Case Report

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Five-year clinical follow-up of a patient with radicular cyst in the maxillary anterior region

Onjen Tak, Serdar Yilmaz[1], Emre Ozel[2], Meral Kavak[3]

Departments of Prosthodontics and [2]Restorative Dentistry, Faculty of Dentistry, University of Kocaeli, Kocaeli, [1]Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Istanbul Medipol University, [3]Private Practice, Istanbul, Turkey

ABSTRACT

Radicular cysts arise from proliferation of epithelium remnants around apices of nonvital teeth as a result of an inflammatory response to the necrotic pulp and chronic infection and are the most common cystic lesion of the jaws. If these lesions are not treated successfully the extractions of the associated nonvital teeth have to be performed, and the tooth loss in patients can cause aesthetic, functional, and psychological problems, particularly if the anterior region is involved. Multidisciplinary treatment proposed to encourage long-term success and aesthetic result in such cases. This case report describes the multidisciplinary management to a 37-year-old male patient with a particularly large maxillary radicular cyst associated with the roots of five maxillary anterior teeth. The patient's esthetic and functional expectations were achieved after the endodontic, surgical, and prosthetic treatments. After 5-year follow-up, excellent bone healing, steady levels of bone, and healthy periodontal tissues around the abutment teeth were observed.

KEYWORDS: Apical root resection, computer-aided design/computer-aided manufacturing, cyst enucleation, lithium disilicate-based glass ceramic, radicular cyst

Introduction

The pathogenesis of the radicular cyst includes the activation of epithelial rests cell of Malassez of the periodontal ligament after physical, chemical, or bacterial injury.[1-5] The primary and basic factor is bacterial endotoxins, which can be found in high amounts in the necrotic pulp of a nonvital tooth with untoward mitogenic effect on the epithelial cells. If a bacterial infection occurs, a periapical lesion may develop, possibly evolving into a chronic inflammatory lesion. Periapical cysts occur as the direct sequel of chronic apical periodontitis, but not every chronic lesion develops into a cyst.[2,3,6] The radicular cysts are the most common cystic lesion of the jaws,[4-8] can occur in the periapical area of any teeth, in all tooth-bearing sites of the jaws. It can occur at any age, but are more frequent in maxillary than mandibular teeth.[6,7] In the maxilla, the anterior region appears to be more prone to cyst development.[7,8]

Address for correspondence:
Dr. Onjen Tak,
Department of Prosthodontics, Faculty of Dentistry,
University of Kocaeli, 41190 Yuvacik, Basiskele, Kocaeli, Turkey.
E-mail: onjentak@hotmail.com

Over the years, the cyst may regress, remain static or grow in size which are benign with their development following a slow pattern.[1-5] Expansion of cysts is associated with the internal (hydrostatic) pressure within the cyst and as the cyst increases in size, the covering bone becomes very thin despite subperiosteal bone deposition.[4,5] Most radicular cysts are symptomless[7] unless secondarily infected.[1,2] If the cyst grows, symptoms such as slowly enlarging swelling, mild sensitivity, pain, infection, tooth mobility, and displacement may be observed. The most significant destructive effect of the growing radicular cyst is the resorption of alveolar bone, resulting from activated osteoclasts.[2,5,7]

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Radicular cysts are often discovered during routine radiographic examination and may appear as small periapical radiolucencies.[2,7] which may be round or pear-shaped unilocular.[5,7] Endodontic treatment alone or with surgical treatment of the affected tooth/teeth is required when clinical and radiographic characteristics indicate a periapical inflammatory lesion depending on the size of the lesion.[1] Endodontic treatment eliminates root canal flora by mechanochemical debridement followed by obturation of the canal to achieve a seal.[8] The surgical treatments include total enucleation with or without apicoectomy and root end filling, marsupialization or decompression of larger cysts, or a combination of the two techniques. In general, inflammatory cysts do not recur after adequate treatment.[1] Failures may arise due to inadequate control of infection or incomplete removal of the cystic lining.

This case report describes the multidisciplinary management of a particularly large maxillary radicular cyst (involving 5 anterior teeth) over a 5-year follow-up.

Case Report

A 37-year-old male patient was referred to the Department of Oral and Maxillofacial Surgery, University of Kocaeli (Kocaeli, Turkey) with a complaint of intraoral swelling in the maxillary anterior region. Intraoral examination revealed a labial swelling in the anterior maxilla that was tender to palpation. The fixed metal-ceramic restorations of the maxillary incisors had a poor marginal adaptation that caused periodontal problems such as gingival hyperplasia [Figure 1]. History revealed that patient had fixed metal-ceramic restorations of the maxillary incisors teeth about 6 years ago. The orthopantomograph revealed large, well-demarcated periapical radiolucency associated with the roots of five maxillary anterior teeth (11, 12, 21, 22, and 23) [Figure 2]. Based on the clinical and radiologic examination, a preliminary diagnosis of a radicular cyst associated with maxillary anterior teeth was made.

Figure 1: Intraoral view of the pretreatment condition

The primary goal of the planned multidisciplinary treatment protocol was to save maxillary anterior teeth. The treatment protocol included biopsy with decompression of the cystic formation, endodontic treatment of involved teeth (11, 12, 21, 22, and 23), enucleation of the cyst, apical resections followed by root end fillings, and all-ceramic crowns. For decompression and biopsy procedure, an orifice parallel to labial sulcus was created. Upon entry into the cyst cavity, there was copious drainage of the typical straw-colored fluid associated with cystic lesions of inflammatory origin, without purulent secretion. Lavage with sterile saline was performed. Two centimeters long latex tube was inserted to the depth of cystic cavity for the preservation of the orifice. Two 3–0 silk sutures were placed, one above and the other below the drain. A third suture was placed through the drain and the surrounding mucosa to stabilize the drain during the initial healing. The patient was recalled twice a week for irrigation with saline through the lumen of the latex tube. A biopsy specimen was obtained at the orifice and sent for the histopathologic examination, which revealed odontogenic stratified squamous epithelium with underlying connective tissue capsules, dense inflammatory cell infiltration, and numerous cholesterol clefts.

Following the decompression of the cyst, the metal-ceramic fixed restorations were removed. The abutment teeth of the restorations had Class II mobility because of the destruction of the surrounding bone. After isolation with a rubber dam, the cleaning and shaping procedures of root canals of five maxillary teeth were performed, and endodontic treatment was completed with Gutta-percha cons (Diadent, Almere, The Netherlands) and sealer (AH Plus, Dentsply DeTrey, Konstanz, Germany) using the cold lateral condensation technique. The teeth were permanently restored with composite resin (Clearfil Majesty Esthetic, Kuraray Medical Inc., Tokyo, Japan). After that, periodontal treatment was performed to eliminate periodontal infections. The temporary crowns were fabricated using bis-acryl composite resin (Protemp II, 3M ESPE, St. Paul, MN, USA) to restore cosmetic during the long lasting treatment period.

Four weeks after decompression and 2 weeks after endodontic treatments, it was decided to perform the surgery. A subgingival trapezoidal flap was created including

Figure 2: Orthopantomograph (pretreatment)

the orifice between the root eminences of teeth number 11 and number 23 to achieve less visible scar formation. Full thickness flap was raised with blunt dissection over the cystic membrane. The roots of the teeth were localized and resected to make enucleation easier. The cystic capsule was enucleated, and the cavity was debrided and irrigated. The apical resections were made almost perpendicular to the long axis of the roots and completed both in buccolingual and in mesiodistal directions. Mineral Trioxide Aggregate (MTA Angelus, Londrina, PR, Brazil) was used as retrograde filling agent [Figure 3]. Findings of the whole capsule histopathologic examination confirmed the first histopathologic examination as a radicular cyst.

Two weeks after enucleation and apical resections, abutment teeth were prepared with a long chamfer in a standardized manner, and all margins were placed at the gingival level. Impressions were made with a polyether impression material (Impregum; 3M ESPE) using a custom tray. After the impression procedure, temporary resin crowns were immediately adapted and cemented on the prepared teeth with zinc oxide-eugenol-based temporary cement (Temp Bond; Kerr Corp., Orange, CA, USA). Lithium disilicate-based all-ceramic crowns (IPS Empress 2; Ivoclar Vivadent AG, Schaan, Liechtenstein) were designed and fabricated with the use of computer-aided design/computer-aided manufacturing technique. All-ceramic crowns of the maxillary incisors were cemented using resin composite cement (Panavia F, Kuraray Medical Inc., Tokyo, Japan) according to the manufacturer's instructions.

The patient's esthetic and functional expectations were achieved immediately after the prosthetic rehabilitation [Figure 4]. At the 1-year follow-up appointment, it was noted that the radiolucent area diminished and a new bone formation was found in cystic lesion space [Figure 5]. Clinical healing and radiographic resolution of the maxillary radiolucency were almost complete. The teeth showed no sensitivity to percussion or palpation. After 2-year follow-up excellent bone healing, steady levels of bone and healthy periodontal tissues around the abutment teeth were observed with a perfect marginal adaptation of the crowns. There were no aesthetical, prosthetic, periodontal, endodontic, surgical, functional, or radiological complications [Figures 6 and 7].

Neither complications nor evidence of recurrence were seen after 5 years [Figure 8]. Healthy periodontal tissues, no mobility of the teeth and excellent aesthetic/functional outcomes of the treatment with high patient satisfaction were observed [Figure 9].

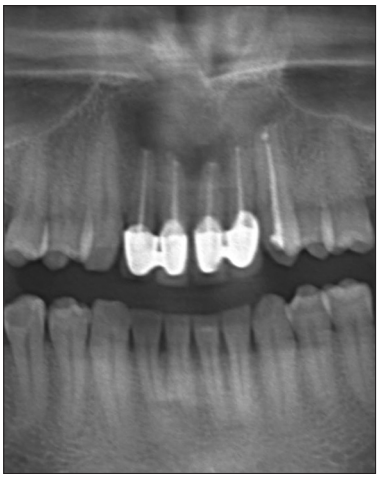

Figure 3: Radiologic view after endodontic and surgical treatment

Figure 4: After prosthetic treatment (intraoral)

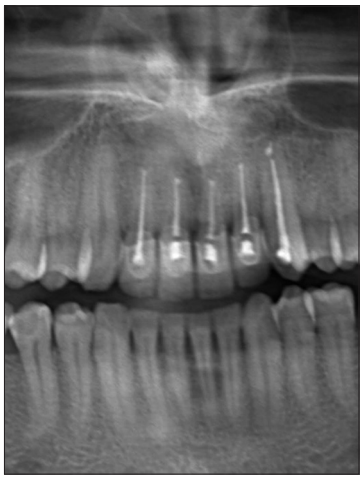

Figure 5: One-year follow-up (radiologic)

Discussion

The current treatment philosophy for large periapical lesions involves the initial use of the endodontic treatment.[1,2] Surgical interventions may also be recommended if the periapical lesion is very large and/or the endodontic treatment failed.[2] Ideally, an endodontic treatment may be performed in association with an apicoectomy to permit direct curettage of the cystic lesion.[7] In this case report, 2 weeks after the endodontic treatment, the cyst was enucleated, and apical resections were performed according to the current treatment approach.

Figure 6: Two-year follow-up (radiologic)

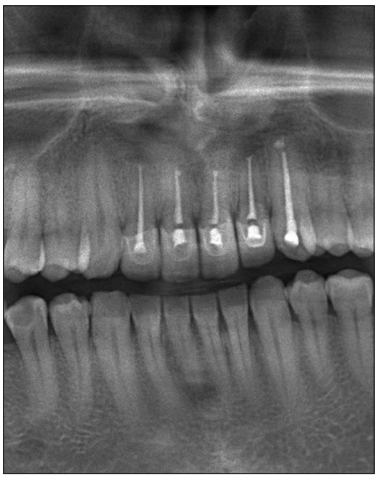

Figure 8: Five-year follow-up (radiologic)

Figure 7: Two-year follow-up (intraoral)

Figure 9: Five-year follow-up (intraoral)

Failures may arise due to the inadequate elimination of the bacteria from the root canal system prior to obturation[9] and/or inadequate control of the infection or remnants of the cyst after the surgical treatment.[8] Lesions that fail may be successfully managed by the extraction of the associated nonvital teeth and the curettage of the epithelium in the apical zone.[7] In this case report, tooth extraction was not performed because the root canal infection was eliminated by the proper endodontic treatment, and the treatment prevailed over tissue destructive events. To prevent the possibility of the continuous enlargement of the radicular cyst, the cyst was removed surgically after the endodontic treatment.

Another important point is to provide a proper artificial apical stop. The difficulty in obtaining apical stops to enable controlled obturation was overcome by long-term placement of calcium hydroxide for stimulating of the calcific barriers and exerting an antimicrobial action.[9] MTA is the material currently in use as root-end fillings[8] and could be considered for use as an apical plug, with an advantage being the speed at which the treatment can be completed.[9] The root ends filled with MTA may have a complete layer of cementum over the root end following healing and no evidence of inflammation.[8] For this reason, MTA was used in this case for an apical plug. Following the endodontic and surgical treatments, the lesion healed completely by remineralization and at the follow-up appointments excellent healing was observed.

In general, the successful treatment of teeth with pulpal disease depends not only on good endodontic and/or surgical treatments but also on the good reconstruction of the teeth after the treatments are completed. It has been suggested that endodontically treated teeth are more brittle and fracture more easily than vital teeth. Adhesive restorations allow clinicians to create minimally invasive preparations, thereby preserving sound tooth structure.[10] Over the last 30 years, significant advances in materials and techniques have occurred that justify the routine use of all-ceramic systems in adhesive dentistry.[11] Today, numerous improved ceramic materials and all-ceramic systems are available and widely used for different indications due to the result of increasing demand for superior aesthetics in fixed prosthodontics and the questionable biocompatibility of alternative materials, such as certain alloys. Metal-ceramic restorations have been

known to cause "graying" of the gingival margin because of metal show-through.[12] In addition, the metals used in these restorations have the potential to cause allergic or toxic reactions within the soft or hard tissues.[13] On the other hand, all-ceramic restorations offer superior aesthetics, exhibit excellent biocompatibility and are inert in the oral environment compared with metal-ceramic restorations.[14] Pressable ceramics are one of the most popular all-ceramic systems because of their excellent marginal fit, biocompatibility, translucency, superior aesthetics, lower plaque accumulation, the net shape formed by pressing, limited shrinkage, lower brittleness compared with conventional high-glass ceramics, and lower porosity.[15,16] With the introduction of heat-pressable ceramics such as IPS Empress 2, lithium disilicate crystals embedded to a glassy matrix prevent the propagation of microcracks,[17] thereby providing improved mechanical stability.[18]

In the patient presented in this report, lithium disilicate-based all-ceramic crowns were preferred because of their superior aesthetics, excellent biocompatibility, excellent marginal fit, lower plaque accumulation, and improved mechanical stability. After the follow-up appointments, steady levels of bone and healthy periodontal tissues around the abutment teeth were observed with a perfect marginal adaptation of the all-ceramic crowns.

Due to the presence of different treatment approaches for the same case, multidisciplinary evaluation is always recommended to provide clarity in treatment planning. In the present case, the multidisciplinary treatment (enucleation of the cyst, endodontic treatment, apical resections of the involved teeth, and all-ceramic crowns) was successful to save the abutment teeth eliminating the need of additional abutment teeth for a new fixed partial restoration and of the implant placement. Multidisciplinary approaches may conclude with much more successful results and higher patient satisfactions especially for complicated cases than alternative and more radical treatment options.

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Conflicts of interest
There are no conflicts of interest.

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