

All-Ceramic Prosthetic Rehabilitation of the Upper Incisors after Removal of a Periapical Lesion from the Lateral Incisor: Palatal Approach

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Abstract

The indication of Osseointegrated implants to restore edentulous gaps or replace hopeless teeth could be assumed as a routine dental treatment; instead, if possible natural teeth should be preferred for the support of fixed prostheses. A continuous pervasive pain was referred by a 49 year-old female patient at the palatal aspect of the anterior maxillary area. Soft tissue swelling at the palatal aspect was present during the clinical intraoral examination. An extensive radiolucent area apically to the area from teeth 21 to 23 was showed by means of the X-ray examination. That teeth supported single crown fixed prostheses. A surgical entry was performed for the lesion treatment. The fixed dental prostheses were removed and root canal therapies were performed on teeth 13 and 23. After that, muco-gingival surgery was performed in order to expose the tooth root. A provisional fixed restoration on the four upper incisors was made. After the lesion resolution an all-ceramic definitive fixed prosthesis was delivered. No adverse events or prosthetic complications were detected during the two years of follow-up after prostheses cementation.

Keywords: Zirconia, Radicular cyst, Natural teeth, Root canal treatment, Enucleation

Introduction

The selection of a natural tooth as support for prosthetic restoration should be, if possible, the first therapeutic choice [1]. In fact, osseointegrated implants should be considered only if the corresponding natural teeth are diagnosed as hopeless [2]. Sometimes unfavorable clinical situations involving natural teeth can be treated by means of proper oral surgery procedures; so that, the maintenance of the dental roots to support prosthetic restorations with a good medium to long term prognosis could be achieved [3]. The favorable outcome of such procedures is clearly depending by both a good clinical diagnosis of the lesion and an adequate operator skill [4].

Regarding the prosthetic restorations, a metal framework could provide the desired strength for a crown; but, the dark color of the metal framework could make difficult to mimic the tooth natural appearance [5]. Nowadays, all-ceramic restorations are often preferred to metal ceramic ones when esthetic outcome is needed, particularly in high demanding areas [6]. A fast development of ceramic restorations with excellent esthetics, color stability, wear and chemical resistance and biocompatibility occurred in the last decade. The use of zirconia as a core for the prosthetic crowns could allow to satisfy such requests. In fact, high flexure strength of more than 1000 MPa is reported for zirconia. Actually, zirconia crowns veneered with feldspathic porcelain are routinely used by clinicians for esthetic restorations. A careful treatment planning and the proper dental technician cooperation will be essential to ensuring the long-term survival of restorations [7-9].

The purpose of this study is to report a multidisciplinary clinical case of fixed prosthetic rehabilitation of zirconia after surgical removal of a large periapical lesion with palatal approach.

Case Report

A pervasive pain was referred by a 49 year-old female patient at the palatal aspect corresponding to the anterior teeth. The following anamnestic data were recorded (Figures 1): no systemic diseases (such as heart, coagulation, and leukocyte diseases or metabolic disorders, recent radio-therapy in the head and neck area, parafunctions like clenching or bruxism, neurological or psychiatric disorders); no smoking habit;

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Figure 1: Upper arch frontal view

adequate compliance and domiciliary oral hygiene; favourable intermaxillary relation; no periodontal disease history.

At the intraoral examination, a soft tissue swelling in the palatal area from teeth 12 to 23 was detected. Fixed prostheses restoring part of the upper jaw were present: it was a fixed partial denture from 12 to 22.

The tooth 22 was painful to the percussion test. Negative vitality was tested for teeth from 13 to 23. An intraoral radiograph was performed in the area to investigate the bone structure around tooth 22 root. An extended radiolucency area corresponding to radicular apices of 21, 22 and 23 was shown by intraoral radiograph (Figure 2). In addition, an orthopantomography was taken (Figure 3); an extensive radiolucent area at the root apex of teeth from 11 to 23 was showed. In order to better investigate the extent of bone loss, a CT was recommended to the patient. A huge amount of the lesion with complete destruction of the palatal cortical bone from 12 to 23 areas was shown by the CT scan (Figures 4-5).

The treatment plan involved two sessions

The first session, with antibiotic coverage (1g every 8 hours for a period of 6 days), provided for the root canal treatment of 22. A haemorrhagic, purulent exudate was found from the canal of tooth 22. During the instrumentation, the canal was irrigated copiously with 3% sodium hypochlorite solution. Drainage was performed until the discharge through the canal ceased. The canal is dried with sterile paper points and then dressed with triple antibiotic paste consisting of cipro oxacin, metronidazole,



Figure 2: Intraoral radiograph

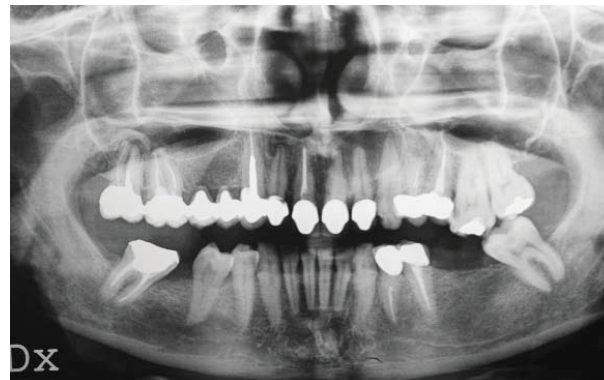


Figure 3: Orthopantomography at baseline before treatment.

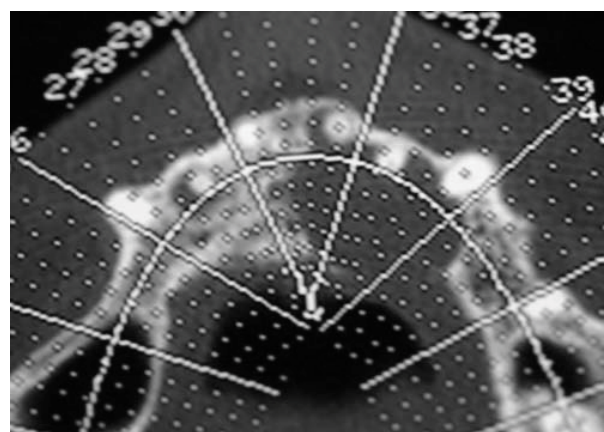


Figure 4: Axial view of the maxillary region. CT image.

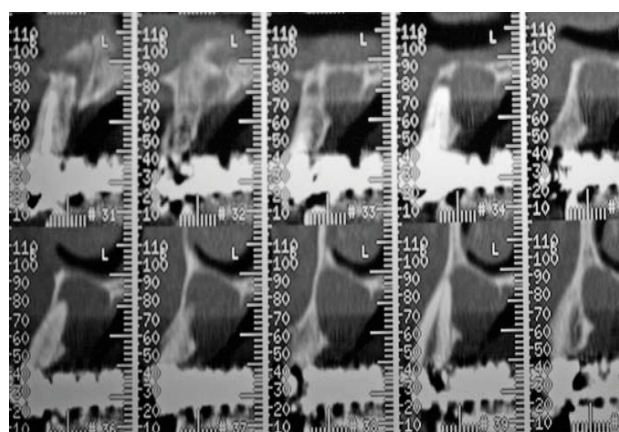


Figure 5: Transverse view of the maxillary region. CT image.

and minocycline. A sterile cotton pellet was inserted into the access cavity before sealing it with Cavit.

The second session ,after 21 days, when the canal of 22 was asymptomatic and dry, it proceeds with the root canal retreatment of 13,11,21 and root canal treatment of 12, 22, 23. They were used rotary instruments (M2 Sweden & Martina), subsequently the canals have been disinfected with sodium hypochlorite 3%. The canals were closed with hot gutta-percha (Termafil

technique). Zinc oxide eugenol has been used as a temporary sealing. The same day as surgery to enucleation of the lesion was performed. After local anesthesia with articaine (40mg/ml with epinephrine 1:100.000) a mucoperiosteal flap was raised at the palatal aspect of frontal teeth from 1.3 to 2.3 in order to reach the bone surface and proceed with the lesion treatment. Apex removal of the tooth 2.2 was carried out during the surgery. The residual cavity was washed with sterile saline solution. Then the flap was repositioned and sutured with monofilament nylon suture 4/0. Post-operative instructions were given to the patient. Amoxicillin was taken by the patient (1 g every 12 hours for 6 days) and rinses with chlorhexidine were done (2 times a day after oral hygiene for 10 days). In case of pain, ketoprofen lysine salt 80mg was taken by the patient (Figures 6 and 7) [10,11].

Histopathological investigation showed cystic (Figure 8) lining composed of 3-5 cell layer thick ciliated stratified columnar epithelium lumen filled with mucoid like eosinophilic material. Fragments of non keratinized stratified squamous epithelium showing arcading pattern in focal areas are seen. Fibrovascular capsule shows mucous acinar glands, along with focal areas of dense chronic inflammatory infiltrate of lymphocytes and plasma cells. Few plasmacytoid cells are binucleated. Increased vascularity with numerous dilated endothelial lined blood capillaries and thickened vessels filled with RBCs are evident



Figure 6: Palatal view before surgery.



Figure 7: Surgery: access to the lesion.



Figure 8: Surgery: lesion removed.



Figure 9: Control visit two weeks after surgery.

along with areas of haemorrhage. Thus biopsy report confirmed the diagnosis as radicular cyst. The patient was followed-up for a month once a week in order to evaluate the healing and post-operative course (Figure 9).

In the next control visit, a plaster model was made to achieve a diagnostic wax-up of the four upper incisors. A resin vacuum mask with shape of diagnostic wax-up was manufactured by the dental technician (Figure 10).

This was used to mark on the gingiva the levels for dental preparation (Figure 11). A Crown lengthening was so performed in order to expose the tooth root up to the expected level (Figure 12). At the end of the surgery soft tissues were sutured (Figure 13).

A provisional fixed restoration (Figure 14) with acrylic resin (Enamel Plus) on the four upper incisors was made by means of the resin mask used to mark the expected gingival levels. The provisional fixed restoration was cemented with temporary cement (Temp Bond). So that, the provisional restoration had the same shape of the diagnostic wax-up. One month after crown lengthening, when good soft tissue stability was obtained, the dental abutments were rebuilt with fiberglass pins (M two post Sweden & Martina) for composite dual resin restorations (Axia Core Dual Dentalica) and prepared with a juxta-gingival slight chamfer design (Figure 15).



Figure 10: Resin mask built on the basis of the diagnostic wax-up.



Figure 14: Provisional resin prosthesis.



Figure 11: Marked gingiva as reference.



Figure 15: Dental abutments rebuilt.



Figure 12: Crown lengthening.



Figure 16: Definitive prosthesis after cementation.



Figure 13: Sutures.



Figure 17: Orthopantomography 18 months after surgery.

The soft tissues maturation was followed over time until the shape and shade of the marginal mucosa was satisfactory. Then, the double-cord technique impression with a polyether (Impregum®, 3M ESPE) material was taken for the final restoration manufacturing feldspathic porcelain (Shofu Vintage ZR) fused to zirconia (Bego CAD-CAM) was used. The restoration was finally cemented with (GC Fuji) resin cement (Figures 16).

Eighteen months after the removal of the periapical cysts an orthopantomography was performed: X-ray image showed a normal periradicular radiopacity in the treated area confirming the substitution of the cystic cavity with trabecular bone (Figure 17).

No adverse events or ceramic veneering chipping were observed two years after the delivery of the definitive restoration.

Discussion

Periapical cysts originating from upper lateral incisors are common as confirmed by data available in the literature [12]. In such clinical case, the considerable lesion extension caused the erosion of the palatal cortical bone with the presence of a neoformation. Root canal therapy of the involved elements allowed the teeth maintenance in order to minimize biological cost to resolve the clinical case successfully [12,13]. In fact, helping patients to keep their teeth should be the primary goal of dentistry. One of the most complex aspects in the treatment planning is the choice to maintain or replace a tooth with an implant. Moreover, the actual trend to place an implant immediately after the tooth extraction should be carefully evaluated, especially in high demanding areas. Treatment with this frame, however, is challenging and can be considered a valid treatment options only for clinicians with the appropriate education, experience and skill.

It is widely accepted that endodontic success is reached when apical radiolucency resolution together with the absence of inflammation are achieved after a non-surgical endodontics [14]. When endodontic surgery is required, surgical outcome can be assessed by radiographic criteria for healing assessment [15-18]. However, the dilemma of teeth extraction or retention has not been completely answered by the literature. Also, the decision between maintain or extract teeth is difficult to investigate. Nevertheless, in clinically well-maintained patients the loss rate of natural teeth is lower than that of implants [19]. When comparing tooth-supported fixed dental prostheses (FDPs) with implant-supported ones; the most common complication is dental caries affecting teeth. Instead, frequent biological complication of peri-implant tissues is soft tissue inflammation as mucositis. The risk of a non-effective mucositis treatment is the involvement of peri-implant hard tissue with peri-implantitis onset. If technical complications are considered, tooth-supported reconstruction showed frequently loss of retention. Conversely, fracture of veneer material is the most common technical complication by implant-supported reconstructions. Clinicians should consider such medium to long events affecting fixed prostheses when they plan prosthetic rehabilitations for patients [20]. Also by considering these aspects in the present report the teeth maintenance was the main focus of the patient treatment plan.

The surgical palatal approach reduced the morbidity for the patient and it allowed to preserve the vestibular cortical bone [21,22]. The use of provisional restorations made from diagnostic

wax-up allowed the clinicians to obtain a better soft tissues management and a proper teeth shape.

Zirconia ceramic as a material for the final prosthetic restoration was chosen due to better aesthetics results at the level of the marginal gingiva if compared to metal ceramic crowns. In fact the color of the paramarginal gingiva should be highly influenced by the material of the substructure. When compared with a not restored teeth, the vestibular soft tissues appearance is highly affected by the material used for the substructure; spectrophotometric measurements confirmed such conclusions [23,24]. A 7-year prospective study evaluated the time-dependent clinical efficacy of posterior and anterior zirconia fixed partial dentures. The cumulative survival and success rates were 88.9% and 81.8%, respectively. So that, fixed prostheses with zirconia frameworks may be regarded as acceptable alternatives to metal-ceramic anterior and posterior FPDs [25]. Also high biomechanical strength was documented for zirconia frameworks [26-28]; hence, prosthetic rehabilitations with good color integration and high level of biomechanical strength [29,30] may be achieved. It was decided to manufacture a prosthesis splinted teeth together as the natural abutments were little retentive [31].

Conclusions

When clinical conditions permit, the preservation of the residual teeth must always be carried out. Multidisciplinary approach involving endodontist, surgeon and prosthodontist holds the key to management of large radicular cysts. Long term follows up and radiographs taken at frequent intervals will help in eventual success of the treatment outcome

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