CONSERVATIVE PROSTHETIC-PERIODONTAL TREATMENT FOR MOLAR CLASS III FURCATION INVOLVEMENT: CASE REPORT

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ABSTRACT

Purpose: The treatment for furcation involvement is a great challenge to the general dentists. Tunneling may be a treatment alternative for class II and III furcation involvements in mandibular molars with large angle separation and great divergence between the mesial and distal roots. This alternative is a conservative treatment that allows a great condition to oral hygiene maintenance by the patient. Thus, the aim of this case report was to describe a conservative and therapeutic treatment modality for the horizontal defect of periodontal tissues in the furcal area with buccal-lingual extension (class III furcation involvement).

Case Report: A patient with class III furcation involvement in the first mandibular molar was submitted to root resection and periodontal surgery to expose the clinical crown for the full-coverage restoration with tunnel preparation.

Results: The final result of the treatment with tunnelled crown was favorable and predictable due to adequate hygiene condition to avoid plaque accumulation and occurrence of root caries.

Clinical Significance: A multidisciplinary approach is essential to achieve a correct treatment plan including surgical-periodontal procedures integrated to the prosthetic rehabilitation. Besides, the recommendation for oral hygiene maintenance is essential for the treatment longevity with tunnelled crown.

Keywords: Furcation Defects, Dental Prosthesis, Molar, Periodontal Diseases.

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INTRODUCTION

The furcation involvements are exhibited in the interradicular regions of multirooted teeth. Its etiology is related to the progressive evolution of destructive periodontal disease, which may establish different grades of furcation involvement. These lesions may also be related to root or pulp chamber floor perforation during endodontic treatment, marginal misfit of prosthetic restorations, caries or accessory canals in furcal area [1].

According to Hamp et al., [2] the furcation involvements can be classified according to the magnitude of interradicular area involvement as shown in Board 1.

<table>
<thead>
<tr>
<th>Furcation Involvement</th>
<th>Description</th>
<th>Treatment alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>Early involvement with horizontal loss of supporting periodontal tissues not exceeding 1/3 of the tooth width – the probe does not penetrate more than 2mm in the furcation.</td>
<td>scaling and root planing furcation plasty</td>
</tr>
<tr>
<td>Class II</td>
<td>Moderate involvement with horizontal loss of supporting periodontal tissues achieving more than 1/3 of tooth width but no encompassing the total furcation width – the probe penetrates more than 2mm without transpierce to the opposed side of the furcation.</td>
<td>furcation plasty tunneling root resection guided tissue regeneration exodontia</td>
</tr>
<tr>
<td>Class III</td>
<td>Buccal-lingual involvement with complete horizontal loss of supporting periodontal tissues – the probe transpierces the both sides of the furcation.</td>
<td>tunneling root resection exodontia</td>
</tr>
</tbody>
</table>

The tooth topography with furcation involvements is usually widely involved, which makes difficult the mechanical instrumentation of the area [3]. So, the professional must consider the anatomy of multirooted teeth to establish a correct diagnosis and the most appropriate treatment [2,4].

The different treatment methods for furcation involvements are related to the classification presented in Board 1 [2,5-9] to establish an appropriate treatment approach for each clinical situation [1,6,10].

Among the several techniques for furcation involvements treatment, tunneling is presented as a surgical-resective treatment that improves the access for cleaning due to removal of bone tissue in proximal margins (mesial and distal), furcal area and dental tissue. Thus, a minimal space for hygiene is created to place an interdental brush in the furcation [1].

Tunneling is an alternative with high success rates (85.7% to 93.3% from 1 to 8 years) [11]. This treatment modality is mostly indicated for mandibular molars with advanced class II and III furcation involvements associated to short roots with great divergence between mesial and distal roots and large angle separation. So, the root fornix must be closer to the
cementoenamel junction to avoid unnecessary wear of dentine tissue and allow the tunnel fabrication with rotary instruments [1,4].

However, the rehabilitation of patients with furcation involvements has been a great challenge for dentists, especially for those less experienced. The treatment for furcation involvements must simultaneously achieve two main objectives: biofilm elimination from root surface and creation of an adequate surface anatomy to allow biofilm control by the patient [7,8,10].

According to this, the aim of this study was to report a conservative treatment approach for general dentist to treat patients with horizontal loss of periodontal tissues in furcal area with buccal-lingual extension (class III) in the left first mandibular molar. The present treatment included root resection and crown lengthening associated to restoration with a tunneled fixed partial prosthesis with appropriate space for hygiene.

**CASE REPORT**

A 56-year-old caucasian patient with satisfactory oral hygiene presented class III furcation involvement in the left first mandibular molar. The teeth was submitted to endodontic therapy and restored with a provisional crown. The restoration presented misfit, inadequate emergence profile, unsatisfactory occlusal anatomy, biological space invasion and unsatisfactory space for hygiene in interproximal area (Figure 1).

According to clinical and radiographic exams, it was observed horizontal loss in the interradicular area and presence of divergent roots. After periodontal exam, it was noted no periodontal disease in the other areas of the mouth, suggesting a relation between the inadequate provisional crown and the furcation involvement.

The periodontal surgical technique involved a divided flap with two lateral incisions (mesial and distal) and a buccal and lingual sulcular incision to apically position the flap and expose the furcation. The procedures included curettage of granulation tissue, scaling and root planing, removal of irregular alveolar bone crests to improve flap position, interradicular osteotomy with chisel, and tunnel preparation with conical diamond bur compatible with the local diameter. The flaps were repositioned on the alveolar crest and sutured in this position.

A one-month period was expected for healing since it was a non-esthetic area with supragingival location.

After the follow-up period and oral hygiene maintenance by the patient, a bipartite tunneled metallic core cast in Au-Pt alloy (Degudent U, Petrópolis, RJ, Brazil) was fabricated. This noble alloy provides better surface smoothness, fit and, consequently, less plaque accumulation. A sufficient space for access of interdental brush in the tunnel area under the core was created (Figure 2). The metallic core was cemented with zinc-phosphate cement (SS White Burs, Lakewood, NJ, USA).

A new provisional crown was fabricated according to the upgrading of the area. Then, an impression was performed with polieter Impregum F (3M ESPE, St. Paul, MN, USA) to obtain a metal ceramic crown with the infrastructure in Au-Pt noble alloy (Degudent U).

Adequate occlusal adjustment and ceramic polishing are essential during the clinical trial for treatment longevity.
Figure 1. Clinical aspect of unsatisfactory provisional crown without appropriate space for interproximal cleaning.

Figure 2. Tunneled metallic core evidencing the appropriate space for cleaning with interdental brush.

Figure 3. Clinical aspect of the tunneled crown.

Figure 4. Radiographic aspect of the tunneled crown after 1 year.
The Figure 3 illustrates the final aspect of the metal ceramic crown after insertion. In this session, the patient was instructed on appropriate oral hygiene. Furthermore, the patient was informed that the prognosis of tunneled crowns may be predictable when associated to prevention of plaque accumulation and root caries. So, dentifrices, mouthwashes, gels and varnishes containing fluorides may be used to avoid caries in the interradicular area.

The figure 4 illustrates the radiographic aspect after a 1-year follow-up.

**DISCUSSION**

The tunneling technique presents some advantages in comparison to the other treatment alternatives for furcation involvements. Some of its advantages are direct access for biofilm control by the patient, reduced cost, and recovery of alveolar bone crest after the one-step surgery with minimal trauma for the patient [1,7,9]. However, this procedure must be indicated only when there is sufficient space between the roots to allow interradicular cleaning using an interdental brush to avoid caries occurrence.

Nevertheless, the treatment approach depends on the grade of furcation involvement, periodontal disease, bone loss in the furcation lateral and apical to the defect, and tooth mobility. In addition, other factors such as root anatomy, access for the procedure, tooth localization, costs and professional experience may influence the treatment choice [1,7-9]. According to Socransky and Haffajee, [12] the periodontal disease is related to individual factors as presence of specific pathogens, temperature and depth of periodontal pocket, and variations of local inflammation.

Langer [13] stated that the treatment choice is difficult since many variables should be considered for treatment of furcation involvements. In addition, anatomic characteristics should be also evaluated as proximity and parallelism between roots, narrow furcations that makes difficult the conformation of periodontal structures, apical fusing, and furcations located in the medium or apical third [3,9,10]. Considering that tunneling, root separation and resection are counter-indicated in these cases, tooth extraction followed by dental implants placement may be the treatment choice.

Other limitation for tunneling is the occurrence of caries and periodontal disease or inadequate plaque control without regular professional follow-up [14]. This occurs since the success of tunneling technique depends on biofilm control by the patient associated to scaling and root planing in furcation. These procedures promote disinfection, detoxification and smoothing, which improves cleaning and biofilm control [7,8].

When tunneling is performed, the patient must rigorously follow the oral hygiene recommendations after surgery. According to Hellden at al., [15] the hygiene should include mechanical cleaning with interproximal brush in the tunnel area, mouthwash with 0.1% digluconate of chlorhexidine during 4-6 weeks after surgery, daily mouthwash with 0.025% sodium fluoride, and toothbrushing with fluoride-containing dentifrices using appropriate devices for cleaning (interproximal brush) associated to chlorhexidine.

The periodic follow-up after tunneling includes the evaluation of patient’s ability on biofilm control through plaque index, occurrence of root caries, probing depth in tunnel area, bleeding on probing index and possible teeth mobility. Furthermore, Hellden et al. [15] suggested radiographic exam with a position device during follow-up to evaluate possible
incipient caries that may cause treatment failure. However, Hamp [2] reported that radiography is limited to identify furcation structures. In maxillary molars, only the buccal furcation can be identified while, in mandibular molars, the buccal and lingual furcations may not be distinguished due to superposition of teeth and bone structures. So, the most appropriate radiographic technique for these situations is periapical parallelism or bite-wing.

**CONCLUSION**

The treatment success of furcation involvements depends on a precise diagnosis based on clinical and radiographic exams associated to a knowledge concerning the root anatomy in the interradicular area. So, a multidisciplinary approach is essential for a correct treatment planning including periodontal-surgical procedures associated to the prosthetic rehabilitation.

The correct indication of the tunneling technique is a key-factor for a favorable prognosis. However, the authors suggest that the recommendations for oral hygiene maintenance to avoid caries in the treated area are essential for treatment longevity.

**REFERENCES**


