

Original Article

Assessment of the role of Tetracycline Fibers in conjunction with Periodontal Flap Surgery in Chronic Periodontitis patient– A Case Report

Chhaya Mangla

M.D.S. (Periodontology)

Former Senior lecturer, Adesh Institute of Dental Sciences and Research, Bathinda, Punjab, India

ABSTRACT:

Dental plaque which is a primary etiological factor for periodontal disease is composed of bacterial aggregates that are adherent to one another and to surfaces and interfaces. These bacteria form a highly resistant biofilm with an exopolysaccharide matrix protection. The different treatment modalities available to treat this disease are aimed at removal of micro-organisms from both hard and soft tissues. Hence, antimicrobial agents can be used as an adjunct to conventional therapy. Tetracyclines have been used extensively in the treatment of periodontal disease since many years as these are capable of achieving high concentration in the sulcular fluid. Tetracyclines are semi-synthetic, broad spectrum chemotherapeutic agents which are bacteriostatic in action and hence are effective against rapidly multiplying bacteria. In the present case report, the role of tetracycline fiber in combination with periodontal flap surgery was evaluated.

Key words: Periodontitis, local drug delivery, tetracycline fibers.

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Corresponding author: Dr. Chhaya Mangla, M.D.S. (Periodontology), Former Senior lecturer, Adesh Institute of Dental Sciences and Research, Bathinda, Punjab, India

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INTRODUCTION:

Periodontal disease belongs to a group of inflammatory disorder whose pathogenesis is not well defined, although it is known that the interaction of host defense mechanisms and etiologic agents is an important determinant of the onset and progression of the disease. There is well-documented evidence that bacteria and their products found in dental plaque comprise the primary etiologic agents responsible for periodontal disease. The primary aim of nonsurgical as well as surgical treatment regimen is the removal of etiologic factor (i.e., plaque and calculus). Nonsurgical therapy, that is, scaling and root planning, may not always result in the complete elimination of etiologic factor because of poor access to the base of deep periodontal pocket and anatomical complexities which may occasionally limit the efficiency of root planing. Periodontal surgery therefore retains an important role in treatment of periodontitis, with

trends away from resective approaches to more conservative and regenerative techniques.¹

It has also been suggested that residual bacteria in the dentinal tubules and soft tissues may repopulate the scaled teeth. Therefore, local and systemic antimicrobial agents are used as adjunct to non-surgical therapy. Drugs administered systemically are absorbed into the blood stream and distributed throughout the body through the circulation. However, systemic drug therapy is limited by adverse reactions such as toxicity, acquired bacterial resistance, and drug interactions. Patient compliance is also a recognized problem. In contrast, local administration of the drug allows the therapeutic agent to be delivered at the diseased periodontal site with increased therapeutic effect and minimal side effects.² Commonly used methods for local drug delivery are sub-gingival irrigation and controlled release of drug. The antimicrobial agents used as local drug delivery agents include tetracycline, ofloxacin, clindamycin,

chlorhexidine, etc. Tetracycline as well its derivatives doxycycline and minocycline are the most commonly used antimicrobial agents in the treatment of periodontal infections.³

Tetracycline offers a broad-spectrum antimicrobial activity and may be a useful adjunct to periodontal therapy. Tetracyclines are the most commonly prescribed antimicrobials in periodontal therapy. The groups of tetracyclines are generally considered to be more effective against Gram-positive bacteria than Gram-negative bacteria and display good activity against most spirochetes as well as many anaerobic and facultative bacteria. High drug concentrations have been reported in gingival crevicular fluid making them particularly suitable for periodontal applications.²

Various systems for insertion of tetracyclines into periodontal pockets have been introduced which include hollow fibers, ethylene vinyl acetate copolymer fibers, ethyl cellulose fibers, acrylic strips, collagen preparations, and hydroxypropylcellulose films. A newer delivery system of tetracycline fibers within collagen fibers "Periodontal Plus AB™" (Advanced Biotech Products, Chennai) containing 25 mg of pure fibrillar collagen along with 2 mg of tetracycline HCL has been introduced² [Figure 1]. In the present study, the effect of local delivery of Tetracycline fibers in periodontal pockets during periodontal flap surgery is evaluated.

CASE REPORT:

A 35 yr old female came with chief complaint of bleeding gum, mild pain and sensitivity in left lower back tooth region since 7-8 months. On clinical examination, edematous red gingiva, bleeding on probing was present in left lower quadrant and probing pocket depth of 5mm was present between left lower first molar and second molar. Radiographically, there was mild bone loss between first and second molar. Treatment plan included scaling and root planing (non-surgical) followed by placement of Periodontal Plus AB at the time of Periodontal Flap surgery at the site between left lower first and second molar.

A general assessment of patient was made through history and routine laboratory investigations. No abnormality was detected. The non-surgical and surgical procedure was explained to the patient and the informed consent obtained. Before the start of the procedure, patient was instructed regarding home care oral hygiene measures. This includes use of soft toothbrush with conventional toothpaste by employing Modified Stillman's method of tooth brushing twice daily. Patient was instructed not to use any medicated toothpaste, mouth rinse during the study period.

Parameters (Site specific Plaque scoring using Quigley-Hein and Elliot Plaque Index, Probing Pocket depth, Clinical attachment level and Site specific Bleeding on probing using index by Muhlemann H.R.) were recorded on day 0 at the time of surgery and subsequently at the end of six weeks, three months. Probing pocket depth and Clinical

Attachment level was recorded using a calibrated periodontal probe and customized acrylic occlusal stents. Alginate impression was made for fabrication of custom made acrylic stent with groove and fixed reference point was marked on it. Probe placement for probing pocket depth and clinical attachment level was guided by the stent to ensure reproducibility at subsequent soft tissue measurements.

TREATMENT PROCEDURE:

Scaling and root planning of the patient was done. After six weeks, parameters were assessed at day 0 before surgery. Sulcular incisions were given and a full thickness mucoperiosteal flap was reflected both on facial and lingual side. Thorough debridement and root planning of the exposed root surface was performed by hand instrumentation. The area was irrigated with sterile saline (Figure 2). Periodontal plus AB fibers were soaked in saline and placed at the diseased site (Figure3). The flap was adapted back to its original position and suturing was done using non-resorbable silk thread (3-0). The surgical site was dried using gauze and Coe-pak was then applied (Figure 4). Amoxicillin 500 mg thrice a day was prescribed for 5 days. Ibuprofen 400mg thrice daily and vitamin-B complex, 1 capsule daily was also prescribed for 5 days. During the healing phase of the surgical wound, the patient was instructed to follow all the routine oral postoperative hygiene instructions. She was instructed not to brush the operated site for one week and to rinse the oral cavity with chlorhexidine (0.2%) mouthwash daily. After 7 days, the periodontal dressing and sutures were removed and the surgical area was flushed with antimicrobial solution. Plaque score, bleeding index, gingival index and patient assessment of the periodontal dressing were recorded at 6 weeks and 3 months using indices already mentioned.

Figure1. Periodontal Plus AB Fibers



Figure2. Full thickness flap reflected



Figure3. Placement of Tetracycline fibers.

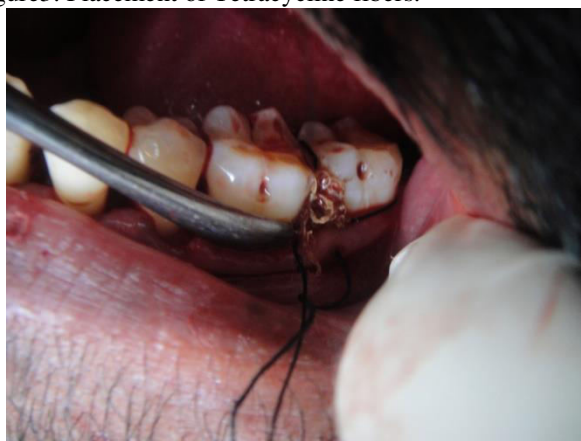


Figure4. Coe-pack placed.



RESULTS:

Plaque score decreased from 1.5 to 1.25 and then 1 at day0 at the time of surgery, after 6 weeks and after 3 months respectively. Probing pocket depth decreased from 5mm to 3mm and then 2mm at day0 at the time of surgery, after 6 weeks and after 3 months respectively. There was a change in clinical attachment level of 7 mm to 5mm and then 4mm at the time of surgery, after 6 weeks and after 3 months

respectively. Bleeding score decreased from 0.75 to 0.5 then 0.25 at day 0 at the time of surgery, after 6 weeks and after 3 months respectively.

DISCUSSION:

Periodontal diseases represent a group of localized microbial-induced infections involving the gingival and supporting tissues of the teeth. There is considerable evidence implicating facultative and anaerobic bacteria as a primary cause of periodontal disease.⁴ The control of prevalence and progression of periodontal disease requires a reduction of subgingival microbial plaque mass or at least a suppression of periodontopathic bacteria. Systemic administration of antimicrobial agents required frequent dosing which is associated with the risk of developing resistant organisms and super infection as well as adverse effects such as gastrointestinal disturbances.^{5,6} A local delivery device consists of a drug reservoir and a limiting element that controls the rate of medicament release. The goal is to maintain effective concentrations of therapeutic agents at the site of action for longer period, despite drug loss from crevicular fluid clearance.⁵ Tetracyclines are superior to other antibiotics as they are the only class of antibiotics which has the ability for retention to the tooth cementum and soft tissues. They are the only antibiotics, which can achieve higher levels of gingival fluid concentrations than serum levels.⁷ Tetracycline has also been to inhibit collagenase activity, collagen degradation and bone resorption.⁸ The substantivity of tetracyclines have proved to be effective against gram-positive and gram-negative anaerobic microflora associated with chronic adult periodontitis. They exert their antimicrobial effect by inhibiting protein synthesis.³

Mechanical debridement alone may fail to eliminate the putative pathogens from the pockets completely because of the location of these organisms within gingival tissue or in deeper areas inaccessible to periodontal instrumentations and thus results in recurrence of disease. Thus, there is need of periodontal flap surgery to treat chronic periodontitis for thorough debridement and disease control.²

In the present case report, local drug delivery agent i.e. tetracycline fibers were used along with periodontal flap surgery. There was reduction in probing pocket depth with change in clinical attachment level. Hence, a combination of periodontal flap surgery results in added benefits in the control of periodontal diseases.

CONCLUSION:

This case report demonstrates that application of tetracycline fibers along with periodontal flap surgery is effective and beneficial to patient suffering from chronic periodontitis, with results demonstrating an improvement in clinical parameters.

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