Periodontal regenerative management of residual tunnel osseous defect results from the enucleation of lateral periodontal cyst in anterior maxilla: A rare case report

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Abstract:
The lateral periodontal cyst (LPC) is a nonkeratinized, noninflammatory developmental cyst occurring adjacent or lateral to tooth root. It is a relatively uncommon lesion found in the maxillary incisors and found mostly in adults during 5th to 7th decades. In this case, 45-year-old male patient reported with occasional mild discomfort between left maxillary central and lateral incisor region since 1 year. Interproximally, a well-defined round radiolucent area with corticated borders was determined radiographically between vital tooth #21 and #22. Preliminary diagnosis of LPC was established based on clinical and radiographical findings. Following enucleation of the lesion, an anticipated residual tunnel osseous defect was observed, which was managed successfully utilizing bone graft and guided tissue regeneration-assisted technique. Cystic tissue removed was examined histologically; hematoxylin- and eosin-stained sections showed features suggestive of LPC. Complete healing of tunnel defect was achieved at 1 year follow-up.

Key words:
Developmental cyst, guided tissue regeneration, lateral periodontal cyst, regeneration, residual tunnel osseous defect

INTRODUCTION

Lateral periodontal cyst (LPC) is an uncommon developmental odontogenic cyst, located commonly on the lateral aspect of roots of vital mandibular canine and premolar, usually account for <1% of the jaw cyst.[1,2] LPC lesion is now believed to originate from odontogenic epithelial remnants (rests of Serres) though there is controversy regarding the possible implication of the enamel epithelium, dental lamina remains and the rests of Malassez.[1,3] Treatment of LPC includes enucleation.[10] The aim of the present rare case report is to lay emphasis on early diagnosis and simultaneous periodontal regenerative management of residual tunnel defect resulting from the enucleation of LPC.

CASE REPORT

A 45-year-old male patient reported to the Department of Periodontology with a chief complaint of mild occasional discomfort between left upper front teeth since 1 year. On clinical examination, tooth #21 and #22 reported to be vital on cold test, without mobility and tenderness, having 5 mm probing depth on each distofacial and mesiofacial aspect [Figure 1] with 2 mm of clinical attachment loss (CAL), respectively, with narrow interdental papilla and Class I gingival embrasure (GE) as per Norland and Tarnow classification.[5] Radiographical examinations revealed a well-defined round radiolucent area with corticated borders, which was <1 cm just 2–3 mm apical to the crest of interproximal bone between teeth #21 and #22 [Figure 2], but lesion was not accessible clinically. The patient was otherwise systemically and periodontally healthy. LPC was preliminary diagnosed on the basis of clinical and radiographical findings.

Different treatment modalities such as autogenous bone graft, allograft (demineralized freeze-dried...
Figure 1: Preoperative clinical probing at distofacial and mesiofacial aspect of tooth #21 and #22, respectively, with Norland and Tarnow’s Type I gingival embrasure

Figure 2: Preoperative intraoral periapical radiograph taken using parallel profile radiography technique, occlusal radiograph, and orthopantomogram showed a well-defined round radiolucent area with corticated borders just apical to the crest of interproximal bone between teeth #21 and #22

Figure 3: Vertical incision on mesial line angle of #21, crevicular incision on facial surface of #21 to distal line angle of #22, followed by papilla preservation incision at the base of interdental papilla between teeth #22 and #23

Figure 4: The periodontal cyst location after full thickness flap reflection

Figure 5: Enucleation of cyst depicts residual tunnel osseous defect labiopalatally between teeth #21, #22

Figure 6: Residual tunnel osseous defect of 0.7 cm × 0.4 cm × 0.4 cm extending labiopalatally between teeth #21, #22

Figure 7: After the placement of Bio-Gide membrane labiopalatally, the resorbable tissue replacement bone graft was placed from labial aspect of residual tunnel osseous defect completely

Figure 8: Bio-Gide membrane secures the resorbable tissue replacement bone graft
Figure 9: Flap was approximated using 3-0 black silk sutures

Figure 10: Hematoxylin-and eosin-stained section microphotograph of cyst examination showed thin 1–5 cell thick, nonkeratinized stratified squamous epithelium which resembles reduced enamel epithelium; focal thickened plaques of proliferating lining cells were seen toward lumen of cystic cavity with mild chronic inflammatory cell infiltrate, chiefly consisting of lymphocytes in the fibrous connective tissue wall

Figure 11: Two weeks postoperative healing of surgical site

Figure 12: Two millimeter of PD reduction and 5 mm of clinical attachment loss, with Norland and Tarnow’s Class II gingival embrasure were observed 6 months postoperatively with slightly inflamed interdental papilla

Figure 13: Parallel profile radiography technique-assisted intraoral periapical X-rays showed complete healing of residual tunnel osseous defect with the loss of 2 mm of crestal bone lying coronal to residual tunnel osseous defect

Figure 14: Two millimeter of PD reduction and 5 mm of clinical attachment loss, with Norland and Tarnow’s Class II gingival embrasure were observed at 1 year postoperatively

Figure 15: Excellent soft tissue healing of surgical site at 1 year postoperatively

Figure 16: Intraoral periapical (parallel profile radiography technique assisted) and occlusal X-rays showed complete healing of residual tunnel osseous defect at 1 year postoperatively
bone allograft [DFDBA]), allograft, and guide tissue regeneration (GTR), with their pros and cons were discussed in detail with patient. Looking after patients interest and clinician choice, conventional flap surgery with resorbable GTR and bone graft-assisted periodontal regeneration was advised and patient submitted written informed consent in favor of same.

After phase I periodontal therapy, under strict surgical protocol; after vertical incision on mesial line angle of 21, crevicular incision on facial and palatal surface of 21 to distal line angle of 22 due to narrow interdental papilla followed by papilla preservation incision at the base of interdental papilla between #22 and #23 (interdental papilla >2 mm with diastema present) periodontal cyst was observed after conventional full thickness flap reflection from #21 to #23 [Figures 3 and 4]. Enucleation of the cyst depicts a residual tunnel osseous defect (RTOD) of 0.7 cm × 0.4 cm × 0.4 cm extending labiopalatally [Figures 5 and 6]. After root planing, RTOD was managed with resorbable tissue replacement (RTR) β-tricalcium phosphate (RTR Septodont®) bone graft and an hour glass shape biodegradable collagen membrane (Geischtlich Bio-Gide®) placed labiopalatally between teeth #21 and #22 to stabilize the graft [Figures 7 and 8] followed by removal of over extension of GTR membrane beyond 3 mm in all direction from RTOD along with folds, and flap was approximated with 3-0 black silk sutures [Figure 9]. Oral hygiene, as well as postoperative instructions, was given to the patient.

Hematoxylin- and eosin-stained section microphotograph of cyst examination at ×10 showed thin 1–5 cell thick, nonkeratinized stratified squamous epithelium which resembles reduced enamel epithelium (REE); focal thickened plaques of proliferating lining cells were seen toward lumen of cystic cavity with mild chronic inflammatory cell infiltrate, chiefly consisting of lymphocytes in the fibrous connective tissue wall suggestive of LPC [Figure 10].

Two weeks postoperatively, surgical site healed uneventfully [Figure 11]. Patient missed the 3-month follow-up but undergone maintenance therapy by a family dentist. At 6 month post-operative visit, clinically 3mm of PD with 5mm of CAL along with slightly inflamed interdental papilla as well as transition of class I to class II GE [Figure 12] whereas radiographically complete healing of osseous defect at the expense of 2 mm of interdental bone coronal to RTOD were observed [Figure 13]. Supportive therapy was given and oral hygiene instructions were reinforced. Papilla healed completely but all other parameters remained stationary at 12 months postoperatively without any complication [Figures 14-16].

**DISCUSSION**

LPC is a noninflammatory intraosseous lesion of the oral cavity, associated with the root of a vital tooth with no or mild signs or symptoms clinically, usually observed during routine radiography as round/oval radiolucency with well-defined border <1 cm of diameter.[7] The mandible premolar region is most affected site followed by upper lateral incisor and canine region and found commonly in men between the 5th and 7th decade of life.[7] LPC is very uncommon lesion corresponding to 0.8%–1.5% among all the maxillary cysts. [7] Similar findings were observed in the 45 years of patient but location between teeth #21 and #22 which made this case a rare entity.

Differential diagnosis was taken into consideration from odontogenic keratocyst because of their aggressiveness and high potential for recurrence after treatment which was discarded on the behalf of chronicity, occlusal radiograph as well as its close proximity to the defect; in addition, dentigerous cysts are always associated with an impacted tooth, whereas primordial cysts are mostly located in the ascending mandibular ramus; radicular cyst appears with nonvital tooth[9] as none of the above finding exists in the present case, so diagnosed as LPC on the basis of clinicoradiographically and later on reconfirmed histologically.

The tunnel defect typically has a three-wall configuration with mesial, distal, and basal bone structures, but the buccal and lingual bone plates were missing.[7] Such defect became filled with connective tissue infiltration, and radiographically no bone fill was observed histologically.[10] whereas other authors reported since new bone formation is slower compared to soft tissue proliferation, the latter will grow into the “unprotected” bony crypt with a scar bridging the defect from buccal to lingual, thereby preventing or retarding bone formation[9] if no regeneration was attempted. On the contrary, bone regeneration in such defect site was observed histologically when membrane-assisted regeneration was attempted.[10] Therefore looking after the interest of patient, GTR membrane and bone graft-assisted regeneration were opted in the present case.

As patient was not in favor of harvesting autogenous bone graft which is the gold standard osteoinductive material whereas DFDBA is osteoinductive in nature, due to the removal of the mineral phase of the freeze-dried bone graft (osteocoinductive in nature) which can expose the underlying bone collagen and possibly bone growth factors such as bone morphogenetic proteins (BMPs) but as its osteogenic potential depends on quantity and quality of bone matrix in the graft material, but majority of commercial bone banks do not verify the presence or activity of BMPs in DFDBA nor the ability of DFDBA to induce new bone as cited in the report of Liu and Kerns.[11] Even from the same tissue bank, different batches may have different clinical results. This may partially explain why Rummelhart found similar clinical results between DFDBA and FDBA for osseous regeneration.[12] Therefore, considering the technical sensitization of papilla preservation technique with respect to 21 and 22 conventional flap was advised with resorbable GTR membrane with RTR bone graft in the present case; as GTR (i) facilitates tissue regeneration by creating an optimum environment (stable and protected wound), (ii) excludes undesired fast proliferating cells from interfering with bone and periodontal tissue regeneration,[9] (iii) no need to removal of membrane during healing phase, whereas RTR bone graft (i) supports and prevents collapse of buccally and palatally placed nonrigid GTR membranes and (ii) resorbable osteoconductive β-tricalcium phosphate expected to be resorbed within 3–6 months after placement and will be replaced by newly mineralized bone tissue without fibrous tissue proliferation.[13] That may be the reason for excellent periodontal tissue regeneration outcome at 1-year follow-up in
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the present report which was in accordance with the reports of Nart et al. and Meseli et al. demonstrated complete healing of osseous tunnel defect after utilizing GTR membrane and bone grafts at 6 and 7 months postoperative, respectively, but because of ethical issues reentry could not be performed in the present case report.

To the best of our knowledge, this may the third report of tunnel defect associated with the enucleation of LPC and its successful management by resorbable GTR and bone graft, which also made this report a rare entity.

CONCLUSION

The combined periodontal regenerative therapy of GTR and bone graft is an effective treatment modality for the management of RTOD.

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Conflicts of interest
There are no conflicts of interest.

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