



## Local Drug Delivery of Tetracycline Fiber (Periodontal AB Plus) in an Isolated Periodontal Pocket: A Case Report and Its Implications on Chemical Health Risk Reduction

1Dr. Geeta Bhutda; 2Dr. Raghavendra Metri ; 3Dr. Gauri Ugale; 4Dr. Omkumar Baghele; 5Dr. Vishnudas Bhandari; 6Dr. Sawal Kala

1,6 Post graduate student, Department of Periodontology, Maharashtra institute of dental sciences and research (dental college), Latur.

2 Professor and HOD, Department of Periodontology, Maharashtra institute of dental sciences and research (dental college), Latur.

3,4 Professor, Department of Periodontology, Maharashtra institute of dental sciences and research (dental college), Latur.

5 Professor and Guide, Department of Periodontology, Maharashtra institute of dental sciences and research (dental college), Latur.

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### KEYWORDS

Local drug delivery, Tetracycline fiber, Periodontal AB Plus, Periodontal pocket, Chemical health risk, Scaling and root planing

### ABSTRACT:

Localized periodontal pockets harbor pathogenic microorganisms that contribute to chronic inflammation and progressive periodontal destruction. Systemic administration of antibiotics is associated with increased chemical burden, adverse reactions, and the risk of antimicrobial resistance. Local drug delivery (LDD) systems offer a targeted approach by delivering antimicrobial agents directly into periodontal pockets, thereby achieving therapeutic concentrations locally while minimizing systemic exposure.

This case report describes the clinical application of tetracycline fiber (Periodontal AB Plus) as an adjunct to scaling and root planing (SRP) in a 34-year-old male patient presenting with an isolated 5-mm periodontal pocket in relation to tooth 36. Clinical and radiographic evaluation using orthopantomography revealed localized horizontal bone loss with no furcation involvement.

Phase I periodontal therapy was performed, followed by placement of tetracycline fiber after 21 days. At 3-month follow-up, a reduction in probing pocket depth from 5 mm to 3 mm and marked improvement in gingival inflammation were observed. No local or systemic adverse effects were reported. The present case highlights the role of LDD as a site-specific, low-risk chemical therapeutic modality that enhances periodontal healing while reducing systemic antibiotic exposure and associated health risks.

### 1. Introduction

Chronic periodontitis is an inflammatory disease characterized by progressive destruction of the supporting structures of the teeth, primarily initiated by pathogenic microorganisms present within dental plaque biofilms<sup>1</sup>. Scaling and root planing (SRP) remains the cornerstone of non-surgical periodontal therapy; however, mechanical debridement alone may

be insufficient in eliminating pathogens from deep or isolated periodontal pockets<sup>2</sup>.

Systemic antibiotics have been used as adjuncts to periodontal therapy but are associated with increased chemical burden, gastrointestinal disturbances, hypersensitivity reactions, hepatotoxicity, and the growing global concern of antimicrobial resistance<sup>3-5</sup>. In this context, local drug delivery (LDD) systems were developed to deliver antimicrobial agents directly into



periodontal pockets, achieving high local concentrations while minimizing systemic exposure<sup>6</sup>.

Tetracycline fibers are a well-established LDD system that provides sustained drug release, inhibits collagenase activity, suppresses periodontal pathogens, and promotes periodontal healing<sup>7-9</sup>. From a chemical health risk perspective, LDD represents a safer therapeutic alternative by reducing cumulative systemic antibiotic exposure. This case report presents the clinical outcome of tetracycline fiber (Periodontal AB Plus) placement in an isolated periodontal pocket in relation to tooth 36, with a 3-month follow-up.

## 2. CASE DESCRIPTION:

A 34-year-old male patient reported to the Department of Periodontology with a chief complaint of food lodgement and occasional bleeding from the lower left posterior region. The patient was systemically healthy, with no history of smoking or tobacco use and no known drug allergies.

### 3. Clinical Examination

Intraoral examination revealed generalized mild gingival inflammation with localized deep periodontal pocketing in relation to tooth 36. Probing pocket depth (PPD) of 7 mm was recorded on the mesiobuccal aspect of tooth 36, with bleeding on probing. Other periodontal sites exhibited probing depths within normal limits. Plaque index and gingival index scores indicated fair oral hygiene and localized gingival inflammation in the affected area.

### 4. Radiographic Examination

An orthopantomogram (OPG) was advised to evaluate the extent of alveolar bone loss. The radiograph revealed localized horizontal bone loss in relation to tooth 36, with no evidence of furcation involvement.

### 5. Diagnosis

Localized Periodontitis – Stage II, Grade B, in relation to tooth 36.

### 6. Treatment Plan

The treatment plan consisted of:

1. Phase I periodontal therapy (scaling and root planing).

2. Re-evaluation after 21 days.

3. Local drug delivery using tetracycline fiber (Periodontal AB Plus) in the isolated periodontal pocket.

4. Reinforcement of oral hygiene instructions and maintenance therapy.

### Phase I Therapy:

Thorough scaling and root planing were performed using ultrasonic and hand instruments to eliminate supra- and subgingival plaque and calculus. The patient was instructed on proper oral hygiene measures, including the modified Bass brushing technique and interdental cleaning.

The patient was recalled after 21 days for re-evaluation. At the recall visit, a mild reduction in gingival inflammation was observed; however, the probing depth of 5 mm persisted in relation to tooth 36, indicating the need for adjunctive local drug delivery.(fig1)



**fig 1: Pre-operative photograph showing 5 mm pocket depth with 36**

### Local Drug Delivery Procedure:

After obtaining informed consent, the periodontal pocket in relation to tooth 36 was isolated and gently dried. Tetracycline fiber (Periodontal AB Plus) was inserted into the periodontal pocket using sterile tweezers until the pocket was completely filled. The fiber was adapted to the pocket walls, and excess fiber was trimmed.

A periodontal dressing was not placed. The patient was instructed to avoid brushing and flossing in the treated area for 7 days and to refrain from chewing hard food



on the affected side. The patient was advised to continue routine oral hygiene in the remaining areas.

Intraoperative clinical photographs documenting fiber placement were recorded.(fig 2)



**fig 2: Intra-operative photograph showing LDD with tetracycline fibers**

#### 7. Follow-Up and Clinical Outcome

The patient was recalled at 14 days, 1 month, and 3 months for clinical evaluation. At the 3-month follow-up visit, a reduction in probing pocket depth from 5 mm to 3 mm was observed in relation to tooth 36. Clinical attachment level gain of approximately 2 mm was noted. Gingival inflammation and bleeding on probing were significantly reduced.

Postoperative clinical photographs demonstrated healthy gingival contours and resolution of localized inflammation. The patient reported no discomfort or adverse effects related to tetracycline fiber placement.(fig 3)



**fig 3: Post-operative photograph pocket reduction to 3mm at 3month follow-up**

#### 8. Discussion

Local drug delivery systems serve as effective adjuncts to mechanical periodontal therapy by enabling direct delivery of antimicrobial agents to diseased sites<sup>6</sup>. Tetracycline fibers have demonstrated the ability to inhibit periodontal pathogens, suppress collagenase activity, and promote fibroblast attachment, leading to improved periodontal healing<sup>7-9</sup>.

Systemic antibiotic therapy increases overall chemical exposure and is associated with adverse reactions and the development of antimicrobial resistance<sup>10-12</sup>. In contrast, LDD systems achieve concentrations several times higher than systemic dosing at the target site while maintaining negligible plasma levels<sup>13</sup>.

From a chemical health risk perspective, LDD represents a safer therapeutic approach by minimizing systemic drug dissemination and reducing cumulative antibiotic exposure. The favorable clinical outcome observed in the present case supports the concept of site-specific chemical modulation as an effective risk-reduction strategy in periodontal therapy. The limitation of this report lies in its single-case design and short-term follow-up; long-term randomized controlled trials are required to validate these findings.

#### 9. Conclusion

The present case report demonstrates that local drug delivery using tetracycline fiber (Periodontal AB Plus) can be an effective adjunct to scaling and root planing in the management of isolated periodontal pockets. This modality offers a minimally invasive, site-specific therapeutic option that enhances periodontal healing while reducing systemic antibiotic exposure and associated chemical health risks.

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