Systemic antibiotic therapy in periodontal diseases

Samira Fattahy Meybody[1], Nodar Sulashvili[2], Marika Sulashvili[3], Maia Matoshvili[4]

[1]The University of Georgia, School of Health Sciences and Public Health
[2]Tbilisi State Medical University
[1]Student of Dental program in English; [2]Supervisor, Pharm.D, PhD(c); [3]MD; [4]Supervisor, MD, PhD, Assistant Professor[2]

Summary

Periodontitis is inflammation of periodontal tissues that it can has much different microbial etiology. This periodentium inflammation treated in the way of nonsurgical treatment and mechanical debridement and regular pattern of periodontal care the only indication is for the patient to improve visual approach for mechanical debridement. Quite high list of systemic antibiotic are published for treatment of periodontal therapy that some of them are effect in high clinical result while others do not. This has resulted in discussion for the role of systemic antibiotics in treatment of periodontitis while the recent researched shows evidence-base assessment for use of antibiotics for relevant treatment .the objective aims of this research is to provide an update information for use of systemic antibiotics on clinical issues for periodontal therapy.
Keyword: *systemic antibiotics, periodontitis, mechanical debridement.*

Introduction

This research aims to provide the physician with a recent literature respect the use of systemic antibiotic therapy for periodontitis. Even though the use of antimicrobial therapy has been controversy, the recent publication reviews have shows an evidence base assessment of the use of systemic antibiotic, which has also benefit for treatment of periodontitis. This paper provides some important information regarding the how and when to use of systemic antibiotics for treatment of periodontal disease.

The principles of using antibiotics for treating periodontitis:

Periodontitis is an infectious disease that is happens by bacterial accumulation in subgingival or supragingival margin area by producing of biofilm (figure 1). Its important to know that a wide range of systemic antimicrobial have been used as a part of periodontal therapy aimed at marking potential pathogenic bacterial spectrum inside of periodontal biofilm.

Figure 1: Chronic periodontitis: deep probing depths, supra and subgingival biofilm.

The complicated structure of biofilm is including of poly bacterial accumulation located in a glycocalyx matrix. The researches are shown that high rate of bacteria in the biofilm and living them within the mature biofilm makes their structure more strong than in planktonic or free floating bacteria. Thus mechanical debridement is more indicate for disrupting the biofilm when using systemic antibiotics to treat periodontitis also it can help to further reducing bacteria load and resolution of surrounding inflammatory process in periodontal pocket [1].

Antibiotics should be used as monotherapy in treatment of periodontitis, the result of four studies shows use of metronidazole alone or combination of metronidazole with amoxicillin is effective but it has short-term effect. The majority of studies do not accept the conception of monotherapy with low result in case of probing depth reduction, clinical assessment level gain and decreasing of bleeding seeing in comparison with scaling and polishing. Furthermore the studies are shown that the using of systemic antibiotics for patient with aggressive and developed level of periodontal disease even with present of abscess is done without mechanical debridement. These patients had received broad spectrum of penicillin and tetracycline around one to three weeks before development of abscess.it was mentioned that the use of broad spectrum of antibiotics in case of advanced patient might cause the change of position of sub gingival microbiota and outcome can be periodontal abscess [2].

Two recent studies made a supreme agreement of discussion in periodontal community when observed there are similar clinical outcomes for scaling and root planning as for antimicrobials component for example amoxicillin and metronidazole, which prescribe as monotherapy. Lopez and Gamonal provide only short term, four month, microbiological and clinical outcomes and Lopez compered scaling of under gingiva and antibiotic with scaling of under gingiva and root planning and placebo .the authors recommend that this treatment plan can used in populations, with or without access to dental care. However the result of this treatment plans still not support by all literature and should be done by caution. Furthermore the adverse effect and antibiotic resistance need to pay attention [3].

Advantage of antibiotic therapy for the treatment of chronic periodontitis

As the routine treatment plan for majority of periodontitis patients diagnosed by chronic periodontitis which is mechanical debridement, enough oral hygiene, but the new studies shows that systemic antibiotic used with scaling and root planning can have extra benefit over scaling and root planning alone because it can reduce the probing depth (0.4 mm, spiramycin) and clinical attachment level gain (0.5 mm, combination of amoxicillin and metronidazole) in pockets of 6 mm or deeper. And also systemic review of antibiotics therapy in case of surgical mechanical therapy reported an extra clinical profit in attachment level gain (weighted mean gain 0.6 mm) when systemic antibiotic were give to patient in combination with surgical mechanical debridement[4].

Choice of systemic antibiotic

Successful treatment for use of antibiotic is depending on the strength of antibacterial agent in contrast to infectious microorganism. In the otherwise periodontitis is multiple microbial diseases that makes difficult to choose antibiotics regimen .for example some antibiotics target are specific part under the gingiva. Like metronidazole that affects just the grams positive species anaerobes such as Treponema denticola, Fusobacterium nucleatum, Porphyromonas gingivalis, Tanerella forsythia, while members of the family Actinomyces, Streptococcus and Capnocytophaga are low effect by metronidazole. Also Metronidazole has a low effect on the member of Aggregatibacter actinomycetemcomitans, that is a facultative anaerobe. Amoxicillin has a broader spectrum lowering number of gram-negative anaerobes as well as decreasing the proportions of Actinomyces in process of antibiotic therapy. Microorganism can be resistant to antibiotics or they can gain resistancy by nascent of resistant species of bacteria that can be sensitive to antibiotics [5].

The studies report a high bracket of antibiotics usage in combination with surgical and non-surgical debridement in case of chronic and acute type of disease. The most commonly used antibiotics are tetracyclines, penicillins (amoxicillin), metronidazole, macrolides (spiramycin, erythromycin, azithromycin), clindamycin and ciprofloxacin. (Table 1) lists common antibiotic regimens for the treatment of periodontitis.

The duration, dosage and time of the antibiotic usage:

The dosage and duration of the antibiotic, which is report by literature, are quite in different duration and dosage and also timing but the important concept is to prescribe an enough dosage for enough duration and also is important to know when should start antibiotic in combination with the mechanical debridement phase. Evidence suggests the ideal use of antibiotics should prescribe on the day of debridement. And it should be finish within a short time for example less than one week.

Table 1. 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 .day, 14 days	Advanced chronic periodontitis	AlJoburi, 1989 38
Doxycycline	200 mg, 1 .day, 8 days	Generalized rapidly progressive periodontitis	Sigusch, 2001 39
Spiramycin	1.5 UI, 2 .day, 14 days	Advanced periodontal disease	Bain, 1994 40
Azithromycin	500 mg, 1 .day, 3 days	Aggressive periodontitis	Haas, 2008 29
Metronidazole	250 mg, 3 .day, 7 days	Periodontitis > 10% spirochetes	Loesche, 1984 41
Clindamycin	150 mg, 4 .day, 10 days	Refractory periodontitis	Walker, 1993 42
Amoxicillin and metronidazole	375 mg, 3 .day, 8 days□250 mg, 3 .day, 8 days	Chronic periodontitis□ presence of *A.a, P.g*	Flemmig, 1998 43

The duration, dosage and time of the antibiotic usage:

The dosage and duration of the antibiotic, which is report by literature, are quite in different duration and dosage and also timing but the important concept is to prescribe an enough dosage for enough duration and also is important to know when should start antibiotic in combination with the mechanical debridement phase. Evidence suggests the ideal

use of antibiotics should prescribe on the day of debridement. And it should be finish within a short time for example less than one week.

Patient compliance during u antibiotic therapy:

This issue hasn't been addressed too much; otherwise some studies have shown that just 20% of patient complies with antibiotic therapy. One benefit of azithromycin may be because of its pharmacologic characteristic and long half-life, just one tablet (500 mg) per day for three days is required as opposed to one tablet three times a day for seven days with other antibiotic therapy.

Antibiotic therapy for aggressive periodontics:

Forceful periodontitis is a type of periodontitis where there is a quick movement of sickness in either a limited or summed up design influencing generally sound individuals.28 Aggressive periodontitis is much of the time related with large amounts of subgingival Aggregatibacter actinomycetemcomitans, (once in the past Actinobacillus actinomycetemcomitans) and additionally Porphyromonas gingivalis. It has been demonstrated that adjunctive antimicrobials might be required to eradicate these pathogens, which can possibly attack the periodontal tissues. It was inferred that adjunctive fundamental anti-toxins ought to be considered in instances of forceful periodontitis. Last randomized clinical preliminary found that the adjunctive utilization of azithromycin could possibly enhance the treatment result in young patients with aggressive periodontitis contrasted with non□surgical debridement alone. Due to the fast progression of the periodontitis it is better to recommend for specialist treatment [6].

Use of antibiotics for periodontal abscess

The periodontal abscess is a sore with broad periodontal damage that progress fast and is really aggressive with purulent accumulation. This condition that occurs by well-known bacterial mass in high amount, has very extensive effect on general body system. The periodontitis may happen in untreated periodontitis patients or in treated patients in upkeep treatment. The part of fundamental anti-toxins in the treatment of the periodontitis is in argument. A few literature recommended use of systemic anti bacterial agents with mechanical debridement together, or drainage. Others prescribe systemic anti-bacterial just if a reasonable foundational contribution is available, for example, lymphadenopathy, fever or discomfort or when the disease isn't well localized. Mechanical debridement and drainage through the periodontal pocket without anti-biotic agents is typically powerful in the treatment of the periodontal abscess. (Figs 2 and 3).

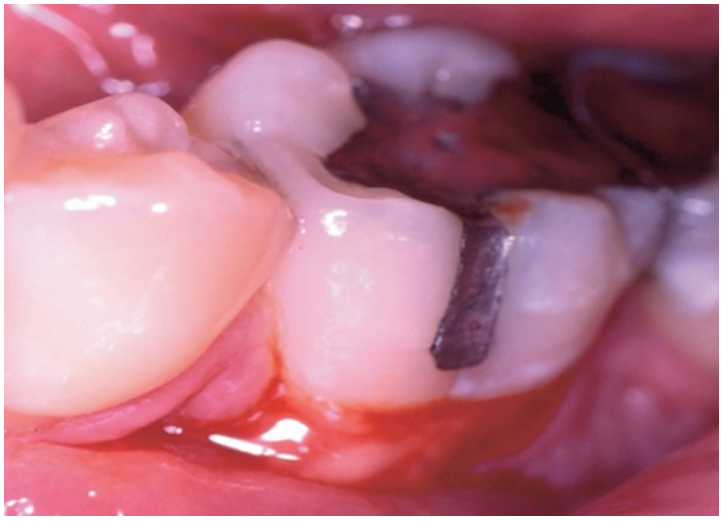

Figure 2: Periodontal abscess: 11 mm probing depth, suppuration and bleeding

Figure3: Healing following mechanical debridement without the use of adjunctive systemic antibiotics. Resolution of the deep probing depth, mesiobuccal gingival recession

Use of antibiotics for necrotizing periodontal diseases:

Necrotizing gingivitis and necrotizing periodontitis are infectious disease that shows ulceration of the gingival edge and interdental papilla. They are related with pain, unconstrained gingival bleeding and halitosis. The inclining factors related with the beginning and movement of necrotizing periodontal ailments incorporate immunodeficiency, ailing health, and stress, smoking and poor oral hygiene. Treatment includes debridement, oral rinse, oral hygiene and administration of NSAD (Non steroid anti-inflammatory drug). At the point when there are fundamental indications, for example, fever or fatigue metronidazole, focusing on the gram-negative anaerobes, ought to be recommended with mechanical debridement [7].

Adverse effects following systemic antibiotics:

Almost in the reports there are not finding in related to side effect for the patient who are treated by systemic antibiotics in case of periodontitis Most side effect which have been accounted for, are minor and identified with gastrointestinal issues, for example, the diarrhea and nausea. But also,

there is unfavorable adverse effect also, for example, allergic reaction and anaphylactic response and pseudomembranous colitis, may happen and patients ought to be educated of the potential for antagonistic occasions both minor and significant while using systemic antibiotics agents. Anaphylactic reactions to penicillin happen around 10 000 courses administered, with 10 % of these being fatal. The utilization of anti-infection agents ought to be considered carefully selected antibiotics that amplify antimicrobial action and limit potential medication connections and unfavorable responses. A careful medicinal history should be taken before prescription. These days the antibiotic resistance is the main concurring problem around the world, so before prescription of systemic antibiotics should pay attention to this issues. Distinguished antibiotic□resistant species in subgingival plaque and saliva samples from chronic periodontitis patients that treated by scaling and root planning took after by orally regulated amoxicillin or metronidazole. There was an expansion in the level of resistance subgingival species following antibiotics prescription. However, levels back to baseline approximately after 90 days.

In Spain, where systemic antimicrobial agent are promptly accessible over the counter without prescription and broadly utilized as a part of the all-inclusive community, it has been demonstrated that there was an expansion in the microbial resistance, of oral microscopic organisms to commonly proscribe antibiotics in compared to the Netherlands where antibiotics proscribe very carefully. This underlines, the significance of advancement of microbial protection from antibiotic agents and the significance of keep safe the worldwide spread of resistant strains of bacteria [8].

Conclusion:

Systemic antibiotic ought not to be endorsed as a mono therapy for the treatment of periodontitis. Systemic antibiotic agents are valuable antimicrobial agent for the administration of periodontal disease when utilized as a part of conjunction with satisfactory mechanical debridement for interruption of the subgingival biofilm. There is no agreement with regards to the perfect anti-microbial, dosage, span and timing of antibiotic agents. Adjunctive systemic antibiotic agents ought to be considered in treatment of aggressive periodontitis. While the writing demonstrates an additional clinical advantage following adjunctive systemic antibiotic agents for the treatment of chronic periodontitis in deep pockets, the choice to recommend anti-infection agents ought to be made on an individual premise. The degree and seriousness of the periodontal infection and in addition plaque control and patient consistence issues ought to be tended to. The patients' medical history, regarding drug sensitivities and allergic reactions must be considered. Patients ought to be very much educated with regards to the allergic reactions and medication collaborations that may emerge following systemic antibiotics.

Reference:

1. Marsh PD. Dental plaque: biological significance of a biofilm and community life-style. *J Clin Periodontal* 2005; 32(Suppl 6): 7–15
2. Haffajee AD, Dib art S, Kent RL Jr, Socransky SS. Clinical and microbiological changes associated with the use of 4 adjunctive systemically administered agents in the treatment of periodontal infections.
3. Herrera D, Sanz M, Jepson S, Needleman I, Roland S. A systematic review on the effect of systemic antimicrobials as an adjunct to scaling and root planning in periodontitis patients.
4. Herrera D, Sanz M, Jepson S, Needleman I, Roland S. A systematic review on the effect of systemic antimicrobials as an adjunct to scaling and root planning in periodontitis patients.
5. Cionca N, Giannopoulou C, Ugolotti G, Mombelli A. Microbiologic testing and outcomes of full-mouth scaling and root planning with or without amoxicillin/ metronidazole in chronic periodontitis. J Periodontal. 2010; 81:15–23.
6. Cionca N, Giannopoulos C, Ugolotti G, Mombelli A. Amoxicillin and metronidazole as an adjunct to full-mouth scaling and root planning of chronic periodontitis. J Periodontol. 2009;80:364–371.
7. Goodson JM, Haffajee AD, Socransky SS, Kent R, Teles R, Hasturk H, et al. Control of periodontal infections: a randomized controlled trial I. The primary outcome attachment gain and pocket depth reduction at treated sites. J Clin Periodontal. 2012;39:526–536.
8. Karen Whalen PharmD BCPS , Lippincott Illustrated Reviews: Pharmacology 6th edition (Lippincott Illustrated Reviews Series) Sixth, North American Edition .2015,pp 116-129.