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Case Report

A combination of endodontic therapy and root resection in furcation involvement case

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ABSTRACT

Background: *Management of furcation involvement is one of major problems in clinical periodontology. The prognosis and treatment choices depend on the degree and severity of the lesion. Thus the decision for a specific treatment of furcation-involved tooth certainly depends on several factors. Tooth anatomy and the degree of furcation involvement are considered as the most important factors affecting the decision for one or more treatment plans mode.* ***Purpose:*** *The aim of this case report is to determine the management of class IV furcation involvement with the combination of endodontic therapy and root resection.* ***Case:*** *This study reported a case of 47 years old male patient who came to Periodontics clinic with tooth mobility, hypersensitivity and furcation involvement.* ***Case management:*** *One of the treatment is a combination of endodontic therapy and distal root resection. The results of these case could help the patient to have a better treatment for his furcation defect.* ***Conclusion:*** *Combining endodontic treatment and root resection were considered as an appropriate choice for retaining clinically-important trifurcation-involved tooth. Root resection had a better prognosis to treat periodontal problems than for non-periodontal problems. However, complex interdisciplinary treatment is important to be performed in the overall treatment plan.*

Key words: *Furcation involvement, endodontic therapy, root resection*

ABSTRAK

Latar belakang: *Penatalaksanaan furkasi merupakan salah satu masalah di bidang periodontik. Rencana perawatan dan prognosis tergantung pada derajat keparahan furkasi. Untuk menentukan perawatan yang spesifik tergantung pada beberapa faktor. Anatomi gigi dan derajat keparahan furkasi merupakan faktor yang paling berpengaruh terhadap keputusan rencana perawatan.* ***Tujuan:*** *Tujuan laporan kasus ini adalah untuk menjelaskan penatalaksanaan furkasi kelas IV dengan perawatan kombinasi endodontik dan reseksi akar.* ***Kasus:*** *Penderita laki-laki usia 47 tahun datang ke klinik Periodonsia dengan keluhan gigi goyang, hipersensitif dan tampak adannya furkasi.* ***Tatalaksana kasus:*** *Dilakukan kombinasi perawatan endodontik dan reseksi akar distal. Hasil perawatan menunjukkan hasil yang lebih baik pada defek furkasi.* ***Kesimpulan:*** *Kombinasi perawatan endodontik periodontik dapat menjadi pilihan untuk mempertahankan gigi dengan furkasi. Reseksi akar dapat meningkatkan prognosis yang lebih baik. Perawatan interdisipliner yang kompleks dibutuhkan dalam membuat semua rencana perawatan.*

Kata kunci: *Furkasi, perawatan endodontik, reseksi akar*

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INTRODUCTION

Furcation involvement is actually considered as a periodontal disorder involving open bifurcation or trifurcation because of the loss of alveolar bone located among the roots. Furcation involvement is actually the most common case found in the mandibular and maxillary first molar. The problem often raised is the difficulty to

reach furcation areas during plaque control, especially in the area of furcation with mesial-distal direction or on the roots adjacent to each other. It is because furcation is an area that has a complex anatomy which even makes it is difficult to be cleaned with care at home; as a result, the periodontal disease is aggravated.[1]

The etiology of furcation involvement lesions may originate from plaque, pulp, abnormal occlusion, or the combination of those three causes. However, the main etiology of the aggravated furcation defect is caused by the presence of bacterial plaque in situ for a long time. It is also affected by the anatomical variations of root morphology and the anomalies of dental form, such as cervical enamel projections. Pulp inflammations may cause furcation involvement because of the additional root canals are connected with the area of furcation. Products of these necrosis and traumatic occlusion pulps then can cause inflammation in the area of furcation.[2]

The classification of the furcation involvement can actually be divided into four classes based on the degree of alveolar bone loss in the horizontal area of furcation.[1] Class I: in the early stage of furcation defect, there are suprabony pockets where furcation involvement still cannot be observed. Class II: the furcation defect may involve one or more furcation located on the same side, but alveolar bone is still attached to the teeth. Class III: the furcation defect has already been covered by soft tissue, so it cannot be observed anymore. Probe even cannot pass the area of furcation. The radiolucent area in the bifurcation or trifurcation areas can be observed through radiographic examination. Class IV: the soft tissue is lowering to the apical area. The furcation involvement can clinically be observed, and probe can pass through the area of furcation.

The treatment of furcation involvement is selected based on the classification of furcation involvement, the expansion and position of bone resorption, and the tooth anatomy. The goals of the treatment are aimed to facilitate the self-maintenance of oral hygiene, to prevent the more severe attachment loss, and, whenever possible, to close the furcation defect. Types of treatment of furcation involvement, furthermore, are various depending on the degree of damage in the inter-radicular area. In this case report, furcation involvement was treated with a combination of endodontic therapy and root resection.

CASE

A 47-year-old man came to Periodontics clinic in Faculty of Dentistry, Airlangga University, with main complaint in the upper left posterior area. The patient felt sensitive in the maxillary left area, especially when exposed to cold, and also felt that the tooth was shaky and the gums receded. Medicine that has been taken was paracetamol. Intra oral examination showed calculus, inflammation, bleeding, and gingival recession on the upper left posterior area.

CASE MANAGEMENT

Based on the anamnesis of clinical and radiographic examinations on the first visit, it was known that there were chronic periodontitis cases, on teeth 24, 25, 26, and 27, with furcation involvement on 26 (Figure 1). On the first visit, full mouth scaling and root planning were performed. Then on the second visit, the shaky tooth was splinted with wire-composite splinting along the 24, 25, 26, and 27. On the third visit, the patient still felt sensitive on tooth 26 when exposed to cold; as a consequence, the patient was consulted to the endodontic division for root canal treatment on 26. During the post-endodontic therapy, the patient had not felt any pain on the tooth 26, but the tooth was still loose; thus, it still could not used optimally for chewing. During intraoral examination, it was known that there were bleeding and inflammation on teeth 26 and 27, and gingival recession on the distobuccal root of tooth 26. Therefore, the resection of the distal root of tooth 26 was planned to be performed on the next visit (Figure 2). On the fourth visit, the resection of the distal root of the tooth 26 was conducted (4 months after the first visit).

After reviewing the patient's medical history and treatment plan, the patient was prepared for periodontal surgery and anesthetized. Access to the root surface was gained by elevating buccal and lingual full-thickness mucoperiosteal flaps. The extent of the flap must be sufficient to provide access and visibility for instrumentation and to facilitate proper wound closure. All chronic inflammatory tissue was removed with curettage, exposing the bone and root surfaces. In the case of a single root resection, a long fissure or diamond bur is used to section the root by positioning it at the most coronal portion of the root (the roof of the furcation) and gently penetrating through the furcation. Complete root separation was verified by inserting a probe through the furcation and removing it through-and-through or by testing the mobility of each root individually. Once the root was clearly separated from the remaining roots and the crown of the tooth, it can be elevated carefully from its socket with elevators to avoid luxation or damaging the remaining roots. Once the resected root has been removed, odontoplasty should be performed to ensure that no "lip" of tooth structure, which would act as a plaque-retentive ledge, was left in the dome of the furcation. After the removal of the root, the remaining root surfaces were planed to remove deposits, all soft tissue in the furcation area is curetted, and an ostectomy or an osteoplasty was performed to eliminate the remaining bony deformities and provide a biologic width for the dentogingival complex after healing.[3] The flaps were then re-approximated and sutured. Postoperative instructions were similar to other periodontal surgical procedures, and the patient should be reinstructed on oral hygiene procedures, which were specific for the new dento-radicular morphology. On the fifth visit, the patient did not feel any pain on the tooth 26 after the resection was done, and even the patient could clean the area by himself easier than before. During intraoral examination,

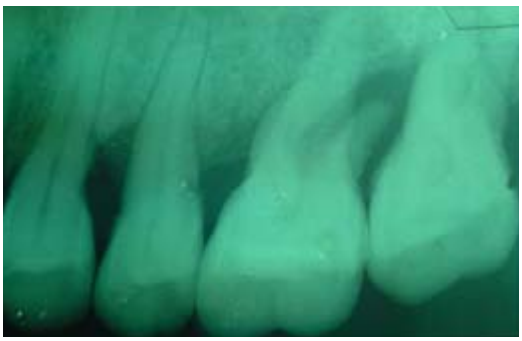

Figure 1. The radiographical examination, showed the resorption on the horizontal bone in the area of alveolar crest, 24, 25, 26, 27, and there was also radiolucency in the area of 26 furcation.

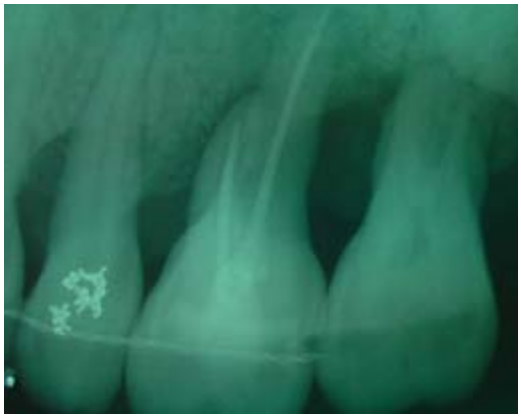

Figure 2. The treatment of furcation involvement class IV by using the combination of endodontic therapy and root resection.

Figure 3. The result of endodontic therapy and root resection treatment combination.

the gingiva had partially covered the area of the distal root of the tooth 26 which had been resected (Figure 3). Thus, the gradual treatment was needed in the division of periodontics. To obtain the best result of the treatment, periodontal tissue regeneration, the regenerative therapy by using bone graft, growth factor and coronally positioned flap then was planned to be conducted on the next treatment. The patient was satisfied were the result of endodontic and root resection and agreed to do maintenance and supportive periondontal therapy every 3 months.

DISCUSSION

Periodontal attachment loss associated with marginal periodontitis around multi-rooted teeth can progress to the furcation area. Because of the physical inaccessibility for hygiene procedures, infections in this area present a considerable therapeutic challenge with the potential for continued periodontal breakdown. Consequently, the objective of periodontal furcation treatment is to eliminate the plaque-retentive areas in the exposed furcation and make the area more accessible for maintenance. Success depends on the magnitude to which the periodontal infection has invaded the furcation area. Early furcation involvement may be treated by therapeutically debriding the area, addressing the etiologic factors (eg, overhanging restorations, enamel projections) and improving hygiene access to the furcation entrance through odontoplasty. Moderate to advanced furcation involvement, or through-and-through furcation involvement, often requires surgical intervention.[2]

The presence of furcation involvement is one clinical finding that can lead to a diagnosis of advanced periodontitis and potentially to a less favorable prognosis for the affected tooth. Furcation involvement therefore presents both diagnostic and therapeutic dilemmas. The etiologies of furcation involvement include extension of inflammatory periodontal disease, local anatomic factors, trauma from occlusion, pulpo-periodontal disease and root fractures involving furcation. Pulp and periodontal inflammation problems are tightly interconnected, both of which affect the diagnosis, the treatment planning, and the treatment procedure. The reason is because bacteria and inflammatory products of periodontitis can reach the pulp through the additional canal, apical foramen, or dentin tubule. Inflammatory processes in the periodontium associated with necrotic dental pulp and periodontal disease have an infectious etiology. The essential difference between the two diseases entities is their respective source of infection. A potential pathway for infectious elements in the root canal in such instances may be lateral canals. Acute manifestations of root canal infections can result in rapid and extensive destruction on the attachment apparatus. The effect of periodontal inflammation on the pulp is controversial. It has been suggested that periodontal disease has no effect on the pulp, at least until it involves the apex. On the other hand, the effect of periodontal disease on the pulp may include an increase in calcifications, fibrosis and collagen resorption. It seems that the pulp is not directly affected by periodontal disease, until recession has opened up an accessory canal to the oral environment.[4]

Combined periodontic-endodontic lesions are localized, circumscribed areas of bacterial infection originating from either dental pulp, periodontal tissues surrounding the involved tooth. Combined periodontic-endodontic lesions can originate from each or both of two distinct

locations and may be informally subclassified as follows: endodontic–periodontic, infection from the pulp tissue within a tooth may spread into the bone immediately surrounding the tip, or apex, or the root, forming a periapical abscess. This infection may then proliferate coronally to communicate with the margin of the alveolar bone and the oral cavity by spreading through the periodontal ligament; periodontic–endodontic, infection from a periodontal pocket may proliferate via accessory canals into the root canal of the affected tooth, leading to pulpal inflammation. Treatment includes conventional endodontic therapy followed by periodontal therapy. Endodontic therapy involves the removal of these structures, the subsequent cleaning, shaping, and decontamination of the hollows with tiny files and irrigating solutions, and the obturation (filling) of the decontaminated canals with an inert filling such as gutta percha and typically a eugenol-based cement.

Methods for periodontal therapy with the treatment of furcation involved molars have shown varying degrees of success. Grade I early furcation involvements are generally treated well with effective plaque control and scaling and root planning. Early grade II and III furcations require surgical management. Surgery permits access or root debridement, odontoplasty, osseous recontouring and periodontal regeneration. Advanced defects require endodontic therapy and resection of the root or part of tooth with advanced bone loss.[3] The first step in performing a root resection is to determine which root will be removed. Radiographs and clinical examinations are used to assess the extent of the furcation involvement, the amount of attachment loss, the morphology and proximity of the roots, the ability to perform endodontic therapy, the proximity of anatomical structures, and the existence of caries or root resorption. It is typical that the root with the least amount of remaining bony support or the most difficult for the endodontist or restorative dentist to treat should be removed.[5] Because of the high incidence of furcation involvement in maxillary teeth and the anatomy and relation of the first and second molars, the root most commonly resected is the disto-buccal root of the maxillary first molar.[6] It is generally agreed that whenever possible, endodontic treatment should be performed before a root resection. This facilitates the performance of the endodontic obturation and allows the endodontist to determine whether the canals can be adequately instrumented. In addition, performing endodontic treatment before a root resection may minimize the potential for postoperative pain.[4,6]

Root resection can be a valuable procedure when the tooth in question has a very high strategic value or when specific problems exist that cannot be solved by any other therapeutic approach. Root resections may be the treatment of choice when the proximity to anatomical landmarks (eg, maxillary sinus, mandibular canal) limits the amount of bone available for dental implants.[6] In this case report, furthermore, the patient had furcation involvement degree IV, in which gingival recession. The type of the treatment of furcation involvement degree IV can be the combination of restorative endodontic therapy and surgical therapy. The reason is because of the severe periodontitis indicated by the opening of the root surface and the loss of attachment induced inflammatory products and bacterial toxins spread to the pulp through additional canal, apical foramen, or penetration dentin tubule, which can lead to pulpitis or pulp necrosis. In this case, endodontic treatment can reduce acute symptoms suffered by the patient although the patient will still have sensitive pain to percussion. Endodontic therapy and the root resection then can be indicated to be good for the treatment of furcation involvement class IV. Actually, the root resection can be conducted on vital tooth that has been treated with endodontic therapy, but it better to conduct the endodontic therapy prior to the root resection.[7]

Root resection is the process by which one or more of the roots are removed at the level of the furcation while leaving the crown and remaining roots in function. Root resections have been performed in dentistry since the late 1800s. With proper long-term monitoring and maintenance, a root resection is accepted as a valid treatment with reasonable long-term effectiveness. In a recent report on periodontal outcomes in a private practice setting in teeth followed a minimum of 10 years after active treatment, 90% of root-resected teeth were maintained in a stable state long term. Complications and failures were mainly of an endodontic nature and tended to occur 10 years or more after the resection procedure.[7] The result of root resection in this treatment showed that the gingiva had been covered the surgical site. The patient even did not complain of pain anymore and could easily clean the area by himself. Through root resection therapy, furcation-involved molars can be converted to non-furcated single–root teeth and provide a favorable environment for oral hygiene for patient and clinicians. Root resection therapy had poor long term results unless a high level of expertise was available in all applicable disciplines. Root resection therapy for molars with periodontal problems was based on the periodontal pathology and could obtain a good prognosis.[8] Root resection therapy can remove the deposited periodontal bacteria as well as unfavorable anatomic features, which can act as an a future bacteria reservoir. In addition, bone defects can be resolved by healing after removing the involved roots and a positive architecture can be achieved.[9,10] According to the standardized reports on root resection, 89% of root resected teeth survived over a 7-year period.[7] After the resection, regular maintenance treatment, consisting of subgingival instrumentation might be needed for the resected molars to prevent progressivity of periodontal disease. In this case, the teeth were still shaky since the splinting was often loose. It was suggested to have further treatment with regenerative therapy or with fixed splint. Surgical debridement of the furcation alone may not be sufficient to improve the long-term prognosis. The regeneration therapy is indicated to be a good treatment for the furcation defect vertically similar with 2 walls or 3 wall-defects. Surgical therapy involving regenerative

procedures is indicated in grade III and IV furcation involvements. The regenerative procedures used in these cases include bone grafts and guided tissue regeneration. Results obtained from studies have revealed the positive effects of bone grafts for the treatment of furcation defects especially vertical defect fill. In addition to this, platelet rich factor (PRF) which is an autologous source of platelets was used to enhance the results of the regenerative procedure.[5] Extraction is used to indicate severe furcation involvement with extensive bone resorption surrounding one or two roots, especially in patients who cannot maintain oral hygiene by themselves, has the high risk of dental caries, or cannot comply with program maintenance because of socioeconomic factors.[11]

As a conclusion, that understanding the periodontic-endodontic continuum is a vital part of successful endodontic and periodontal treatment. Treatment and prognosis of primarily endodontic and primarily periodontal disease are very straightforward. Endodontic therapy is more predictable and completion of this therapy before periodontal procedures has a positive effect on periodontal healing. The most guarded prognosis is given for true combined lesions. In cases of combined disease, the success of endodontic therapy is dependent on the completion of periodontal therapy. The complete treatment of both aspects of perio-endo lesions is essential for long term results. Therefore it is absolutely essential that the periodontal problem also be treated to obtain optimal therapeutic outcomes.

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