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EFFECTIVE ANTIMICROBIAL THERAPY OF PERIODONTITIS - AN OVERVIEW OF DENTAL/PERIODONTAL CHIP

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ABSTRACT

Periodontitis is an inflammatory response to bacteriological infections that destroys the attachment of teeth resulting in periodontal pocket formation. Organisms responsible for periodontitis are *acinetobacillus actinomycetem comitans*, *bacteroides gingivalis*, *bacteroides melanogenicus subsp.intermedius*, *eikenella corrodens*, *fusobacterium nucleatum*, *wolinella recta*, *porphyromonas gingivalis*, *perotella intermedia* and *staphylococci* subspecies epidermidis and *aurantus*. Treatment of periodontitis varies widely from non-surgical to surgical options depending on how far the disease has progressed. Non-surgical methods are systemic delivery of antimicrobials, scaling and root planning and local delivery of drug. Systematic administration of antibiotics requires large dose as it provides only small amount of drug in the periodontal pockets and can lead to the potential threat of bacterial resistance. So the use of antibiotics through systemic delivery is not the best choice to treat chronic periodontitis. Scaling and root planning are mechanical methods for the treatment of periodontitis. Local delivery of antimicrobial medication gives site specific and therapeutic level of drug at the site of infection for prolonged periods of time. Periochip is a controlled sub gingival delivery of chlorhexidine developed by Perio Products Ltd, Jerusalem, Israel and it is a commercially available product. V.Parthasarathy and co-workers developed a non-biodegradable sustained release local delivery system of sparfloxacin for the treatment of periodontal disease which was effective in the treatment of periodontal disease. Types of periodontal surgery are soft tissue grafts, gingivectomy and frenotomy. Evaluation of efficacy of the drug delivery systems by physical evaluation, economic evaluation, *in vitro*, *in vivo* and clinical trials are discussed in the article. From the review it shows the local delivery of drug can be used as an adjuvant in the treatment of periodontitis.

Key words: Periodontitis, non-surgical, surgical, systematic administration, local administration, periochip.

INTRODUCTION

Periodontitis is a dental disease, which is an inflammatory response to bacteriological infections [1]. Periodontitis destroys the attachment apparatus of teeth resulting in periodontal pocket formation and alteration of normal osseous anatomy. The primary objective of the therapy for patients with chronic periodontitis is to halt disease progression and to resolve inflammation. The scaling and root planning reduces probing depth, gain clinical attachment, inhibit disease progression and regenerates lost periodontal structures [2].

Surgical procedures such as root planning, curettage and flap surgery facilitating mechanical instrumentation of the roots have been utilized to treat

periodontitis for decades. A surgical approach to treat of periodontitis is utilized in an attempt to (i) provide access for removal of etiologic factors (ii) reduce deep probing depths and (iii) regenerate or reconstruct lost periodontal tissue. Clinical studies indicate that both surgical and non-surgical approaches can be effective in achieving stability of clinical attachment levels.

Drugs especially antibiotic therapy is an adjunctive in the management of periodontitis/advanced periodontitis [3]. Numerous investigations have assessed the progression of periodontitis and methods to improve periodontal status. Potent risks associated with the systemic administration of antibiotics include development of resistant bacterial strain, emergence of opportunistic

infections and possible allergic sensitization of patients. The prolonged use of non steroidal anti inflammatory drugs leads to harmful adverse effects such as gastrointestinal upset, hemorrhage, renal and hepatic impairment, central nervous system disturbances, inhibition of platelet aggregation, prolonged bleeding time, bone marrow damage etc.

Local controlled drug delivery of chemotherapeutical agents can alter the pathogenic flora of periodontal pockets and improve clinical signs of periodontitis. Benefits of local drug delivery system are; the drug can be delivered at the site of infection at a bacterial concentration and it can facilitate prolonged drug delivery. Local drug delivery modalities have shown beneficial clinical improvement with regard to probing depth reduction and gain in clinical attachment [4]. The potential uses of local drug delivery devices are to enhance therapy at sites that normally do not respond to conventional treatment [5]. Ultimately the result of local drug delivery is evaluated with regard to the magnitude of improvement of disease severity.

Aetiology of periodontal diseases

Several diseases of gingiva and tissue supporting the teeth are collectively termed as periodontal diseases. Accumulation of spirochete loaded supra gingival plaque or food particles renders the gingiva swollen and prone to bleed easily, giving rise to gingivitis the common disease of the periodontium. Periodontitis is a more severe stage of the periodontal disease resulting in loss of the bone and collagen support of the affected teeth. Although both gingivitis and Periodontitis involve tissues of the periodontium there is no direct association between these two [7]. Considerable active research into the identification of organisms responsible for periodontitis has implicated *acelinobacillus actinomycetem comitans* is a pathogen responsible for juvenile periodontitis, while *bacteroides gingivalis*, *bacteroides melanogenicus subsp.intermedius*, *Eikenella corrodens*, *Fusobacterium nucleatum*, *Wolinella recta*, *capnocytophage* species [8-11], *porphyromonas gingivalis*, *perotella intermedia* and *staphylococci* subspecies epidermidis and *auresus* are implicated in adult periodontal diseases

Bacterial isolates from periodontics patients were identified [3], 72.9% patients had *Streptococcus oralis*, 70.8% *Streptococcus mitis*, 60.4% *Prevotella buccae*, 39.6% *Prevotella denticola*, 37.5% *Fusobacterium nucleatum*, 35.4% *Prevotella intermedia*, 25% *Capnocytophaga spp*, 23% *Veillonella spp*, 22.9% *Prevotella melaninogenica* and *Streptococcus sanguis*, and less than 20% other species. Further investigations were carried out to find the levels, proportions and percentage of sites colonized from samples of healthy and chronic

periodontitis patients. The investigation confirmed the strong association of *P.gingivalis* and *T.forsnthia* with chronic periodontitis. Other species found are *S.oralis*, *Eikenella corrodens*, *S.intermedius* and *F.nucleatum ssp. Vincentti* were associated with disease when *P.gingivalis* and *T.forsythia* were present in low proportions [7].

Elimination of periodontal pocket and improvement in attachment level are the basic aims of the overall treatment regimen of periodontitis. Conventional methods of pocket elimination are aimed at removal of supra and sub gingival plaque, degenerated necrotic tissue lining the gingival wall of periodontal pockets. However long term control of established periodontal diseases through these conventional means is difficult [12], so the local delivery of the drug to the periodontal pocket as sustained and controlled delivery systems is used.

Treatment of periodontitis

The treatment of periodontitis varies widely from non-surgical to surgical options depending on how far the disease has progressed. Simple procedures can be done to remove the plaque and calculus from the gum line and disrupt the infection-causing bacteria if the disease is diagnosed in the initial stage itself. But further treatment is necessary if the periodontal disease is advanced where periodontal pockets are deep and the supporting bone is lost [13].

Systemic administration of antimicrobials

Systemic delivery of antibiotics has been used since 1929 in the form of tablet or capsule taken orally to kill or suppress bacteria. The drug is dispersed through circulatory system in the systemic drug delivery [14]. The biological rationale for using antibiotics in the treatment of periodontal diseases is that bacteria are the major etiological factor [7]. Improvement in disease conditions like pocket depth, attachment loss and elimination of periodontal pathogens have been achieved through conventional non-surgical treatment by debridement supplemented with systemic antimicrobials [15]. Systematic administration of antibiotics requires administration of large dose as it provides only small to moderate amount of drug in the periodontal pockets and can lead to the potential thread of bacterial resistance. So the use of antibiotics through systemic deliver is not the best choice to treat chronic periodontitis [16]. The uses of imidazole derivatives and tetracyclines as antimicrobial agents in the treatment of periodontal diseases have been studied extensively. In one such study two groups of young adult with refractory periodontitis after non-surgical treatment took either three 400mg metronidazole tablets (test group) daily or placebo tablets (control group) for 7 days. Reassessment study carried out and six months latter showed complete healing in 30% of the test group and in only 9% of the control group. The difference is

statistically significant and shows the additive effect of metronidazole in non-surgical treatment of periodontitis. Systemic drug therapy offers several benefits compared to local drug delivery such as it can deliver drug via serum to the base of the pocket and can alter tissue invasive organisms [15]. Many prescriptions are written for the course of 10-30 days for the treatment of periodontitis [17]. Emerging resistance among oral and medical pathogens to common antibiotics dictates a restrictive and conservative use of antibiotic therapy.

Periostat: It is an antimicrobial pill taken orally consisting of doxycycline. It has no direct influence on the germs that cause periodontitis. Periostat reduces the activity of gum and tissue destroying enzymes in periodontitis patients and is taken in conjunction with scaling and root planning for no less than three months.

Resistance of pathogens in periodontitis to common antibiotics

Resistance in streptococci or gram-negative bacteria is associated with antibiotic consumption [18, 19]. Scarce information exists on the antibiotic susceptibility of bacterial isolates from patients with periodontitis in countries with high antibiotic consumption, as this is an area in which microbiological testing is not performed in daily practice. Maestre and co-workers explored the susceptibility of bacterial isolates in periodontitis to antibiotics prescribed in odontology in Spain as treatment for local infections or prophylaxis for distant focal infections [3]. *Streptococcus viridans* resistance rates were 0% for amoxicillin, ≈10% for *clindamycin*, 9-22% for tetracycline, and for azithromycin ranged from 18.2% for *S. sanguis* to 47.7% for *S. mitis*. *Prevotella* isolates were susceptible to amoxicillin-clavulanic acid, with amoxicillin resistance ranging from 17.1% in *P. buccae* to 26.3% in *P. denticola*. Metronidazole resistance was <6% in all *Prevotella* species, while clindamycin resistance ranged from 0 to 21.1%. β -Lactamase production was positive in 54.1% *Prevotella* spp., 38.9% *F. nucleatum*, 30% *Capnocytophaga* spp., and 10% *Veillonella* spp. In this study, amoxicillin-clavulanic acid was the most active antibiotic against all species tested, followed by metronidazole in the case of anaerobes.

Scaling and root planning

Periodontal scaling is a treatment procedure involving the instrumentation to remove plaque, calculus and stains from the crown and root surface of the teeth [20]. Numerous studies have supported the contention that root planning can reduce probing depth, inhibit disease progression and gain clinical attachment. In a thorough evidence based review, Cobb calculated the mean probing depth reduction and gain of clinical attachment that can be achieved with root planning at sites that instantly were 4-6

mm in depth and 7 mm or greater depth. The author reported that the mean pocket depth reduction of 1.29 mm and mean gains of clinical attachments of 0.55mm and 1.29mm respectively [20]. The decrease in probing depth consisted of two components; gain of clinical attachment and recession. The efficacy of root planning can be found in several large clinical trials that compared the efficacy of local delivery with that of root planning [21]. It was reported that the mean reduction of probing depth after root planning was around 1mm.

Periodontal surgery

Soft tissue grafts: Soft tissue grafts increase gum tissue thickness and covers exposed roots where gum is absent due to excessive gingival recession. During this procedure gum tissue taken from palate to augment tissue thickness and cover the exposed root. The soft tissue graft can help to inhibit further recession. Soft tissue grafts reduce tooth sensitivity, covers exposed roots and improve esthetics of smile.

Frenotomy: It is the surgical removal of a frenum in the mouth. A frenum is a fold of tissue that passes from the movable lip or cheek to the gum. A frenotomy is indicated when a frenum is positioned in such a way as to interfere with the normal alignment of teeth or results in pulling away of the gum from the tooth surface causing recession

Gingivectomy: Since the bacteria that causes periodontal disease breed in the deepened pockets between the gum and the tooth, dentists may attempt to eliminate the area in which this bacteria can grow with a gingivectomy. In a gingivectomy, the periodontist will trim the unhealthy gum in order to reduce the pocket size. As a result, the bacteria will no longer have a suitable environment in which to grow, and healthy gum tissue can begin to grow back.

Local delivery antimicrobial medications- mouth washes rinses, irrigation and implants

Local delivery of antimicrobial medication gives site specific and therapeutic level of drug at the site of infection for prolonged periods of time [22]. The best way to prevent periodontal disease, tooth decay and to keep teeth for a lifetime is good oral health care, Brushing, flossing and regular dental visits including a periodontal evaluation helps in maintenance of good oral health. Brushing and flossing remove a thin sticky film of bacteria that grows on teeth. The sticky film called plaque is the main cause of tooth decay and gum disease. A locally administered product should remain in the pocket long enough to be effective, considering that the gingival fluid in 5mm pocket is replaced about 40 times per hour [14]. The benefits of the local drug delivery include its ability to deliver drugs within pockets at a bactericidal or bacteriostatic concentration [23]. At present no study

has confirmed that local drug delivery induces bacterial-resistant strains [7, 23]. Local drug delivery is not effective against tissue invasive micro organisms [16] and so clinicians should consider microbiological testing in patients who do not respond to local drug delivery to determine proper drug delivery [24]. For routine use in the treatment of periodontal diseases local drug delivery devices require carriers for the drug to be administered and removed at regular intervals [17]. But in the case of biodegradable polymer as carrier in the devices the removal of carrier after administration is not required.

Periochip: It is the controlled sub gingival delivery of chlorhexidine developed by Perio Products Ltd, Jerusalem, Israel and it is a commercially available product [25]. Periochip is a 5 mm×4mm×0.3 mm film containing 2.5 mg of chlorhexidine gluconate incorporated in a biodegradable matrix of gelatin cross linked with glutaraldehyde. It weighs about 7.4 mg and should be stored under refrigerated condition at 20-80°C. Periochip was first introduced into US dental market in 1998. Room temperature periochip, which provides the added benefit of being easy to store, simple to use and having half life of two years was introduced in 2002. Soskolne conducted an in vivo estimation of chlorhexidine release profile of the Periochip in the gingival cervical fluid, plasma and urine from a ten day pharmacokinetic study [26]. Results indicate that periochip can maintain clinical effective levels of chlorhexidine in the gingival cervical fluid of periodontal pockets for over one week with no detectable systemic absorption.

Periocol: It is a sustained release device of chlorhexidine in fish collagen membrane. The source of collagen is from the air bladder of fresh water fishes [25]. Application of this chip in chronic periodontitis as an adjunct to scaling and root planning procedure has shown reduction in probing pocket depth, gingival bleeding and clinical attachment level compared to scaling and root planning alone.

Sustained drug delivery

Sustained drug delivery system prolongs the therapeutic blood or tissue levels of the drug for an extended period of time [5]. V. Parthasarathy and co-workers developed sustained release system of sparfloxacin for use in the treatment of periodontal disease [27]. The chip has dimension of 10mm length, 2mm width and 0.5mm thickness. Ethyl cellulose, polyethylene glycol and plasticizer diethyl phthalate are used for the preparation of chip. The in vitro drug release pattern and clinical evaluation of the formulation were studied. Short term clinical trials shows the use of sustained release chip of sparfloxacin may cause the complete eradication of the periodontogenic bacteria in the pockets with chronic periodontics. R. Elkayam and co-workers developed a

system for the sustained release of minocycline for use in the treatment of periodontitis [5]. Minocycline cast from ethanol, chloroform, or chloroform with poly ethylene glycol were prepared as sustained release delivery devices. The release rate and anti-microbial activity of minocycline were measured in vitro and in vivo. The results indicate that each formulation studied releases minocycline at a rate that decreases with time. The release kinetics of minocycline in vivo correlates with the in vitro results.

Controlled drug delivery

Controlled drug delivery refers to the ability of the device to maintain a high drug concentration for prolonged periods [28]. Controlled drug delivery system attempts to localize drug action by spatial placement of a controlled release system adjacent to or in the tissue or organ and to target drug action using carriers or chemical derivatization to deliver drugs to a particular target cell type [30]. Biodegradable controlled release chlorhexidine chip is used as an adjuvant to scaling and root planning in adult periodontitis [29]. Gram negative anaerobic micro organism possesses the ability to invade gingival tissues and is responsible for initiation and progression of periodontitis. The important goal of periodontal therapy is to eliminate supra and sub gingival micro organisms. Use of antiseptics such as chlorhexidine has the advantage of having a minimal, if any potential to induce bacterial resistance. Yamagami and co-workers developed a newly water soluble controlled release insert containing ofloxacin as an anti bacterial agent Pt-01 [31]. The effect of Pt-01 was evaluated by split mouth application after oral hygienic instructions. No mechanical debridement was carried out during the experiment. Clinical findings are plaque index, gingival index, bleeding on probing, pus discharge, pus and probing depth. Pt-01 was applied once a week for four weeks in periodontal pockets and controlled inserts without any anti bacterial agents was applied in selected pockets. Results suggested that weekly applications of Pt-01 in periodontal pockets have a significant effect on the resolution of periodontal inflammation. Advantages of controlled drug delivery (i) Less fluctuation in blood drug levels - controlling rate of release eliminates peaks and valleys of blood levels. (ii) Frequency reduction in dosing - controlled release products deliver more than single dose, hence taken less often than conventional forms. (iii) Enhanced convenience - with less frequency of dosing a patient is less prone to neglect taking a dose and also greater convenience. (iv) Reduction in adverse side effects - because of fewer blood level peaks outside therapeutic range and into toxic range, adverse side effects are less frequent. (v) Reduction in overall health care cost - although initial cost of controlled release dosage form may be more, overall cost of treatment may be less because of enhanced therapeutic benefits, fewer side effect, reduced time for health care professionals to dispense and monitor the patient [32].

Evaluation of efficacy of the drug delivery systems

Physiochemical evaluation

For overall evaluation of polymeric materials various physio/chemical tests may be utilized to characterize the polymer. These include tensile strength, compression, elasticity etc. Also the materials may be subjected to extraction procedures with selected solvents and subsequent analysis of characterization and identification of extractable substances. Variety of analytical techniques such as IR or UV spectroscopy, thin layer chromatography, GC-Mass spectroscopy, Gas liquid chromatography, particulate counting etc [33].

In vitro evaluation

In vitro susceptibilities of three hundred and sixty nine to nine hundred and sixty six bacterial isolates from periodontal lesions to eight antibiotics were evaluated [34]. Most bacteria are susceptible to penicilins, but greater activity was noted for amoxicillin than either penicillin or ampicillin. Antibacterial activities of minocycline were greater than with tetracycline for actinobacillus actinomycetecomitans and streptococcus. Clindamycin and metronidazole demonstrated excellent activity against anaerobic gram-negative rods. Erythromycin was considered less active against majority periodontal bacteria. The local delivery of medications to treat disease more effectively has become popular [28]. The chlorhexidine chip is composed of a small biodegradable chip of hydrolyzed gelatin containing 2.5mg of chlorhexidine gluconate. An in vitro study of minimum inhibitory concentration demonstrated that the chip is capable of inhibiting 99% of the sub genital micro flora. A six month European study used a split arch design to compare the use of scaling and root planning with chlorhexidine chip. In both groups bleeding on probing depth improved. The gingival index improved sufficiently in patients using scaling root planning with chlorhexidine chip.

In vivo evaluation

In vivo evaluation of chlorhexidine release profile of periochip in the gingival cervical fluid, plasma and urine were carried out by Soskolne [26]. Evaluation was done by in vivo, open label, single centre, and ten day pharmacokinetic study conducted on nineteen volunteers with chronic adult periodontitis. Single chip was inserted into each of four selected pockets in each volunteer. Gingival cervical fluid volume was measured using a calibrated periotron 6000. Blood samples and urine samples are collected. Chlorhexidine levels in gingival cervical fluid, blood and urine are quantified using high performance liquid chromatography. The results indicate an initial peak concentration of chlorhexidine in gingival cervical fluid at two hours post chip insertion and slightly

lower concentration being maintained over next ninety two hours.

Clinical trials in patients after local administration

Connie Hastings Drisko and co-workers evaluated the clinical safety and effectiveness of a sub gingivally delivered bio-degradable drug delivery system containing doxycycline hyclate in three large nine month multi centre randomized parallel design controlled clinical trials (Connie Hastings Drisko, 1998). Study 1 compared doxycycline hyclate to sanguinarine chloride and vehicle control. Study 2 and study 3 compared doxycycline hyclate to vehicle control, scaling and root planning and oral hygiene. Clinical parameters like probing depth reduction, attachment level gain, bleeding on probing reduction, plaque index were measured, results of these three clinical trials demonstrate that treatment of periodontitis with 10% doxycycline hyclate in a bio-absorbable delivery system is equally as effective as scaling and root planning and superior to vehicle control and oral hygiene. Salvi and co-workers evaluated the clinical and microbial effect of three sustained release biodegradable polymers based system delivered into periodontal pockets following initial periodontal therapy [35]. Forty seven patients with a mean age of fifty one years underwent a periodontal examination at baseline including plaque index, bleeding on probing, probing pocket depths and probing attachment levels at six sites per teeth. Patients randomly received afridox, elyxol or periochip. Analysis of variance/covariance was done. Application of three biodegradable sustained release devices resulted in significant gain in mean probing attachment levels for afridox and probing pocket depths for all three devices under study.

Clinical trials in patients after systemic administration

Clinical trials were performed to study the effect of systemic administration of metronidazole and amoxicillin as an adjuvant to mechanical therapy in patients with advanced periodontitis [1]. Sixteen individuals including ten female and six male with advanced periodontics has been recruited, distributed into two groups of eight subjects each and their baseline examinations were carried out. One group received active periodontal therapy of antibiotics administered via systemic route and during the corresponding period second group received placebo. In each of the two groups of eight patients, four patients were exposed to sub gingival scaling and root planning. Thus four groups were formed antibiotic therapy alone (ii) antibiotic therapy plus scaling (iii) placebo therapy alone (iv) placebo therapy plus scaling. Re-examination was performed on the harvested micro biota, soft tissue biopsy from one scaled and no scaled and clinical parameters after two and twelve months of active

therapy. The findings demonstrated that the combined mechanical and systemic antibiotic therapy group (ii) was more effective than mechanical therapy alone in terms of improvement of microbiological features. Another similar study compared clinical changes occurring in chronic periodontitis patients receiving scaling and root planning with systemic administration of antibiotics [36]. Ninety two chronic periodontitis patients were randomly assigned to receive (i) scaling and root planning alone (ii) scaling combined with azithromycin (iii) scaling root planning combined with metronidazole and (iv) scaling and root planning combined with doxycycline. Clinical parameters like gingival redness, bleeding on probing, pocket depth and attachment levels were measured at baseline for three, six and twelve months post therapy. This study demonstrated that periodontal therapy provides clinical benefits and antibiotics provide clinical benefits over scaling and root planning alone. Effect of metronidazole plus amoxicillin as the sole therapy on the sub gingival micro biota of chronic periodontics was the concept evaluated [13]. Twenty two patients with untreated chronic periodontics were randomly assigned to a group that received metronidazole plus amoxicillin or to scaling and root planning and two placebo groups. Clinical measurements were made after three, six, nine and twelve months after therapy. After twelve months many species were still present at significantly lowered levels compared with their baseline counts.

Economic evaluation

Chlorhexidine chip is a small biodegradable chip of hydrolyzed gelatin containing the antimicrobial chlorhexidine gluconate [37]. Clinical studies showed the adjunctive use of chlorhexidine in patients with chronic periodontitis reduces probing pocket depth and bleeding. The intent of the study was to assess the treatment periodontitis patient group including men and women received under the care of general dental practitioners over a period of one year. It was concluded that adjunctive chlorhexidine chip used in general practice for patients with periodontitis increases cost but reduces surgeries over one year. Potential economic impact of new periodontal chemotherapeutic, testing the hypothesis that its adjunctive use would result in reduced periodontal surgical needs [38]. Costs were assigned using general list fees and special list fees weighed by the percentage of the procedure performed by each group. Adjunctive use of the chlorhexidine chip could reduce periodontal surgical needs at significantly little or no additional cost.

Efficient treatment for periodontitis

The goal of follow-up care after periodontal therapy is to preserve the function of individual teeth and dentition, ameliorate symptoms and simplify future surgery or make it unnecessary [16]. Effective follow-up of

periodontal care depends on early diagnosis and treatment as well as patient education. The main determinants of successful periodontal maintenance therapy are dental professionals' ability to combat periodontal infections and patients' compliance with prescribed follow-up care. Mechanical and chemical antimicrobial intervention is the mainstay of preventive periodontal therapy. Chemotherapeutics alone is unlikely to be effective in the presence of sub gingival calculus, underscoring the importance of sub gingival mechanical debridement. Also, because tooth brushing and rinsing alone do not reach pathogens residing in periodontal pockets of increased depths, oral hygiene procedures should include sub gingival treatment with home irrigators or other appropriate self-care remedies. When considering possible preventive therapies, dental professionals must weigh the risk of patients' acquiring destructive periodontal disease against potentially adverse effects, financial costs and inconvenience of the preventive treatment. It can be both difficult and expensive to control periodontal disease via conventional preventive measures alone. Antimicrobial protocol for supportive periodontal therapy is simple and more cost effective. The dental biofilm [39] is a complex bacterial ecosystem that undergoes evolution, maturing and development, and thus leads to odontogenic infection. The infection is normally located in the tissues of the dental organ itself, and follows a chronic course of evolution. However, bacterial pathogens express virulence factors in the biofilm, and this together with changes in host immunity, may cause clinical exacerbations and spread of infection to other areas of the body. Odontogenic infection management should consider the fact that therapeutic success is the control of the infectious aetiologic agents, using mechanical-surgical debridement and/or antimicrobial therapy. Debridement techniques have a quantitative effect i.e., reducing the size of the inoculums and therefore if these techniques are used alone to control infection, despite an initial clinical improvement odontopathogens may persist and the process may reoccur or become chronic. Microbiological examination may be helpful in defining therapeutic success in a more reliable way, it could define the prognosis of recurrence more precisely, and could enable the most appropriate antibiotic to be selected, thus increasing therapeutic efficacy. Antimicrobial therapy brings about a quantitative and qualitative change in the bacterial composition of the biofilm, in addition to being able to act on sites that are inaccessible through mechanical debridement. However, incorrect antimicrobial use can lead to a selection of resistant bacterial species in the biofilm, in addition to side effects and ecological alterations in the host. In order to minimize this risk, and obtain maximum antimicrobial effect, we need to know in which clinical situations their use is indicated, and the efficacy of different antibiotics with regard to bacteria isolated in odontogenic infection.

Fig-1 Healthy gingival

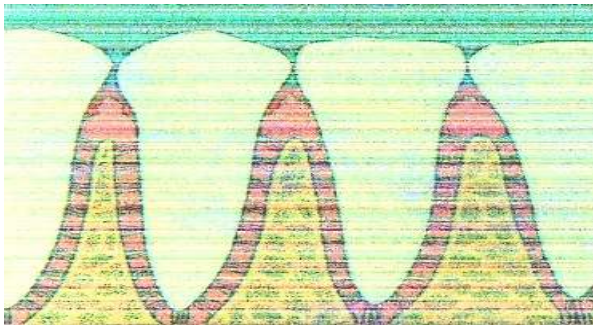


Fig-2 Gingivitis

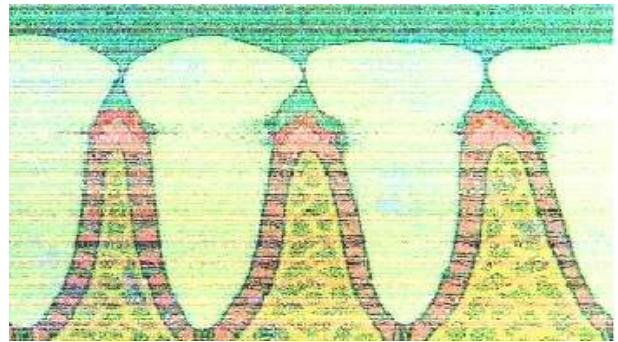


Fig-3 Periodontitis

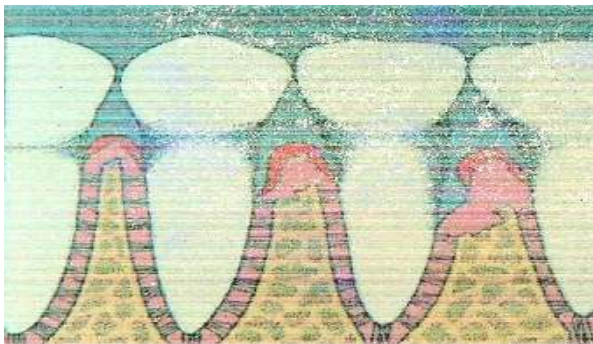


Fig-4 Advanced periodontitis

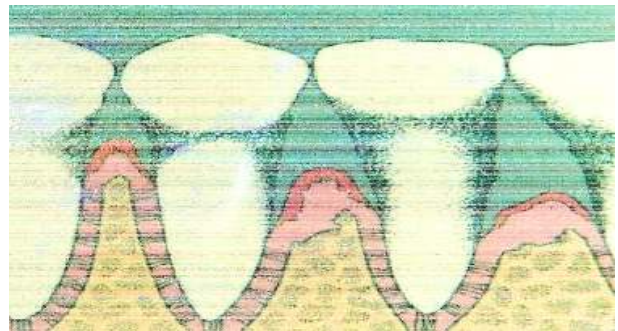


Fig-5: Insertion of dental implant into periodontal pockets



Fig-6: Stabilization of dental implant in position by dental impression paste



Conclusion

Periodontitis is the inflammatory disease resulting in the destruction of the tissue that supports the tooth. It results from extension of the inflammatory process inflated in the gingival to the supporting periodontal tissues. Active phase of the disease can be reversed by oral hygiene,

correction of inadequate restorative dentistry, root planning, surgical elimination of the pockets, antibiotics etc. Transmucosal drug delivery routes like the nasal cavity, the rectum or the buccal or sublingual areas of the mouth offer the advantage of being a non-injection route of administration. Presumably patients usually prefer to avoid

needles. Antibiotics could cause resistance in the gram negative bacteria. Local administration of the antibiotics in the periodontitis patients require very less dosage compared to the systemic administration. Local administration is through various targeted devices like the periochip. Advantages of the targeted devices for the treatment periodontal diseases are effective and prolonged local levels of the antibiotics with a much less frequent

administration. Periodontopathic organisms are rendered incapable to colonize specific sites at levels of antimicrobials well below their minimum inhibitory concentration. The low levels of antibacterial agents for prolonged time is an effective means of disease control. Most commonly investigated antimicrobial agents are metronidazole, tetracycline, minocycline and clindamycin.

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