

**MANAGEMENT OF A RADICULAR CYST  
WITH SYNTHETIC BONE GRAFT SUBSTITUTE  
(CASE REPORT)**

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**ABSTRACT**

The radicular cyst has been classified as inflammatory cyst, as a consequence to pulpal necrosis following caries, with an associated periapical inflammatory response. Many times it is difficult to differentiate periapical cysts from the obligatory pre-existing chronic periapical periodontitis lesions radiographically. This paper presents a case of radicular cyst in the maxillary anterior region and removal of the cyst followed at all times with the laying of a bone graft substitute in which the defect area.

**Key words:** Radicular cysts, periapical cyst, bioactive glass resorbable, apex resected

## INTRODUCTION

The radicular cyst is the most common odontogenic cyst lesion of inflammatory origin that is preceded by a chronic periapical granuloma and stimulation of cell rests of Malassez present in the periodontal membrane. It is also known as apical periodontal cyst, root end cyst or dental cyst. It is caused by pulp necrosis secondary to dental caries or trauma. The cyst lining is derived from the cell rests of Malassez. Usually the periapical cyst is asymptomatic, but a secondary infection can cause pain. On radiographs, it appears a radiolucency (dark area) around the apex of a tooth's root. A number of studies have been shown poor correlation between the size of radiolucencies and histological findings of periapical cysts and periapical granulomas. However, it is apparent that there is a greater likelihood of radiolucencies being radicular cysts rather than chronic periapical periodontitis lesions with increasing size of radiolucencies, particularly those over 2 cm in size.<sup>1-2</sup>

The treatment of maxillary and mandible cysts is common in oral and maxillofacial surgery. The most widespread treatment methods are curettage and radical enucleation of the cyst (cystectomy). The removal of a cysts evidently results in a bone defect. Depending on its size and location, the bony lesion has to be treated with regard to functional and aesthetic aspects using autogenous grafts or bone substitutes.<sup>1-2</sup> The author present the treatment of a radicular cyst in male patient in this case report. The lesion probably occurred as a consequence of pulp necrosis secondary to dental caries under the composite filling on the left incisors of the maxillary.

The cyst was asymptomatic and an incidental finding when the patient want to change the discoloration composite filling. After endodontic treatment using metal parapost intracanal, curettage and bone augmentation were performed.

## CASE REPORT

A male patient aged 29 years came to Darul Ehsan dental clinic in Malaysian student hostel Egypt with chief complaints of discoloration filling on 21, 22 and wanted to changed to crown porcelain. On the clinical examination, teeth 21 and 22 showed no mobility, on percussion painless and pulp

vitality test revealed no response in these teeth.

On radiological examination, composite fillings were so weak with the conditions already contained caries under fillings and there was periapical radiolucency in relation to 21 and 22, the periapical radiograph before treatment was lost.

Cyst removal is done on the same day but after endodontic treatment on teeth 21 and 22. Root canals were prepared and then obturation using gutta percha and endomethasone (septodont), where obturation deliberately exaggerated to mark the root apex to be resected. After the end to support the retention of the temporary and final restoration used metal post (ParaPost® XH™ Titanium Alloy Post-Coltene/Whaledent). This surgical procedure performed using local anesthesia. Upon elevation of a trapezoid mucoperiosteal flap from the teeth 12 to 24, the destruction of cortical bone was evident (Fig. 1, Fig. 2 and Fig. 3). The cyst was enucleated and sent for histopathological examination (Fig. 4).



Figure 1. Local status after flap reflection



Figure 2. Periapical x-ray after endodontic treatment on teeth 21 and 22



Figure 3. Bone defect and root of 21 and 22 after cyst removal and resection.

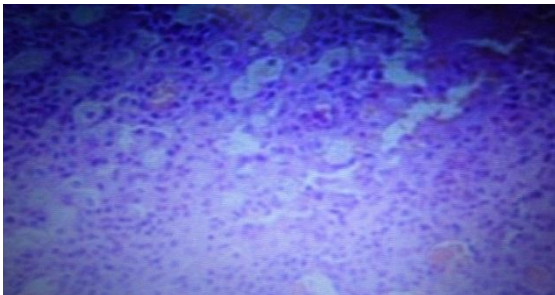


Figure 4. H and E stained section shows cystic lining with the characteristics of congestion, chronic lymphocytic and plasmolytic inflammatory.

After thorough debridement, the bone defect with partial destruction of the vestibular cortical bone walls was filled with a synthetic bone substitute (Bioactive Glass Resorbable) (Fig. 5). The material consists of surface reactive glass-ceramic biomaterials and include the original bioactive glass, Bioglass (Fig. 6). This composition is known as 45S5 (46.1 mol% SiO<sub>2</sub>, 26.9 mol% CaO, 24.4 mol% Na<sub>2</sub>O and 2.5 mol% P<sub>2</sub>O<sub>5</sub>. Bioglass), 58S (60 mol% SiO<sub>2</sub>, 36 mol% CaO and 4 mol% P<sub>2</sub>O<sub>5</sub>), 70S30C (70 mol% SiO<sub>2</sub>, 30 mol% CaO).<sup>3</sup>



Figure 5. Bone graft substitute in situ

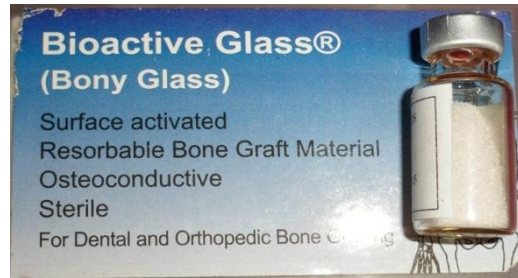


Figure 6. Bioactive Glass Resorbable

Five inorganic reaction stages are commonly thought to occur when a bioactive glass is immersed in a physiological environment: Ion exchange in which modifier cations (mostly Na<sup>+</sup>) in the glass exchange with hydronium ions in the external solution; Hydrolysis in which Si-O-Si bridges are broken, forming Si-OH silanol groups, and the glass network is disrupted; Condensation of silanols in which the disrupted glass network changes its morphology to form a gel-like surface layer, depleted in sodium and calcium ions; Precipitation in which an amorphous calcium phosphate layer is deposited on the gel; Mineralization in which the calcium phosphate layer gradually transforms into crystalline hydroxyapatite, that mimics the mineral phase naturally contained with vertebrate bone.<sup>3,4</sup>

After application the bone substitute, the wound was closed. The patient received analgesic brufen 400 mg every 8 hours and 625 mg augmentin twice a day for 5 days. The post-operative healing was uneventful. The suture were removed after seven days. One month after the cystectomy, the patient returned for the manufacture of all porcelain crown (zirconia). After one year the patient returned no complaints, all in good condition and confirmed that the alveolar bone had been reconstructed at the former defect site showed radiopacity similar to the surrounding bone. Clinically showed excellent gingival contour. (Fig. 7 and 8).



Figure 7. Photograph after one year



Figure 8. Periapical x-ray after one year

## DISCUSSION

The radicular cyst is very common in oral and maxillofacial surgery. Several treatment options are available for a radicular cyst such as surgical endodontic treatment, extraction of the offending tooth, enucleation with primary closure, and marsupialization followed by enucleation.<sup>1</sup> In this case, surgical enucleation was preferred and was performed uneventfully.

After removal of the cyst, the bone defect will usually be filled with blood. The blood clot contracts during early healing, which results in loss of contact between the clot and the walls of the surrounding bone. The formation and in-growth of blood vessels and, consequently, oxygen and nutrient supply, a prerequisite for bone regeneration, may be disturbed. Furthermore, the blood clot may be destroyed by fibrinolytic activity of bacteria from the oral cavity. Which may result in wound infection. Leaving post resection area unfilled could lead to an aesthetic defect or even complication such as loss of the resected teeth or fracture.<sup>2,5-6</sup>

Various treatments are described to avoid such complication and to promote bone regeneration. Schulte describes a method in which the blood clot is stabilized with collagen sponges soaked with antibiotics to reduce the contraction of the clot.<sup>2</sup> The use of bone substitute enables the surgeon to stabilize the clot without graft harvesting. Bone substitutes differ in their origin (allogeneic, xenogenetic or synthetic) and their behavior in the human body (resorbable or non-resorbable).<sup>5-6</sup>

In the case presented, the author used a bioactive glass (bony glass) resorbable bone graft substitute to fill a moderate bone defect

and the flap directly closed. After one year patient returned radiographically showed the former bone defect similar with the surrounding bone, and clinically demonstrated adequate gingival contour and good adaptation to the porcelain crown.

## CONCLUSION

To conclude, this case report has demonstrated how management of a radicular cyst with enucleation and using bone graft substitute filled the defect area can be successful.

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