

To Prescribe or Not To: Systemic Antibiotics in Treatment of Periodontal Infections

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Abstract: *Periodontitis is a chronic infection induced by a mélange of microfloral aetiology. The first line of treatment by and large includes non-surgical mechanical debridement and regular periodontal maintenance care. In some cases surgical intervention may be indicated to improve access to the root surface for meticulous debridement. An array of systemic antibiotics available as adjuncts for treatment of periodontitis has been recorded. While some studies claim superior clinical outcomes following inclusion of these, others do not. A controversy was born as to question the role of systemic antibiotics in the treatment of periodontal diseases. Recent orderly reviews have bestowed an evidence-based assessment of the possible perks of adjunctive antibiotics in periodontal therapy. This review aims to provide an update on clinical issues of when and how to prescribe systemic antibiotics in periodontal therapy.*

Keywords: periodontitis, adjunctive therapy, systemic antibiotics, root planing.

1. Introduction

The objective of this review is to render the clinician an updated current literature regarding the use of systemic antibiotics in periodontal treatment. While the use of systemic antimicrobials for treatment of periodontitis has been controversial, the recent publication of two systematic reviews^{1,2} has provided an even-handed evidence-based assessment of the possible advantages of systemic antibiotics. This paper will discuss some important clinical questions regarding when and how to use systemic antibiotics for the treatment of periodontal disease.

2. To Use Or Not To Use In The Treatment Of Periodontal Infections

A meta-analytical study indicated that systemically administered antibiotics provide a clear clinical benefit in terms of mean periodontal attachment level “gain” post-therapy when compared with groups not receiving these agents. Subjects with aggressive periodontitis showed greater benefit than subjects with chronic periodontitis.^{1,2} The Sixth European Workshop of Periodontology concluded that there is no direct evidence to recommend a specific protocol for the adjunctive use of the antimicrobials.¹⁵

2.1 Are adjunctive systemic antibiotics expedient over surgical mechanical therapy alone?

Deficiency of access for effective mechanical debridement calls for surgical intervention. An additional clinical attachment level gain (weighted mean gain 0.6 mm) was reported in a systematic review by Haffajee et al. which encompassed prescribing systemic antibiotics as an adjunct to surgical mechanical debridement in deep pockets.² The results of three studies¹⁶⁻¹⁸, using different antibiotics (tetracycline, penicillin, amoxicillin plus clavulanate), were

merged in this meta-analysis comparing periodontal surgery plus adjunctive antibiotic versus periodontal surgery plus placebo.

However, Herrera et al., in his most recent review of the literature, concluded that there was deficient data supporting additional benefits of adjunctive antibiotics when combined with periodontal surgery.¹⁵

Hayes et al in 1992 stated the results of a meta-analysis, however, did not demonstrate an additional benefit of the systemic administration of tetracycline.³

Similarly, Elter et al. 1997 suggested that the additional benefit of the systemic metronidazole was not evident after a thirteen week follow-up period.⁴

Contrary to the above findings a recent systematic review and meta-analysis by Sgolastra F, et al. 2012 seems to support the combined systemic administration of amoxicillin and metronidazole adjunctively to scaling and root planning.⁵ However, due to the small number and discrepancy regarding dosages of the included studies, no judgement could be made. Although the cost effectiveness of this therapeutic modality, the risk of inducing bacterial resistance should be taken seriously into considerations before antibiotics are prescribed as adjuncts of the nonsurgical periodontal therapy.^{6,7}

Although an additional clinical benefit of adjunct systemic antibiotics has been described, it would be wise not to use this remedy routinely but only in cases of refractory or aggressive periodontitis so that the risk of developing antibiotic resistance is substantially reduced.

While these reviews indicate that, on average, the antibiotics contribute to therapeutic success, they fail to answer a number of critical questions.

- First, which patient would benefit most from systemic antibiotic administration?
- Second, which antibiotic or antibiotic combination is most appropriate for which form of periodontal infection?
- Third, what is the optimum dosage, duration and timing of antibiotic administration (in relation to mechanical debridement)?
- Fourth, is a poor treatment response due to the use of the wrong agent or failure of the agent to reach the site of action.
- Fifth, what is the “Negative Aspect” of antibiotic administration; i.e. the negative consequences of side effects and the development of antibiotic resistant species?

The optimal timing of antimicrobial drug administration is one subject for discussion, as it remains controversial whether adjunctive systemic antibiotics should preferably be administered during the initial non-surgical phase, or during a subsequent surgical treatment phase.

A landmark study, published in 1992 by Loesche et al., sparked this controversy by showing that systemic metronidazole, when given as an adjunct to scaling and root planing, reduced the need for surgical therapy in periodontitis patients with elevated levels of spirochetes in subgingival samples, thereby reducing the costs and the inconvenience for the patient.⁸ These findings were contrary to the opinion that mechanical therapy should be exploited to its limits before a decision is made to administer an antibiotic.

Postponing antibiotic therapy to the surgical treatment phase may be defended for two reasons.

- First, it is known that scaling and root planing alone are able to resolve a considerable amount of periodontal pathology on their own^{9,10}, and this strategy may help to keep the prescription of antibiotics to a minimum.
- Second, given the restricted effects of antibiotics on intact biofilm¹¹, and the known limitations of scaling and root planing¹², surgical intervention may be necessary for complete biofilm disruption on all contaminated surfaces.

As most available studies tested systemic antibiotics in the context of non-surgical debridement, a systematic review that tried to assess the relative benefit of prescribing antibiotics either during the non-surgical or the surgical phase of therapy was inconclusive.¹⁵

One study, which was not included in that review, found that administration of amoxicillin and metronidazole immediately after initial scaling and root planing provided better clinical outcomes in deep sites than late administration in the context of rescaling after 3 months¹³, corroborating the views expressed in 1992 by Loesche et al. Slots *et al.* described a series of steps using anti-infective agents for enhancing regenerative healing. They recommend starting antibiotics 1-2 days before surgery and continuing for a total of at least 8 days, however, the value of this regimen has not been well documented.¹⁴ Haffajee *et al.* concluded that data support similar effects for most antibiotics.²

2.2 Examples of antibiotic regimens documented for treatment of periodontitis

Antibiotic	Antibiotic regimen	Periodontal disease as described by authors	First author / year
Tetracycline	250 mg, 4 x day, 14 days	Advanced chronic periodontitis	Al Joburi, 1989 ³⁸
Doxycycline	200 mg, 1 x day, 8 days	Generalized rapidly progressive periodontitis	Sigus, 2001 ³⁹
Spiramycin	1.5 UI, 2 x day, 14 days	Advanced periodontal disease	Bain, 1994 ⁴⁰
Azithromycin	500 mg, 1 x day, 3 days	Aggressive periodontitis	Haas, 2008 ²⁹
Metronidazole	250 mg, 3 x day, 7 days	Periodontitis > 10% spirochetes	Loesche, 1984 ⁴¹
Clindamycin	150 mg, 4 x day, 10 days	Refractory periodontitis	Walker, 1993 ⁴²
Amoxicillin and Metronidazole	375 mg, 3 x day, 8 days	Chronic periodontitis	Flemmig, 1998 ⁴³
	250 mg, 3 x day, 8 days	presence of A.a, P.g	

3. Patient compliance : A crucial perspective

The concern of patient compliance has been intermittently documented in publications assessing the effects of systemic antibiotics. Some studies have demonstrated patient compliance, with antibiotic regimens prescribed, to be as little as 20 percent.¹⁹

Antibiotic azithromycin, due to its pharmacologic properties and long half life, may be advantageous over other antibiotic regimens as only one tablet (500 mg) per day during three consecutive days is required as opposed to one tablet three times a day for seven days with other antibiotic regimens.²⁰

Significance of compliance as a part of oral hygiene and maintenance care should also be delivered. It should be noted

that, in studies where beneficial results following adjunctive antibiotics were reported, patients had received optimum maintenance care and had good plaque control. If a patient was belligerent with protocols of oral hygiene maintenance, then a benefic treatment causatum following adjunctive antibiotics was implausible. Prescription of antibiotics is no proxy for meticulous debridement, good oral hygiene technique and regular maintenance care.

4. Conclusion

The clinical diagnosis and situation dictate the need for possible antibiotic therapy as an adjunct in controlling active periodontal disease as the patient's diagnosis can change overtime. Continuing disease activity is an indication for periodontal intervention and possible microbial analysis

through plaque sampling. Also, cases of refractory or aggressive periodontitis may indicate the need for antimicrobial therapy. When used to treat periodontal disease, antibiotics are selected based on the patient's medical and dental status, current medications, and results of microbial analysis, if performed. Microbial samples may be obtained from individual pockets with recent disease activity or from pooled subgingival sites. A pooled subgingival sample may provide a good representation of the range of periodontal pathogens to be targeted for antibiotic therapy. Plaque sampling can be performed at the initial examination, root planing, reevaluation, or supportive periodontal therapy appointment. Systemic antibiotic therapy should be an adjunct to a comprehensive periodontal treatment plan. An antibiotic strength 500 times greater than the systemic therapeutic dose may be required to be effective against the bacteria arranged in the biofilms. Therefore, it is important to disrupt this biofilm physically so that the antibiotic agents can have access to the periodontal pathogens. Antibiotics have also been shown to have value in reducing the need for periodontal surgery in patients with chronic periodontitis. Risks and benefits concerning antibiotics as adjuncts to periodontal therapy must be discussed with the patient before the antibiotics are used.

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