erythromycin,Tetracycline -50-80%
3. Cephalexin, Metronidazole, Amoxicillin, Ciprofloxacin - < 25%

This binding also increases with infection, diabetes, malignancy decreases with liver disease, burns and malnutrition. In general, antibiotics with lower plasma protein binding are preferable.

Food interference

The bioavailability of certain drugs are reduced by the concomitant intake of food materials. Hence, a minimum delay of 1 hour is allowed between the food intake of drug administration. Classical example is the administration of tetracyclines taken 1 hour before or 2 hours after food intake.

Factor III : Penetration

Blood concentration must exceed by a factor of 2-8 times to offset tissue barriers. Also, drugs administered at an interval of 3-4 times its serum half life also help to achieve steady state blood levels.

Factor IV: Duration

Shortest time that will prevent both clinical and microbial relapse must be selected when administering an antibiotic. Additionally, clinical improvement of the patient as judged by remission of infection must be assessed before discontinuing the drug.

Patient related factors

Age

Dosage reduction in elderly and children must be considered.

Medical status

Often, the medical status of an individual determines the drug and the dosage to be used while treating periodontal diseases. The following guidelines can be followed:

Dose reduced for metronidazole and macrolides in patients with impaired hepatic

function.

All tetracyclines except Doxycycline is contraindicated in patients with renal impairment.

Clindamycin and metronidazole usually do not require dose alterations in renal failure.

Dosage of penicillins, cephalosporins, erythromycin and ciprofloxacin are decreased with severe failure.

Erythromycin and amoxicillin are safe during pregnancy.

Characteristics of an ideal antibiotic

1. Selectively toxic
2. Bactericidal
3. Active when diluted
4. Long duration of action
5. Not easily induce resistance
6. Assists host defence
7. Less adverse effects
8. Not to affect commensal flora
9. Minimal to no drug interactions

Advantages

1. Reach up to base of the pocket and furcation areas
2. Effect on residing organisms
3. Disinfecting other oral niches
4. Reduced risk of subgingival recolonisation

Disadvantages

1. Unnecessary exposure
2. Adverse drug reactions
3. Compliance
4. Resistance

Protocol to be followed before administration of systemic antibiotics

The following protocol is advised before starting systemic antibiotics in patients with periodontal diseases.

1. Analysis of the Patient
2. Microbial analysis
3. Antibiotic Selection

Analysis of the Patient

The patient must be clinically examined and the antibiotics are usually indicated in the following conditions.

1. Refractory patient
2. Aggressive periodontitis, or with medical conditions predisposing to periodontitis
3. As an adjuvant to chronic periodontitis not responding to conventional therapy.
4. Acute or severe periodontal infections
5. Post surgery, during or after implant placement

Microbial analysis

Is carried out after completion of conventional therapy. The causative organism is identified either by culture or molecular techniques and susceptibility testing done if required

Antibiotic Selection

The antibiotic is selected by considering the following factors:

1. able to travel easily to the infection site
2. able to achieve therapeutic concentration in GCF, bone or tissues
3. minimal side effects
4. positive benefit:risk ratio
5. well documented clinical effects

Antibiotics used in the Treatment of Periodontal Diseases

Chronic Periodontitis

Not advocated as a routine treatment for

uncomplicated periodontitis as it offer little or no additional benefit than mechanical therapy. Only used, if the disease is not responding to conventional therapy.²

Aggressive Periodontitis

The following regimen were tried with successful results in the literature.

1. 1g/day of TC for 3-6 wks in conjunction with mechanical debridement.³
2. 1g/day of TC for 2 wks with surgical treatment.⁴
3. 1 g/day of TC along with non surgical therapy for 2 weeks and continued for 1 week after obtaining negative culture⁵

Recently combination of amoxicillin and metronidazole has been tried with successful results.⁶

Refractory Periodontitis

Microbial analysis and sensitivity testing is a must followed by reevaluation. Clindamycin, TC, Doxy, Amox-clavulanic acid, Metronidazole found to be effective.^{7,8}

CONCLUSION

Antibiotics do not provide a benefit beyond what is achievable with conventional scaling and root planning, but can be used as an adjunct to conventional therapy. The sites most likely to be responsive to this adjunctive treatment method may be refractory or recurrent periodontitis.

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