Case Report

Use of Guided Tissue Regeneration in the Treatment of a Lateral Periodontal Cyst With a 7-Month Reentry

José Nart,* Eleni Gagari,† Michael A. Kahn,† and Terrence J. Griffin*

Background: *The lateral periodontal cyst (LPC) is an unusual cyst of odontogenic origin, most frequently encountered in the mandible between the roots of canines and premolars. The most common treatment for LPC is surgical enucleation. This article reports a case of an LPC treated with guided tissue regeneration (GTR) and bone allograft.*

Methods: *A 74-year-old woman presented for periodontal examination. Radiographs revealed a cystic lesion with LPC characteristics. After surgical incisions and flap reflection, the cyst was removed and sent for biopsy. Because of the anatomy of the resulting intrabony defect, GTR was considered the ideal treatment.*

Results: *The biopsy revealed the histologic features of an LPC. Radiographs at 7 months posttreatment indicated bone fill of the initial defect. Although some attachment loss occurred, the reentry demonstrated a high percentage of bone fill of the defect after 7 months.*

Conclusion: *Depending on the anatomy of the defect left after the removal of an LPC, GTR, along with bone grafting, can be a very useful tool for its treatment by reducing the attachment loss observed after simple enucleation of the cyst.* J Periodontol 2007;78:1360-1364.

KEY WORDS

Guided tissue regeneration; periodontal cyst.

The objective of this report is to present, for the first time in the literature to our knowledge, the treatment of a lateral periodontal cyst (LPC) with guided tissue regeneration (GTR) using an osseous allograft and a bovine collagen membrane. Its importance in periodontal therapy is that the bony defect created by the LPC would have had virtually no chance of regeneration if not treated with GTR; it would have been an esthetic problem and would have created a difficult area to maintain with hygiene therapy.

The LPC is an uncommon type of developmental odontogenic cyst. Studies have found its prevalence to range from 0.7% to <1% of all cysts found in the jaws.[1,2] LPCs are believed to originate from rests of dental lamina, although the initial reports identified reduced enamel epithelium as the tissue of origin.[3-5] LPCs are more common in adults during the fifth to seventh decades of life and seem to show no gender or race predilection,[6,7] although a slight male predilection has been reported.[1]

The majority of LPCs are located in the mandibular canine to premolar areas and usually are discovered during routine radiographs.[8] An important aspect that allows their differential diagnosis from inflammatory odontogenic cysts is that the adjacent teeth are vital.[9] Expansion of the buccal or lingual alveolar plate with normal appearing or slightly blanching surface mucosa may be observed in some cases. Pain has been reported rarely in LPCs. Usually, there is no communication between the cystic cavity and the gingival sulcus upon probing.[6]

Radiographically, an LPC presents as a well-defined, oval to teardrop radiolucency with an opaque margin along the lateral surface of the root of two contiguous teeth, between the alveolar crest and the root apices.[7] Typically, the lesion is small (seldom >1 cm); however, it may vary from 1 mm to involving the entire side of the tooth root. LPCs increase in size slowly, resorbing nearby bone and periodontal structures. Cases that were followed radiographically over several years demonstrated a mean growth of 0.7 mm/year.[10] It is

* Department of Periodontology, Tufts University School of Dental Medicine, Boston, MA.
† Department of Oral and Maxillofacial Pathology, Tufts University School of Dental Medicine.

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Figure 1.
A) *Clinical appearance of the lesion with blanching of the soft tissues.* ***B)*** *Periapical radiograph of the mandibular right canine and premolar. A well-defined radiolucency with a narrow sclerotic border can be seen.*

possible that the development of LPCs is stimulated by some genetic factor later in life.[11] Most often, the LPC cyst is unilocular in appearance; however, it may present as a multiloculated radiolucency, in which case it is termed a botryoid odontogenic cyst.[12]

The histology of the LPC is pathognomonic, demonstrating a cystic cavity supported by fibrous connective tissue and lined by a thin non-proliferative layer of epithelium. Often, this epithelium has areas of focal thickening, which may be interspersed with glycogen-containing clear cells. Frequently, rests of dental lamina may be observed close to the cyst wall where inflammation rarely is seen.[13]

Complete surgical excision of the cyst has been the recommended treatment. There is little tendency for recurrence. Only two cases of recurrent cysts have been reported in the literature, and both were botryoid odontogenic cysts.[14] The botryoid variant seems to possess an elevated risk for recurrence compared to the unilocular LPC. However, both lesions are benign and routinely have been treated with enucleation.

CASE REPORT

A 74-year-old white female presented to the Postgraduate Periodontal Clinic at Tufts University School of Dental Medicine (TUSDM) on November 17, 2005, for a periodontal examination. Her medical history was significant for codeine, morphine, and latex allergies, as well as treatment for hypothyroidism, heartburn, and the need for antibiotic premedication for a knee replacement in 1999. Intraoral examination demonstrated slight gingival erythema with probing depths ≤3 mm. There was a 5-mm round nodule at the mucogingival junction between the mandibular right canine and first premolar (Fig. 1A). The nodule was soft and non-mobile and was not tender to palpation. The lesion was asymptomatic, and the patient could not recall trauma to the area. The patient was unaware of its presence until she noticed a growth in the nodule's size during the previous 2 months. Probing of the adjacent teeth indicated sulcus depths of ≤3 mm with no bleeding or suppuration. Cold testing of the adjacent teeth indicated that both teeth were vital.

Radiographically, the LPC appeared as a well-defined ovoid radiolucency with a sclerotic,

Figure 2.
A) *View of the lateral periodontal cyst after flap reflection.* ***B)*** *Lateral periodontal cyst is enucleated leaving an interproximal bony defect that exposes the distal and mesial wall of the roots of the mandibular right canine and premolar.* ***C)*** *DFDBA is placed in the defect, and a collagen membrane is trimmed and positioned over the defect, extending mesially, distally, and below the lingual flap.* ***D)*** *The buccal flap is advanced coronally, covering the membrane, and sutured to the lingual flap with one horizontal mattress suture between teeth #27 and #28 and single interrupted sutures to achieve primary closure.*

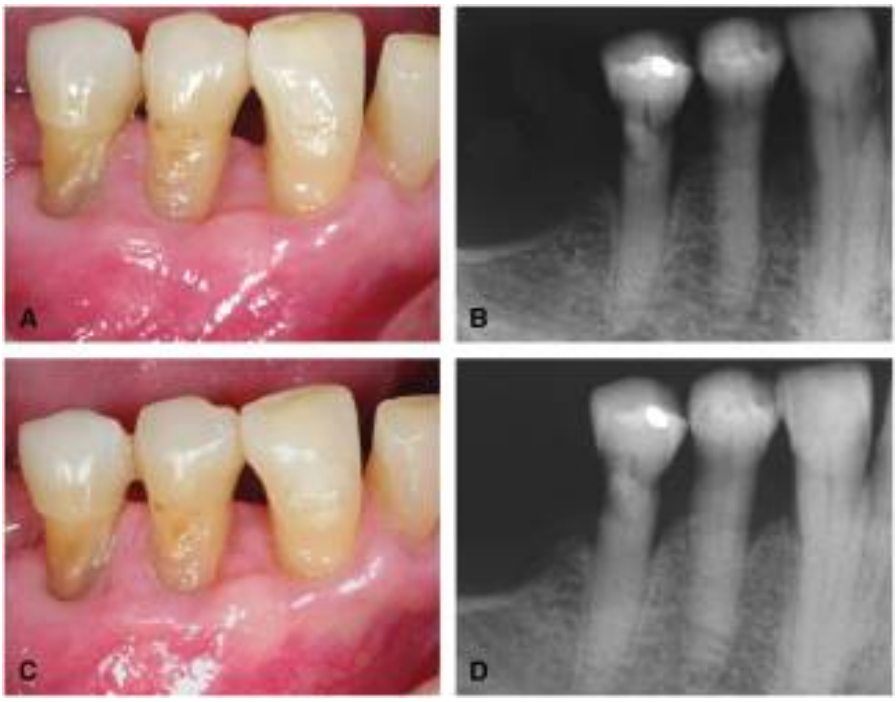

Figure 3.
*Three-month postoperative clinical **(A)** and radiographic **(B)** views. Seven-month postoperative clinical **(C)** and radiographic **(D)** views.*

radiopaque margin located between teeth #27 and #28 in the coronal third of their roots (Fig. 1B).

According to the clinical and radiographic findings, the patient was diagnosed with dental plaque-induced gingivitis in a reduced periodontium. The lesion between teeth #27 and #28 had a preliminary diagnosis of LPC that required confirmation by biopsy. The differential diagnosis included LPC, gingival cyst, and odontogenic keratocyst. The treatment recommended by the Department of Oral Pathology, TUSDM, was complete enucleation for biopsy, and bone grafting if necessary.

The treatment of the lesion between teeth #27 and #28 was initiated by establishing local anesthesia using approximately two carpules of bupivacaine 0.5% (5 mg/ml) 1:200,000 epinephrine (0.005 mg/ml). The route of administration was buccal and lingual infiltration. Intrasulcular incisions were made from the mesial of tooth #25 to the distal of tooth #29, and a facial full-thickness flap was reflected to gain access to the lesion. A teardrop-shaped, well-defined, whitish lesion, about three-fourths encapsulated into the alveolar bone and measuring ~12 mm in height and 12 mm in depth, was found (Fig. 2A). The lesion was completely enucleated using a surgical curet. During the procedure the epithelial lining was ruptured, and a yellowish fluid, the content of the cyst, was released. The soft tissue was submitted en masse as a biopsy specimen. After removal of the cyst, a defined bony defect in between teeth #27 and #28 with interproximal dehiscences associated with both tooth roots within the lesion remained. The lingual plate was intact, and the buccal plate was missing almost until the apex of the adjacent teeth (Fig. 2B). The bone and root surfaces were cleaned with hand and sonic instruments. The bony walls were decorticated with a #2 carbide bur, and the area was irrigated with saline; decalcified freeze-dried bone allograft (DFDBA), 250- to 500-μm particle size, was placed filling the defect and covering the distal root of the canine and the mesial root of the premolar. A bovine, cross-linked, collagen membrane was sized and placed over the defect extending ~3 mm beyond the borders of the bony defect. The soft tissue was undermined below the lingual papilla to accommodate the membrane (Fig. 2C). The membrane was stable, and the bone grafting material maintained the space. The buccal flap was advanced coronally by periosteal incisions to achieve primary closure over the graft and the membrane, without tension. It was sutured to the lingual flap with one horizontal mattress suture between teeth #27 and #28 and single interrupted sutures from tooth #25 through #29 using 5-0 polyglactin 910‡ (Fig. 2D). The patient had taken 2 g of amoxicillin 1 hour prior to the surgery as her prophylactic premedication, and she was prescribed amoxicillin, 500 mg three times a day, and 0.12% chlorhexidine rinse, twice a day, for 10 days. Ibuprofen, 600 mg every 8 hours for the first 3 days, also was prescribed. Examination 10 days later showed uneventful healing with a slight exposure of the membrane between the canine and the premolar. The postoperative appointments at 1 and 3 months showed increased recession of 1 to 2 mm in the facial and interproximal of teeth #27 and #28 (Fig. 3A). At 7 months postoperatively, the area was stable with probing depths ≤3 mm distal of the canine and mesial of the premolar (Fig. 3C). Radiographs at 3 and 7 months revealed increased radiopacity where the cyst had been following the GTR with no evidence of the lesion's recurrence (Figs. 3B and 3D).

‡ Vicryl, Ethicon, Johnson & Johnson, Somerville, NJ.

Figure 4.
A) *Intrabony defect after LPC removal between the canine and the first premolar.*
B) *Seven-month reentry showing bone fill, where the cyst was present, after GTR.*

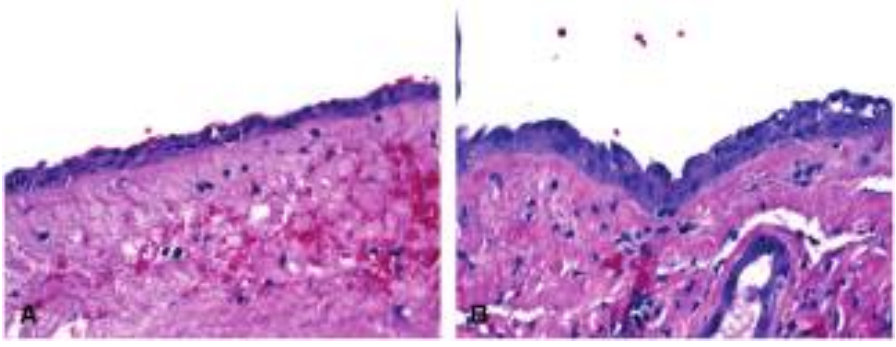

Figure 5.
Histopathologic findings of LPC. ***A)*** *Thin cystic epithelial lining and connective tissue wall.*
B) *Thickened areas of the cystic epithelium containing glycogenated cells. (Hematoxylin and eosin; original magnification, ×20.)*

A reentry was performed 7 months after treatment; significant bone fill could be observed between the roots of teeth #27 and #28 (Fig. 4).

The biopsy specimen was processed using routine histologic technique immediately following the surgery. Histopathologic evaluation disclosed an odontogenic cystic epithelial lining a few cell layers thick. The epithelial cells exhibited prominent basophilic nuclei and abundant eosinophilic cytoplasm. Individual cells with clear cytoplasm (glycogenated cells) were noted. Fragments of the cystic epithelial lining contained focal thickening. The connective tissue wall exhibited fibrous hyperplasia and occasional inflammatory cells (Fig. 5).

DISCUSSION

The LPC is an uncommon lesion. It is considered a distinct pathologic entity with well-established clinical, radiographic, and histologic features. LPC is an intraosseous cyst associated with the root of a vital tooth. Initially, it does not present symptoms, but at a later stage, it can cause swelling of the outer gingiva and alveolar mucosa.

Previously, LPCs had been treated mainly by enucleation, resulting in uneventful healing and some bone fill.[6] However, there is little mention in the literature regarding possible complete bone regeneration and the duration needed to complete this regeneration after LPC enucleation. In addition, postoperative evidence of bone healing after LPC removal is not well documented in the literature. Angelopoulou and Angelopoulos[9] showed a 1-year follow-up radiograph of an LPC, similar to the one presented in this article, which was treated with enucleation. It appeared that there was very little regeneration. In 1997, Lehrhaupt et al.[11] used DFDBA to treat a through-and-through defect created by an LPC. A 30-month radiograph indicated bone fill, which might have been expected if no grafting techniques were done. Meltzer[15] later showed the first 1-year reentry after the treatment of an LPC without any grafting techniques. The investigator indicated that because of the anatomy of the defect, bone fill would have occurred without the use of regenerative materials. In 1996, Vitkus and Meltzer[16] successfully treated a maxillary adenomatoid odontogenic tumor (AOT) located around a canine using GTR. Similar to LPC, simple enucleation is the treatment recommended in the literature for AOT. The investigators reported that the use of GTR, together with freeze-dried bone allograft, seemed to increase the predictability of bone regeneration, as was seen in our case.

Clinical studies[17,18] showed that GTR procedures were more effective than surgical debridement alone in correcting intrabony defects. Moreover, studies[19] showed that these results could be maintained during the course of several years. In this report, the defect remaining after the removal of the LPC had a very poor potential for regeneration by itself because it was mostly a 1-wall (lingual), wide defect. The defect was a combined intrabony defect with two walls in the most apical part (facial and lingual) and one wall for the greatest part of it. At the time of the surgery, it was expected that minimal regeneration would take place without the use of regenerative techniques,

and GTR with a bone allograft was used to improve the outcome of the treatment.

Similar to GTR, it seemed that the number of bony walls of a defect created by an LPC is a major determining factor in whether bone fill will occur with or without a bone graft and a membrane. In the aforementioned studies by Angelopoulou and Angelopoulos[9] and Meltzer,[15] in which the LPC was treated by enucleation, the number of bony walls seemed to be a critical factor in the amount of bone fill. Based on those results, the treatment using a bone graft and a membrane was appropriate in our patient, who had mostly a 1-wall defect.

To our knowledge, this is the first report in the literature that demonstrates the successful treatment of an LPC defect with GTR with a 7-month reentry. In agreement with Vitkus and Meltzer,[16] we propose that GTR in conjunction with bone grafting can be used to achieve better and faster regeneration of large defects surrounding teeth created by benign odontogenic lesions that are characterized by a low risk for recurrence.

CONCLUSIONS

GTR with bone allograft may be a useful adjunct for the treatment of defects created by LPCs with a poor potential for regeneration. In those instances, the use of GTR should be determined after evaluation of the osseous anatomy of the bony defect. GTR in association with bone allograft may lead to optimal bone regeneration of the defect.

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Correspondence: Dr. José Nart, Tufts University, 1 Kneeland St., #250, Boston, MA 02111. Fax: 617/636-0911.

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