

Tetracycline Presteron as a Non-Surgical Approach in Managing Chronic Peri-Apical Infection: A Case Report

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Abstract

Persistent infected Lesions after root canal treatment is an indication of surgical treatment if non-surgical treatment have failed to resolve the persistent infection.

This case report will show an extra step of non-surgical intervention using tetracycline presteron paste before starting a surgical approach.

Patients with presence of intra oral sinus tract in combination with history of several attempts for root canal treatments on affected tooth and presence of persistent peri-apical lesion with differing severity.

Conservative approach through sinus tract with peri-apical curettage, regenerative laser approach, aspiration and irrigation technique, and packing with weekly Tetracycline Presteron paste and monthly follow ups after sinus closure.

After 12 months, Radiographic and clinical evidence shows the inhibition of the inflammation, bone remodelling, and regeneration.

Keywords: *Tetracycline Presteron; Peri-Apical Lesion; Root Canal Treatment*

Introduction

Development of endodontically induced peri-apical lesions is directly related to presence of microbes in the root canal system and the affected lesion [1]. Most peri-apical lesions can be classified as dental granulomas, radicular cysts, or abscess [2,3]. The incidence of cysts in a periapical lesions varies between 6 and 55%. The occurrence of periapical granulomas ranges between 9.3 and 87.1%, and of abscesses between 28.7 and 70.07% [4,5]. However, an initial clinical diagnosis of a peri-apical cyst can be made based on the peri-apical lesion is involved with one or more non-vital teeth, the lesion is greater than 200 mm² in size, the lesion is seen radiographically as a circumscribed, well-defined radiolucent area bound by a thin radiopaque line, and it produces a straw-colored fluid upon aspiration or as drainage through an accessed root canal system [6].

First approach to peri-apical lesion with endodontic approach is performing root canal treatment with complete elimination of intracanal microbes using mechanical and application of antibiotic paste in many studies showing great success and elimination of the lesion [7,8]. Different medications included Triple antibiotic paste [9] and Calcium hydroxide medication [10]. An approach to the peri-apical lesion persisting after root canal treatment can be treated with Aspiration and irrigation technique decreasing the hydrostatic pressure, inhibits osteoclastic activity initiating bleeding and formation of blood clot which can start healing mechanism [11], disadvantage of discomfort to the patient by creation of buccal and palatal wounds [12].

Apical Surgery includes many procedures involving Incision and Drainage (I and D), closure of perforations, root or tooth resections, and apico-ectomy which are done in the failure of non-surgical management [13]. Treatment success rates up to 81% from combined studies shown after surgical management and bone graft placement [14].

Tetracycline paste/ointment, which includes doxycycline and minocycline are primarily bacteriostatic, inhibiting protein synthesis by binding to 30S ribosomes in susceptible organism. They exhibit broad spectrum of activity against gram positive and gram negative microorganisms [15].

The paste including doxycycline were widely used as topical therapy to treat periodontitis and peri-implantitis [16]. Tetracyclines were also used during bone grafting procedures because of their anticollagenase, antibacterial and fibroblast-stimulatory properties. Tetracycline, minocycline, and doxycycline have been incorporated into gels, chips, polymeric fibers and microcapsules to accomplish a sustained level of antibiotics at the site of infections, such as peri-implantitis [17].

In combination with tetracycline in the paste, presteron inhibits the action of bradykinin, a potent inflammatory mediator, by suppressing Ca²⁺-dependent cellular PLA 2 (cPLA 2) and/or secretory PLA 2 (sPLA 2), and COX-1, resulting in alleviation of inflammation [18].

Case Presentation

Two cases with different presentations of Persistent Peri-apical Radiolucency in the Maxillary arch.

Case 1

Patient 34 - year old Female presented at the clinic two years ago complaining of periodic discomfort, puss discharge, and the presence of a ball like enlargement in the palatal and upper labial sulcus in the anterior of the Maxilla #11 and #12 with bitter taste that has been there for 10 years.

Patient reported that a root canal has been done on the front teeth (#11 and #12) 10 years ago when she had severe pain, Re-root Canal on the same teeth 5 years ago as the problem persisted, and finally the third root canal was done a year before she presented to the centre with the same signs and symptoms and no relief.

After consulting with doctors she was advised to go for the surgical solution of Apicectomy and Bone graft as a final solution with no other choice, patient was not willing for surgery and looking for alternatives.

Patient is medically fit with no history of systemic diseases or taking any medication.

After examination, a localised well-defined ovoid unilocular radiographic radiolucency apical in the anterior maxilla of #12 and #11 with no presence of external resorption of the roots as shown in the Peri-apical X-ray (Figure 1) that has been Root Canal Treated, post placed and crowned.



Figure 1

Presence of a bullae in the labial vestibule on the Muco-Gingival border anterior of #11 (Figure 2) and in the palatal region posterior to the #11 (Figure 3) without pus discharge at time of examination, with Gingival margin enlargement and bleeding due to bulky Crowns placed on #15 - #25.



Figure 2



Figure 3

Bone Defect has shown to be a through and through fenestration communication from labial cortical bone of the maxilla to the palatal cortical bone without incisive canal involvement (Figure 4).

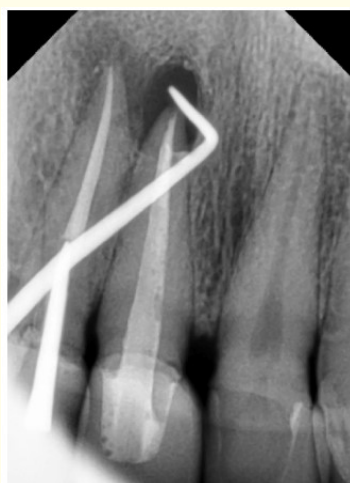


Figure 4

Differential diagnosis of the lesion (Peri-Apical Granuloma, Radicular cyst, Odontogenic Cyst, Peri-apical Abscess).

Without the presence of Pus at the time of examination, history of pain since the first root canal treatment, and presence of strawberry-coloured fluid. As in the absence of pathological examination, the defect will be treated as a chronic peri-apical lesion.

Two Treatment options have been suggested to the patient.

A Surgical Approach which had the most promising success rate involving:

- Apicectomy of the affected roots.
- Curettage of the lesion.
- Bone graft and placement of a membrane Labially and Palatally to restore bone density eliminating the defect.

A non-surgical approach was suggested which had less promising prognosis and a new technique to eliminate the infection without surgical intervention and promoting the body to repair the bone defect by the combination of

- Aspiration and irrigation technique with Chx and saline.
- Peri-apical curettage through the labial and palatal sinus tract.
- Enhancing tissue regeneration with non-activated Laser Tip 810 nm.
- Tetracycline presteron periodontal paste packing in the lesion weekly until sinus closure.

Patient has agreed to go with the second treatment plan as to avoid surgery.

Before the start of the treatment, the patient was advised about the success in the treatments and understood the necessity of surgical intervention if the non-surgical approach was unresponsive, Consent Form was obtained from the patient.

First, the patient was given a Lidocaine 2% 1:80000 infiltration injection in the labial sulcus to block the anterior superior alveolar nerve and Nasopalatine nerve block in the palate.

Second, Aspiration and irrigation technique was used with Chx and Silane to rinse out and promote decompression of the defect. Fluid was not sent for histopathology, defect remains treated as a peri-apical infection.

Third, with the use of a fine Peri-Apical Curette and fine spoon excavator insertion through the labial and palatal sinus tract, curettage of the lesion's walls using tactile sensation only, and irrigation with Saline and Chx washing out Tissue debris from the defect.

Fourth, Insertion of unactivated laser Tip 810 nm from SOL into the sinus with pulsating emission inside the defect to promote regeneration on every mm of the lesion, Irrigation with Chx (Figure 5).



Figure 5

Finally, Insertion of Tetracycline Presteron (TCPS) from Nishika (Figure 6) using the TCPS cartridge syringe into the defect completely packing the lesion with the paste.

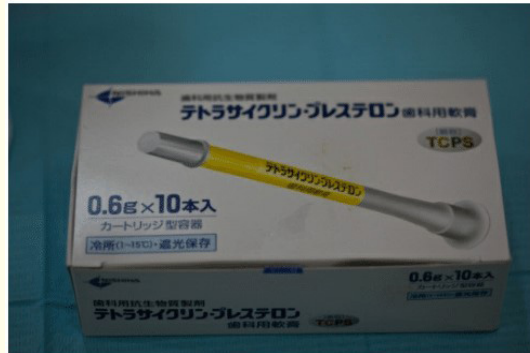


Figure 6

Recall of the patient was scheduled on a 7 day basis for the first month with continuous packing of the final step until the sinus tract has closed.

Replacement of old, bulky veneers/crowns was done to relief, restore biological width, and achieve a healthy outcome.

Follow up appointments were scheduled at 1 month after sinus tract closure, then 3 months, then

1 month after the weekly application of the TCPS (Tetracycline Presteron), the infection has been eliminated and the sinus tract labially and palatally have healed completely leaving the internal bone defect to be observed.

3 month and 6 month follow up, patient reported the discomfort is no longer present with no sign of pus discharge from the area.

12 month follow up, PA X-ray has shown bone regeneration Figure 7.

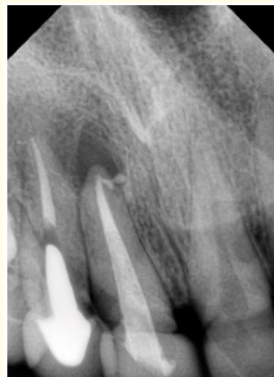


Figure 7

CBCT (Figure 8a-8d) has shown that even though the defect is still present but getting smaller with time and signs of bone regeneration.

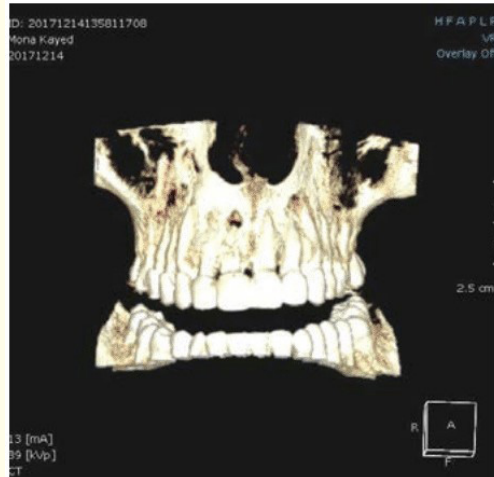


Figure 8a



Figure 8b

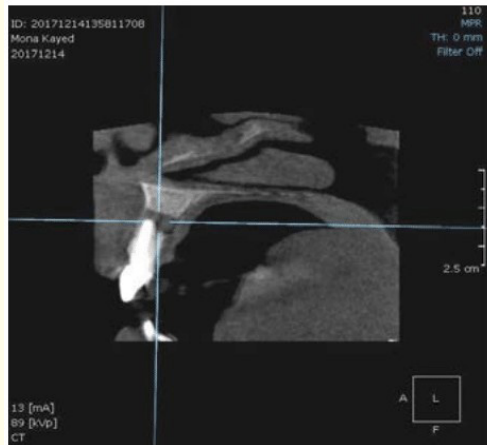


Figure 8c

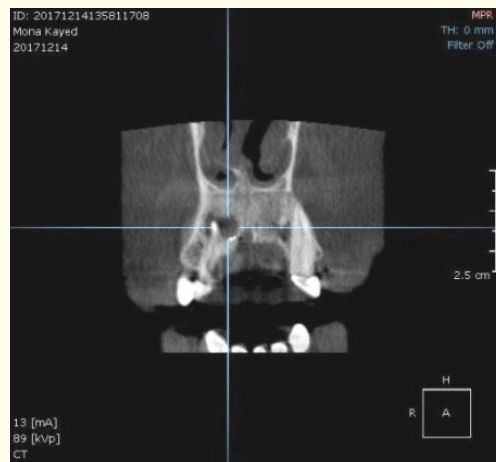


Figure 8d



Figure 9a



Figure 9b

12 month Intra-Oral pictures have shown the disappearance of the sinus tract leaving a healthy vestibule and palatal raphe (Figure 9a, 9b).

Case 2

Patient 43 year old male presented to the clinic with periodic discharge from anterior right side maxilla buccal of the first premolar with a history of root canal treatment 5 years ago and a re-root canal treatment a year ago but complaining of the same signs and symptoms hasn't resolved, patient is medically fit, not on any medications, and with no presence of systemic diseases.

Radiographic appearance was well-defined unilocular ovoid peri-apical radiolucency on #14 (Figure 10).

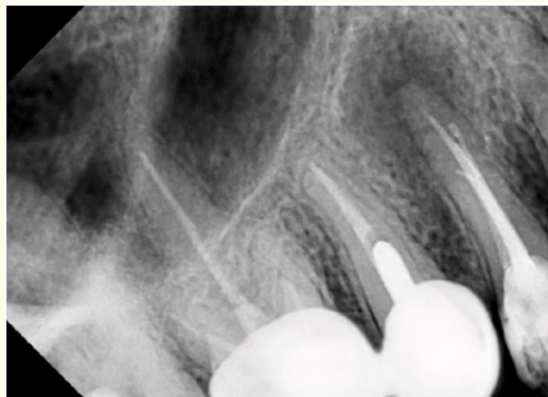


Figure 10

Advice by previous doctor for surgical intervention of apicectomy and bone graft to resolve the problem and heal the lesion but the patient wasn't willing to go through a surgical procedure.

Unfortunately, intra-oral clinical photographs were not taken.

Patient was advised on different treatment plans (Surgical and non-surgical) and agreed to go through with the non-surgical treatment involving TCPS (Tetracycline Presteron), consent form was obtained.

Identical procedure was done as of Case 1 under Local anaesthetic, debridement and disinfection of the bone defect, in-activated laser tip treatment 810nm and weekly recalls with reapplication of TCPS until sinus tract closure.

1 month (after 4 applications) follow up showed healing and absence of the sinus tract, patient reported the discomfort is no longer present and no pus discharge.

3 and 6 months follow up showed continuous healing without discomfort.

12 month follow up showed a complete reduction in the bone defect and bone regeneration in the PA X-ray (Figure 11).



Figure 11

Discussion

Peri-Apical lesions which have originated from endodontic conditions commonly range between 5 to 8 mm in diameter [19,20], with most of the peri-apical lesions (> 90%) can be categorised as dental granulomas, radicular cysts or abscesses [3,21].

There is clinical indication that as the periapical lesions grow in size, the ratio of radicular cysts rises. However, some large lesions have been shown to be granulomas [22]. The definitive diagnosis of a radiolucency/cyst can be made only by histopathological findings. In this case, granuloma and cysts were included in the differential diagnosis list.

Earlier it was believed that cyst/granuloma which does not respond to conventional root canal treatment alone and surgical intervention was always required. However, recently with great awareness of canal morphology, development of newer instruments, materials, and techniques has greatly enhanced the clinician's abilities [23]. More recently it has been proven if the lesion is effectively evacuated of the microbial load with an effective intra-canal or direct medication and inflammatory exudates, it is possible to stimulate the immune system inducing repair even in cystic lesions [24].

All this in consideration, non-surgical approach should always be the first approach before venturing into an invasive surgical procedure in cases of non-vital teeth with peri-apical lesions with the aim of bacterial elimination which is the main concern in any treatment modality and a factor in a successful treatment, the lack of regression in such lesions is directly related to the persistence of bacteria in the canal or in the lesion surrounding it [25].

In the present case, the failure of the root canal treatment numerous times before presenting to our clinic could be attributed to poor management of the lesion, apical management, and the presence of bulky crown restorations impinging on the biological width. A presumptive diagnosis of peri-apical lesion has been made on the basis of radiographic appearance and presence strawberry-coloured fluid.

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It is established that Tetracyclines inhibit bacterial protein synthesis by preventing the association of aminoacyl-tRNA with the bacterial ribosome [26,27]. For the treatment of infected bone defects, antibiotics, such as tetracycline and vancomycin are conventionally used in clinic [28]. However, the treatments with systemic antibiotics alone have several drawbacks, such as a potential systemic toxicity and poor penetration into necrotic tissues at wound sites, to approach these problems, many locally delivering systems have been developed [29]. Tetracyclines, including tetracycline, minocycline, and doxycycline were widely used as topical therapy to treat periodontitis and peri-implantitis [16,30]. In addition, tetracyclines were also used during bone grafting procedures because of their anticollagenase, antibacterial and fibroblast-stimulatory properties [17,31]. Presteron in the TCPS paste inhibits the action of bradykinin resulting in alleviation of inflammation [18]. In this case, the antibacterial effect and stimulatory properties in combination with presteron, the immune system has stimulated osteoblastic activity and inhibited osteoclastic activity lead with the absence of inflammation to bone remodelling/regeneration even though it's taking a much longer time than a surgical approach with bone graft.

Conclusion

Successful management of a Peri-apical lesion can be achieved with non-surgical methods which can be affective overtime, inhibiting the inflammation and inducing regeneration.

When it comes to Surgical vs non-Surgical approach, new materials are developed constantly to reduce the need for the Surgical intervention.

Although Tetracycline Presteron paste is mainly used for the treatment of Periodontitis and Implantitis, its biological combined effect shows potential advancement in the field of endodontics, alveolar defects, and peri-apical lesions as an extra step before surgical intervention. Combination of techniques and exploiting all non-surgical management techniques available to eliminate infection inducing the immune system for self-repair, achieving bone regeneration at its own pace.

Surgical management is the option of treatment if the lesion doesn't respond to treatment.

In this case, an extensive Peri-apical lesion with clinical and radiographic aspects of a radicular cyst was in a combination treatment with Tetracycline Presteron Paste (TCPS) injection in the bone defect, which confirms that a large Peri-apical lesion can heal by non-surgical treatment and potential use of TCPS in the field of endodontics.

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