CASE REPORT

Changing the root morphology in a case of periodontal impairment at a maxillary molar used as a sustaining tooth

CONSTANTIN DĂGUCI1, LUMINIȚA DĂGUCI2, MARILENA BĂȚĂIOSU3, MIHAI RAUL POPESCU2, ADINA BUNGET4, RUXANDRA MĂRGĂRIT5, OANA CELLA ANDREI6, ADINA DUMITRACHE7, NICOLAE VASILE8, RUXANDRA SFEATCU7

1) Department of Oral Health, University of Medicine and Pharmacy of Craiova, Romania
2) Department of Prosthodontics, University of Medicine and Pharmacy of Craiova, Romania
3) Department of Pedodontic Dentistry, University of Medicine and Pharmacy of Craiova, Romania
4) Department of Histology, University of Medicine and Pharmacy of Craiova, Romania
5) Department of Restorative Odontotherapy, "Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania
6) Department of Removable Prosthodontics, "Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania
7) Department of Oral Health, "Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania
8) Department of Oral and Maxillofacial Surgery, Faculty of Dental Medicine, "Lucian Blaga" University of Sibiu, Romania

Abstract

Research evolution regarding dental research determines the increase of patient's desire to preserve their dentition for a long time. The loss of a molar tooth as the last teeth present on the dental arch, raises issues regarding how the prosthesis should be placed, still patients are usually reluctant to use as last resort the prosthetic solution. This article describes the technique of root amputation to save a maxillary molar used as bridge abutments.

Keywords: root amputation, prosthetic restoration, flap.

Introduction

Therapeutic measures that are taken to preserve a molar vary in complexity. In case of low edentulous interspersed area, bordered by multi-rooted teeth that are undergoing periodontal problems the root amputation is a viable solution to solve the issue, so that these teeth can be used as abutment teeth in a future dental bridge [1].

Surgery consists of separating through a horizontal or oblique sectioning the root affected, located near the coronary level [2]. Access to the tooth that is to be removed is conducted after removing a flap that allows the best visibility through a sufficient opening of the area to be operated [3]. This avoids incomplete eviction of the root and also allows discovery of periodontal lesions that were not previously observed, to be treated simultaneously [4].

Patient, Methods and Results

Patient, aged 49 years, presents herself at the dental office to restore the functions of the masticatory apparatus. The patient is normally developed from a somatic point of view, her nervous system is well balanced, and she is cooperative. She has good oral hygiene. Patient experiences tenderness when chewing on tooth 17, indicating that the treatment she followed was sporadic and consisted of anti-inflammatory medication (Figure 1).

On periodontal examination by measuring with the periodontal probe, it can be observed, in the disto-vestibular root of tooth 17, at approximately 4 mm from the distal area, a gingival retraction. After radiological examination, it highlights the disto-vestibular root apex of 17 a defined radiolucent area with a diameter of cca. 3 mm (Figure 2). This establishes the diagnosis of chronic apical periodontitis in the tooth 17. The edentulous diagnosis is IIIrd degree Kennedy with additional edentulous space.

The patient requires the preservation on the dental arch of tooth 17 and restoring the integrity of the maxillary dental arch by using prosthesis for the two edentulous spaces with two bridges.

We decided to amputate the disto-vestibular root of tooth 17 by retaining the palatal root that is the mesio-vestibular root that undergoes proper endodontic treatment. The patient accepts the proposed treatment plan after first being informed about the benefits and risks of this. After having established the working length of the root canals, they were mechanically prepared using step-back technique and were abundantly irrigated with antiseptic solution. The root canals were filled using a material based on calcium hydroxide and the gutta-percha cone (Figure 3).

For disto-vestibular root amputation of tooth 17, we realized truncal peripheral anesthesia by infiltration in tuberos, an angled flap, this type of flap is often used in interventions in the oral cavity (Figure 4). Vertical line incision is made in the vestibule of oral cavity and is situated in the mesial area of root 17, at about 1 cm. Horizontal incision starts from the lower limitation of the vertical line, go to distal area, intersects...
the gingival package of 17 and ends at about 1–1.5 cm. This type of flap has a double advantage: excellent visibility and hermetic sealing of the cavity resulting from surgery. We realized its blunt dissection with a fine decolorator. It is inserted between the bone surface and fibro-mucous area with gentle movements. Therefore, we exposed the subjacent bone plate. All tissues with chronic inflammations are curetted using curettes of different sizes. Using a round drill at low speed and irrigated with physiological saline solution, we removed the remaining vestibular bone plate covering the disto-vestibular root (Figure 5).

We performed root cutting with a fissure drill after an oblique incision line at about 45° to the length axis of the root, to the vestibular surface of the section (Figure 6).

We also removed the chronic inflammatory tissue from the socket thorough curettage and irrigation with physiological saline solution.

Flap closure was achieved through a suture in separate points. The removal of the sutures was done 10 days after surgery (Figure 7).

After surgery, the provisional prosthetic followed for a period of eight weeks. This ensures a stable position, and at the same time restraining the tooth root amputation and maintaining the necessary space for permanent restoration. After taking a dental retro-alveolar X-ray for control, at about eight weeks after surgery, there is favorable mineralization of the disto-vestibular root area, which allows the final prosthesis of the two edentulous spaces (Figure 8). After a period of approximately eight weeks the temporary bridge was removed, the dental abutments were finished and an impression was taken to create the final prosthetic bridges (Figure 9).

Also, we realized a temporary partial acrylic prosthesis at mandible, and subsequently, the patient had to return to replace this with a removable partial prosthesis (Figure 10).

Performing radiological examination after a period of seven years from surgery, we observed a favorable mineralization and the absence of any changes at the periodontal level of 17 (Figure 11).
Discussion

Radicular amputation is a therapeutic method that consists of removing one of the roots of a compromised pluri-radicular tooth, with or without taking into account its corresponding crown portion involvement of it [5–7]. Since sectioning one of the roots of a maxillary or mandibular molar is a complex technique and requires experience, it is essential to make a careful selection of clinical cases that will benefit from this technique.

It is necessary to evaluate the remaining part because it conditions the decision to use this surgical technique. This means that the periodontal support of the remaining root or roots must be strong enough to maintain the amputated tooth, which is most often used as a base for a dental bridge [8, 9]. It is mandatory that the ratio crown–root is correct to obtain sufficient retention for the dental bridge. Also, one of the conditions that must be satisfied by a pluri-radicular tooth root that undergo root amputation is the divergent form of its roots [10].

Some authors recommend root canal treatment before surgery, to see which of the root canals can be handled correctly [11]. However, several authors argue that achieving canal treatment before surgery minimizes the potential occurrence of postoperative pain [12].

In a first stage, it is performed a vertical in-occlusion space of about 2–4 mm at the molar level, thereby avoiding overloading the remaining roots during the act of mastication [13, 14].

The access at the root to be removed is allowed only after raising a flap that allows the best visibility through a sufficient opening of the area to be operated. This avoids incomplete eviction of the root, and also allows for the discovery of periodontal lesions that were not observed and which are to be treated simultaneously [15]. However, if no bone complications, you may be satisfied with a partial alveolar removal, cleaning each side of the tooth gums. Tissue elasticity allows us to have a sufficient opening to remove 4–5 mm of bone around the roots to be amputated. The bone must be resected until the root seems to be free in its alveoli [15].

Sectioning the tooth and reducing the height of occlusion are made preferably before flap, in order not to scrap dental spread below it.

The flap will be made in full muco-periodontal thickness. The main incision will be made as coronary as possible, the lancet coming into contact with the bone and being parallel to the tooth or by an angle of more than 10° with it [16].

An incision line drawn too close to the trepanation deprive, without any possibility of refinishing, the angled flap by all its advantages. The flap is preferable to limit the attached gingiva to prevent postoperative edema. Root cutting will be done with diamond drills mounted at turbine and complete separation is controlled by a fine elevator [17, 18].

Affected root is extracted and simultaneously is controlled not to leave any roughness on the remaining root or roots [19]. At this stage, a thorough curettage must occur at the remaining roots, especially if there is an inter-radicular injury. Curettage and polishing are important phases of treatment for reattaching the flap; it cannot be done on uneven surfaces [20]. Also, a small bone remodeling with bone cutter will be able to give the area a deflector architecture in particular suppressing the bones that are too sharp in the alveoli. This small osteoplasty surgery allows better rehabilitation of the flap [20]. It is repositioned after surgery according to the shape of the bone.

The flap is maintained by a simple and continuous suture. The suture at separate points can be considered the easiest and most versatile suture (Figure 5). It can be used in all types of flap design, offering independent functioning.

One potential risk factor of periodontum is the placement of the prosthetic marginal pieces at an incorrect level to limit the gum margin [21].

To maintain long-term results of root resection the marginal adaptation of dental bridge should be evaluated.

Assessment should be both visual and tactile [22]. Adaptation may cause free gum ischemia, trauma of epithelium situated in the inside slope or injury of epithelial lining. Finally, the edge of the aggregation elements must follow the contour of gingival crest throughout its route, including the interdental papilla at an optimal depth in the gingival sulcus [22, 23].

Conclusions

Root amputation is used successfully both in case of the molars with gum retraction which affect radicular furcation, and in the treatment of periodontal diseases as well, favorable results being obtained when the volume of bone around the roots remaining is more than 50%. The use of these molars as abutment teeth for prosthesis largely depends on a correct prosthetic design from a denture design point of view and the implementation of proper occlusal reports. The use of root amputation to preserve the last maxillary molars prevents bone resorption.
both the tuberosity through remineralization of the alveolar and the transformation of the edentulous interspersed in terminal edentation. The restoration of the operated area shall be designed to allow access for both the physician and to maintain a good oral hygiene by the patient.

**Author contribution**

All authors have equal contributions to the study and the publication.

**References**


**Corresponding author**

Constantin Dăguci, Lecturer, DMD, PhD, Department of Oral Health, Faculty of Dentistry, University of Medicine and Pharmacy of Craiova, 2 Petru Rareș Street, 200349 Craiova, Romania; Phone +40728–272 222, e-mail: dagucicristi@yahoo.com

Received: November 25, 2013

Accepted: September 3, 2014