ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, S Iss 4 ,2022

Antimicrobial Agent Selection for Periodontal Treatment

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ABSTRACT:-

Dental professionals are now able to prevent and treat periodontitis with a number of antimicrobial medications because to the identification of microbial specificity in periodontitis over the past three decades. Systemic antibiotics, topical antibiotics, and topical antiseptics are some of them.

In order to control periodontal pathogens living in different areas of the mouth from where they may translocate to periodontal sites and to eradicate pathogenic bacteria that infiltrate gingival tissue, systemic antibiotic therapy can be crucial. Metronidazole-amoxicillin (250-375 mg of each 3 times daily for 8 days) and metronidazole-ciprofloxacin (500 mg of each 2 times daily for 8 days) are two common periodontal combination antibiotic regimens. Microbiological study aids in determining the most effective antibiotic regimen and course of treatment.

Topical antiseptics that are important for treating periodontitis include 0.1% sodium hypochlorite solution applied subgingivally by patients using an irrigation device and 10% povidone-iodine solution injected subgingivally by a syringe for five minutes. The current study suggests periodontal therapy using a variety of professionally and privately administered antimicrobial agents (appropriately prescribed systemic antibiotics, povidone-iodine and sodium hypochlorite subgingival irrigants, and chlorhexidine mouthwash). The use of available chemotherapeutics can manage different types of periodontal disease and subgingival colonization of periodontal bacteria in a safe, practical, and inexpensive manner.

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INTRODUCTION: -

Due to the potential damage to the dentition and the high cost of treatment, destructive periodontal disease is a matter for concern. There is disagreement about the precise processes by which periodontal tissues are destroyed, although it is generally accepted that microbes found in periodontal pockets cause periodontitis. Periodontal pockets, which offer a wet, warm, nutritious, and anaerobic environment for microbial colonization and multiplication, are home to over 500 bacterial axa (1).

The prevalence and variety of periodontal pocket microorganisms depend on a number of variables, including the efficiency of oral hygiene practices, pocket depth, the severity of gingivitis, the flow of gingival crevice fluid, the type of interacting microbes and viruses, the rate of transmission of microbes from other people, and the effectiveness of the host immune response as an antimicrobial defense.

Most likely, some microbes cause aggressive types of periodontitis due to extraordinarily high virulence, while other microorganisms cause gingivitis and other types of chronic periodontitis due to their simple abundance (the "non-specific" plaque hypothesis). (2)

It is vitally necessary to develop methods for managing or curing severe forms of periodontitis that are more cost-effective and more successful at diagnosing and controlling periodontal infections. Some people with periodontitis lose their teeth as a result of the condition despite receiving regular maintenance appointments (3, 4), or they receive minimal benefit from regular maintenance visits compared to less frequent ones (5).

In a recent study, Haffajee et al. (6) discovered persistent loss of probing periodontal attachment in 18 of 57 (32%) adult patients who had undergone initial scaling and root planing that lasted at least 3 hours, followed by maintenance scaling every three months over the course of the 9-month study. Reassessing the efficacy of existing periodontal antibacterial therapy is necessary. The antibacterial effectiveness of initial periodontal therapy and the reliance on frequent dental visits, scaling and root planing, and plaque management by mechanical cleaning as virtually the only modality of maintenance care must be taken into consideration.

Consideration should be given to the benefits of delivering antimicrobial medicines as a rapid and affordable way to supplement mechanical periodontal debridement. Systemic antibiotics, topical antibiotics, and topical antiseptics may be helpful for people with periodontitis. The usefulness of topical antibiotics in orthodontic therapy is a topic of discussion. His analysis emphasizes current strategies for antibacterial perimeter protection.

Dental therapy seeks to find effective chemotherapeutic treatments for periodontal infectious illness and subgingival microbial colonization.

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Systemic antibiotics

In the last two decades, as evidence for bacterial specificity in periodontitis has accumulated and grown stronger, dentists and microbiologists have welcomed periodontal antibiotic therapy (7). Periodontitis that is actively advancing is almost invariably accompanied by specific bacterial infections and frequently necessitates the use of systemic antibiotic therapy as an adjuvant. Systemic antibiotics can attack organisms that are not reachable by cleaning agents or topical anti-infective chemotherapeutics because they enter the periodontal tissues and the periodontal pocket via serum. Additionally, systemic antibiotic therapy may suppress periodontal infections that are present on the tongue or other oral surfaces, delaying the recolonization of the subgingival space with pathogens (8).

Tetracyclines, penicillins, metronidazole, and clindamycin were the principal single drug regimens used in the early approaches to systemic antibiotics in periodontal treatment. The variability in clinical response to systemically administered tetracyclines observed in practice may be partially explained by the gingival crevice fluid concentration of tetracyclines, which was recently reported to be less than that of plasma concentration and to vary greatly between individuals (between 0 and 8 lg/ml). About 50% of samples did not achieve a level of 1 lg/ml (9). Clinical disease symptoms can only occasionally implicate the offending bacteria because the periodontopathic microbiota contains a variety of microorganisms with varying antimicrobial susceptibilities. Additionally, inappropriate antibiotic therapy may negatively impact human microbial ecology and lead to the development of resistance among serious pathogens.

Systemic antibiotic use can result in a variety of negative side effects, so it should only be done after a thorough patient evaluation. Cost may also play a role in deciding on an antibiotic periodontal therapy. Tetracyclines, amoxicillin, and metronidazole are among the less expensive antibiotics. Azithromycin, clarithromycin, ciprofloxacin, amoxicillin/clavulanic acid, and clindamycin are among the antibiotics in the more expensive price range. According to Slots & Ting (10), systemic antibiotic therapy given to individuals with severe periodontitis can produce a remarkable clinical result. The effectiveness of systemic antibiotics in patients with persistent periodontitis is less certain.

Topical antibiotics

Direct pocket placement controlled release devices with tetracycline-HCl, doxycycline, minocycline, metronidazole, or ofloxacin are commercially marketed in a number of nations.

There is debate concerning the value of topical antibiotic therapy in periodontics. The adjunctive or alternative role of topical antibiotic therapies in the short- and long-term management of periodontal disease has also not been defined. The majority of clinical studies have monitored the effect of controlled drug delivery on variables characteristic of gingivitis and not necessarily of periodontitis.

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In a recent assessment, Quirynen et al. (11) also noted that regulated antibiotic distribution in subgingival areas only provided minor advantages. The use of a broad-spectrum antiseptic agent with little risk of adverse effects seems to be a more preferable option when considering potential issues with the selectivity of antimicrobial action, the potential development of resistance bacteria, and potential host reactions. The usage of double or triple antibiotic combinations can then be used to supply a sufficient range of antibacterial action. However, antibiotics used to treat bacterial pathogens may have an unfavorable effect on periodontal locations with yeast infections.

Topical antiseptics

An antiseptic is a substance that, when administered to live tissues, can stop or halt the growth of microorganisms. Antiseptics, in contrast to antibiotics, frequently have many intracellular targets, which lowers the likelihood of resistance developing and has a noticeably wider spectrum of effect.

Antiseptics are only used on infected wounds, skin, and mucosa in humans because, unlike antibiotics, they may be hazardous to both infectious agents and host cells.

Povidone-iodine

Iodine-povidone has long been used for its antibacterial effects and for other medical purposes. Iodine, a naturally occurring element, has been utilized in mucosal antisepsis, the treatment of skin infections and burns, and wound management for more than 150 years. However, it wasn't until povidone-iodine was developed in the 1960s that a wide range of bacterial, fungal, and viral illnesses could be treated with this incredibly effective microbicide. Different periodontopathic bacteria can be effectively killed in vitro when exposed for brief periods of time to povidone-iodine (12-13).

Povidone-iodine is water-soluble, doesn't irritate either healthy or sick oral mucosa, and doesn't have any negative side effects like discoloring teeth or changing the flavor of your mouth. With a 5% sodium thiosulfate solution, more povidone-iodine stains can be easily removed. Povidone-iodine should only be taken for brief periods of time because it has the potential to cause hyperthyroidism due to an excessive incorporation of iodine in the thyroid gland. Patients with thyroid pathosis and iodine hypersensitivity as well as pregnant and nursing women are contraindicated in order to safeguard the unborn child (14).

The use of povidone-iodine in treating oral infections has, however, only been the subject of a small number of research in the USA and Europe, and none of them involved numerous centers. The high cost of multicenter trials and the low drug costs associated with a whole-mouth povidone-iodine periodontal treatment may make it difficult to secure funding for research, at least from commercial sources.

ISSN PRINT 2319 1775 Online 2320 7876

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Sodium hypochlorite

For more than 100 years, sodium hypochlorite (household bleach) has been used as a disinfectant; for more than 85 years, as an antiseptic; and for more than 75 years, as an endodontic irrigant. Hecker (15), treating periodontal disease in 1913, employed antiformin (concentrated sodium hypochlorite solution) as an epithelial-specific solvent.

You can make a sodium hypochlorite solution for subgingival irrigation using home bleach, which typically includes 5.25–6.0% chlorine that is available. The solution created by mixing 1 part bleach with 49 parts water will have a suitable working concentration of roughly 0.1% or 1000 p.p.m. of accessible chlorine. In practical applications, a usable bleach solution can be made by mixing 1 teaspoon (5 ml) of household bleach with 250 ml of water (about 2 large drinking glasses), and then administering the resulting mixture subgingivally using a high-pressure oral irrigator. It takes 0.01% chlorine concentration to reliably activate test bacteria in vitro (16).

In contrast to irrigation with water, Lobene et al. (17) found that sub-gingival irrigation with 0.5% sodium hypochlorite (Dakin's solution) considerably and more effectively reduced plaque and gingivitis. Gingival curettage with diluted sodium hypo-chlorite irrigation reduced the number of subgingival spirochetes in isolated juvenile periodontitis lesions more than water irrigation did (18)

Chlorhexidine

A diphenyl molecule known as chlorhexidine has only weak antiviral action and is mostly effective against bacteria. Despite the fact that unpleasant reactions to oral chlorhexidine rinse have been reported, chlorhexidine shows substantivity to tooth surfaces and oral mucosa and exhibits low irritation (19).

Commercially available chlorhexidine chips for subgingival placement appear to be able to reduce mean probing depth by less than 1 mm in periodontal pockets that are 4-6 mm deep and may not significantly reduce periodontal infections when compared to full scaling and root planing (20).

Clinical protocol for effective antimicrobial periodontal therapy

Current theories of initial (21) and ongoing (22) antimicrobial periodontal therapy have been described in recent studies. The periodontitis of the patient and the microbial ecology of the entire oro-pharyngeal cavity are both factors that are considered in a successful antimicrobial therapy. Effective periodontal therapy causes gingival recession, which could expose fluoride-poor root surfaces, and a plaque microbiota predominated by gram-positive and potentially cariogenic microbes. As a result, it is wise to advise patients to use 0.05% sodium fluoride rinse, 1.1% sodium fluoride, or 0.4% sodium fluoride gels, supplied with a tooth brush or a bespoke tray, every day.

ISSN PRINT 2319 1775 Online 2320 7876

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In a recent study by Hoang et al. (23), it was demonstrated that subgingival irrigation with 10% povidone-iodine combined with scaling and root planing could reduce total subgingival counts of periodontal pathogens by more than 95% at 5 weeks post-treatment in 44% of sites with pocket depths less than 6 mm and radiographic evidence of subgingival calculus.

Periodontal therapy must to incorporate an efficient anti-caries fluoride treatment. The development of even more potent treatments will surely result from ongoing research into anti-infective drugs to prevent and treat periodontal disorders. The future is promising for patients who are at risk of developing or already have destructive periodontal disease thanks to advances in our understanding of the periodontopathic microbiota and the development of numerous safe, cost-effective, yet effective periodontal antimicrobial agents and therapies.

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