







Latest in periodontitis treatment

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- ▶ Periodontal diseases comprise a wide range of inflammatory conditions that affect the supporting structures of the teeth (the gingiva, bone and periodontal ligament), which could lead to tooth loss and contribute to systemic inflammation.
 - ▶ Chronic periodontitis predominantly affects adults, but aggressive periodontitis may occasionally occur in children.
 - ▶ Periodontal disease initiation and propagation is through a dysbiosis of the commensal oral microbiota (dental plaque), which then interacts with the immune defences of the host, leading to inflammation and disease.

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- This pathophysiological situation persists through bouts of activity and quiescence, until the affected tooth is extracted or the microbial biofilm is therapeutically removed and the inflammation subsides.
 - The severity of the periodontal disease depends on environmental and host risk factors, both modifiable (for example, smoking) and non-modifiable (for example, genetic susceptibility). Prevention is achieved with daily self-performed oral hygiene and professional removal of the microbial biofilm four or two times per year. New treatment modalities that are actively explored include antimicrobial therapy, host modulation therapy, laser therapy and tissue engineering for tissue repair and regeneration.



Management





- ▶ All forms of gingivitis are treated by **debridement** (the removal of plaque and calculus) from teeth by scaling and the removal or reduction of risk factors, followed by daily home care and professional prophylaxis at follow-ups.
- ▶ **Adjunctive therapies** To enhance treatment outcomes, several adjuncts to non-surgical periodontal treatment have been proposed. These include local delivery of drugs, systemic antibiotics and systemic host modulation agents.




- **Local delivery of drugs.**


- Adjunctive drugs include antibiotics, such as **minocycline** and **doxycycline**, or antimicrobials, such as **chlorhexidine**, that are delivered directly to the periodontal pocket using a powder, gel, chip or fibre delivery system for localized treatment.

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- **Systemic antibiotics.** Several regimens that vary in antibiotic type, dosage, duration and timing of initiation have been proposed; typically, a broad-spectrum antibiotic is used either alone or in combination with antibiotic (or antibiotics) targeting Gram-negative bacteria, in the usual adult dose range, for 1–3 weeks. There are different systemic antibiotic regimens in the treatment of chronic and aggressive periodontitis concluded that the combination of amoxicillin and metronidazole seems to be the most potent and resulted in more-pronounced clinical improvements in probing depth and clinical attachment level



- **Systemic host response modulation.**

- When used in a sub-antimicrobial dose, doxycycline targets the host response. Sub-antimicrobial doses do not have antimicrobial properties and the mechanism of action of the drug is exclusively through inhibition of matrix metalloproteinases.
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- **Tetracycline:** Have been widely used in treating refractory forms of periodontal disease, including localized aggressive periodontitis. They have the ability to concentrate in the periodontal tissues and inhibit the growth of *A. actinomycetemcomitans*. In addition, they exhibit anti-collagenase effect which can inhibit tissue destruction and aid in bone regeneration. Mechanical removal of calculus and plaque from the root surfaces may not eliminate the bacteria from periodontal tissues. Systemic tetracycline can eliminate tissue bacteria and has been shown to arrest bone loss and suppress microbial levels in conjunction with scaling and root planing. The dosage recommended is 250 mg, 4 times daily (qid).



➤ Doxycycline

- The importance of doxycycline arises from the fact that it has higher availability in gingival crevice when compared to other drugs, 7–20 times more than any other drug. The second most important factor is its dual mechanism of action. As an antibiotic agent, it has more significant action against *A. actinomycetemcomitans*, warranting its use in aggressive periodontitis.
- Also, its actions do not limit to antimicrobial activity, but include the following host modulating properties:
 - Anticollagenase
 - Anti-inflammatory
 - Inhibition of bone resorption
 - Promotes reattachment
- Because doxycycline can be given only once daily, it makes it more patient compliant. The recommended dosage as an anti-infective agent is 100mg bid on the first day, followed with 100mg once daily for 21 days.



- ▶ **Metronidazole**

- ▶ Metronidazole is not the drug of choice for treating *A. actinomycetemcomitans* infections. However, it is effective against them when used in combination with other antibiotics. It is also effective against anaerobes such as *P. gingivalis* and *Prevotella intermedia*. Studies have suggested that when combined with amoxicillin or amoxicillin–clavulanate potassium, metronidazole may be of value in the management of patients with aggressive periodontitis.

- ▶ **Amoxicillin**

- ▶ Amoxicillin is found to be useful in the management of patients with aggressive periodontitis, in both localized and generalized forms. Recommended dosage is 500 mg tid for 8 days.

- ▶ **Amoxicillin–Clavulanate Potassium**

- ▶ The combination of amoxicillin and clavulanate potassium makes the antibiotic resistant to penicillinase enzymes produced by some bacteria. It has been found to be useful in the management of localized form of aggressive periodontitis, and also to arrest alveolar bone loss.



➤ Ciprofloxacin

- Ciprofloxacin is active against gram-negative rods, including all facultative and some anaerobic putative periodontal pathogens. Since it demonstrates minimal effect on *Streptococcus* species, which are associated with periodontal health, its administration may facilitate the establishment of microflora associated with periodontal health. At present, ciprofloxacin is the only antibiotic in periodontal therapy to which all strains of *A. actinomycetemcomitans* are susceptible. It has also been used in combination with metronidazole.





➤ **Macrolides**

- Azithromycin is found to be effective against anaerobes and gram-negative bacilli. The concentration of azithromycin in tissue specimens from periodontal lesions is significantly higher than that of normal gingiva. It also has been proposed that this drug penetrates fibroblasts and phagocytes, suggesting that it is actively transported to sites of inflammation by phagocytes and then released directly into the sites of inflammation as the phagocytes rupture during phagocytosis.
- Recent data suggest that azithromycin can be an effective adjunctive therapy for increasing attachment levels in patients with aggressive periodontitis. Therapeutic dosage is single dose of 250 mg/day for 5 days, after an initial loading dose of 500 mg.



➤ Serial and Combination Therapy

- Periodontal infections contain a wide diversity of bacteria; hence, no single antibiotic can be effective against all putative pathogens. This “mixed infection” can include a variety of aerobic, microaerophilic, and anaerobic bacteria, both gram negative and gram positive. This scenario makes it mandatory to use more than one antibiotic, either serially or in combination. The metronidazole–amoxicillin and metronidazole–amoxicillin–clavulanate potassium combination caused excellent elimination of many organisms in localized aggressive periodontitis that had been treated unsuccessfully with tetracycline and mechanical debridement. Metronidazole–ciprofloxacin combination is effective against *A. actinomycetemcomitans*; metronidazole targets obligate anaerobes, and ciprofloxacin targets facultative anaerobes. This is very powerful combination against mixed infections. This combination provides a therapeutic benefit by reducing or eliminating pathogenic microorganisms and offers a prophylactic benefit by giving rise to predominantly streptococcal microflora.

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- Antibiotics that are bacteriostatic (e.g. tetracycline) generally require rapidly dividing microorganisms to be effective. They do not function well if a bactericidal antibiotic (e.g. amoxicillin) is given concurrently. When both these drugs are required, they are best given serially, not in combination.



➤ **Current Approaches**

➤ **Local delivery**

- The use of local delivery method to administer antibiotic offers a novel approach to the management of periodontal “localized” infections. The primary advantage is that smaller doses of topical agents can be delivered inside the pocket, avoiding the side effects of systemic antibacterial agents, while increasing the exposure of target microorganisms to higher concentrations and therefore more therapeutic levels of the medication.




➤ Full mouth disinfection

- Another approach to antimicrobial therapy in the control of infection associated with periodontitis is the concept of full mouth disinfection. The procedure consists of full mouth debridement completed in two appointments within a 24-h period. In addition to scaling and root planing, the tongue is brushed with chlorhexidine gel (1%) for 1 min, the mouth is rinsed with chlorhexidine solution (0.2%) for 2 min, and periodontal pockets are irrigated with chlorhexidine solution (1%). Significant reduction in pocket depth and gain in clinical attachment in patients with aggressive periodontitis up to 8 months after treatment was noted, and also, significant reduction was found in periodontal pathogens up to 8 months after therapy



► **Host modulation**

- A novel approach in the treatment of aggressive periodontitis is the administration of agents that modulate the host response. The use of sub-antimicrobial dose doxycycline (SDD) may help to prevent the destruction of the periodontal attachment by controlling the activation of matrix metalloproteinases, especially collagenase, from both the infiltrating cells and resident cells of the periodontium, primarily neutrophils. SDD, as an adjunct to repeated mechanical debridement, resulted in clinical improvement in patients with generalized aggressive periodontitis. Other agents such as CMT, flurbiprofen, indomethacin, and naproxen may reduce inflammatory mediator production. Further research is awaited for the use of such agents.
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➤ Treatment plan

- Treatment of aggressive periodontitis should start with scaling and root planing in combination with systemic antibiotics. It is recommended that (i) initiation of antibiotic therapy is done 24 h before starting scaling and root planing and (ii) the root planing is performed over the short time period during which the antibiotic is prescribed.
- A 4–6 week re-evaluation interval seems to be valid for a patient with aggressive periodontitis. If, however, there is no significant response to initial therapy, the clinician may choose to repeat subgingival scaling with a different antibiotic regimen. If the response to initial therapy supports proceeding to the surgical phase, systemic antibiotic should be prescribed with the patient being instructed to start taking the antibiotic approximately 1 h before surgery. Chlorhexidine rinses should be prescribed and continued for several weeks to aid healing and augment plaque control.



► **Periodontal maintenance**

- Ultimately, the clinician's success in treating patients with aggressive periodontitis depends mostly on the maintenance program. Monthly maintenance is recommended for the first 6 months, after completing active treatment, and then bi-monthly maintenance for six more months. If the patient is stable during this first year, maintenance intervals can be extended up to 3 months. Subgingival scaling in combination with local delivery of antibiotics is a good way to manage isolated sites of recurring disease, while full mouth scaling and systemic antibiotics or host modulation therapy can be used to treat a generalized recurrence.



References

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