CASE REPORT

Labial Cervical Vertical Groove: Hidden Route to Periodontal Destruction

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ABSTRACT
A 24-year-old male patient reported to the Department of Periodontology, with a chief complaint of dull, gnawing and intermittent pain while biting in maxillary left central incisors. On clinical examination, localized inflamed, soft & edematous gingival tissue associated with accumulation of plaque and calculus in relation to #11 and#21 was observed. Phase I therapy was instituted and during phase one therapy Labial-cervical-vertical groove (LCVG) was found on #21 which was extending into gingival sulcus. A week after phase one therapy periodontal examination showed a probing pocket depth of 7 mm on distobuccal aspect of #21 with no mobility. On radiographic examination, a round diffuse radiolucency was on distal aspect of #21. This article describes the management of intrabony defect associated with labial-cervical-vertical groove on #21 using bone graft and restoration of groove using glass ionomer cement.

INTRODUCTION:
One of the primary local etiologic factor initiating periodontal destruction is dental plaque. It is a biofilm of adherent bacteria and their products on all tooth surfaces and dental prosthesis. Anatomic or morphologic features of teeth as well as iatrogenic factors¹ contribute to its formation. These features contribute to changes in dento-gingival relationships thus making it more prone to harboring virulent periodontal pathogens leading to site specific localized periodontitis. Thorough knowledge of these potential anatomic variations have a significant impact on management & prognosis of involved teeth and also would help early detection preventing any attachment loss further.² Internal & the external morphologic anatomic aberrations can at times present difficulty in diagnosis and clinical management to the clinician³. A rare aberration in tooth anatomy runs vertically from the crown surface to the root, starting at the enamel on the crown cervix extending apically, crossing the cementoenamel junction and resembling a short furrow is named as Labial-cervical-vertical groove (LCVG)⁶⁻¹¹. This anomaly is thought to develop due infolding of the enamel organ and Hertwig’s epithelial root sheath that create a groove on the labial surface of permanent maxillary incisors.⁶ This groove grows deeper in the apical direction gradually and in some scenarios run throughout the root surface.⁹ Palataly on maxillary incisors a similar presentation called as palatogingival groove is a common finding.⁶,⁷,¹²,¹³ Enamel hypoplasia, caused by impaired function of ameloblasts during tooth development has also been pointed out as the etiology.¹³,¹⁴ Various causes for hypoplasia forming anatomic malfunction are trauma, disease, and nutritional issues (eg, rickets), or can be genetic or idiopathic also. The first researcher to describe the grooves as a malformation during embryo development was Black in 1908.¹⁵
These grooves are often overlooked as etiologic factor hence this case report describes the diagnosis and clinical management of a maxillary central incisor with localized periodontal destruction associated with a labial cervical vertical groove.

**Case presentation**

A 24 year-old male patient reported to the Department of Periodontology, with a chief complaint of dull, gnawing, intermittent pain with respect to upper front teeth. On examination a localized gingival inflammation was present with the accumulation of plaque and calculus with respect to 21 and 22. Periodontal examination revealed a probing pocket depth of 7 mm on the disto-labial aspect of tooth number 21. Intra oral radiograph examination revealed interdental bone loss with respect to 21 and 22. Phase I therapy consisted of oral hygiene instructions and scaling and root planing. The patient was reviewed after a week. Clinical symptoms subsided, but periodontal pocket was still persisted with respect to 21 and 22, thus decision to perform periodontal flap surgery in the upper anterior region was taken. (Figure 1)

Following flap reflection, a groove was noticed along the labial surface of maxillary left central incisor which began at cervical aspect of 21 and terminated at the middle third of the root surface. Also a class II crater bone defect was observed after thorough debridement.

The groove was restored with class II glass ionomer cement and after completely isolating it, the bone defect between 21 and 22 was filled with demineralized bone matrix bone xenograft(osseograft). Following this the flap was sutured using 3-0 black braided silk suture and periodontal pack was given to cover the surgical area.

Patient was recalled after a week for suture removal. Periodontal healing was satisfactory with gingival health stable. On follow up visit at 6 months, pocket depth reduced to 2 mm and the radiographic examination revealed bone fill with respect to 21 and 22(figure2-9). However there was bleeding on probing due to poor oral hygiene maintenance despite adequate reinforcement.
DISCUSSION

Periodontitis is a polymicrobial infectious disease resulting in loss of connective tissue attachment to root surfaces. Anatomic anomaly of tooth plays an important etiologic factor causing ingress of periodontal pathogens deep into sulcus thus leading to periodontitis. This present case report describes a case of localized periodontitis associated with labial cervical vertical groove. Earlier the etiology of this defect was thought to be due to trauma to the developing tooth bud, but presently it is considered to arise as a developmental defect due to the vertical extension of the mammelon groove. Mass\textsuperscript{16} et al ranked severity of LCVG in three stages i.e: 1) a mild subgingival shallow groove below the marginal gingiva that can be felt only by probing, 2) a moderate groove that can be detected with the eyes, extending subgingivally as in (1), and additionally supragingivally on the labial crown surface, not more than 2 mm from the marginal gingiva in the incisal direction and 3) a severe defect extending supragingivally more than 2 mm from the marginal gingiva on the labial crown surface and further subgingivally. Gingival contour associated with LCVG was also described in three categories\textsuperscript{16} based on their clinical presentation: a) normal coverage, ie, the gingiva covers the groove with no change in the regular shape of the gingival margin; b) partial coverage, ie, the gingiva partially covers the groove with mild change in the contour. c) irregular coverage, ie, the gingiva covers the groove with a severe change in the contour. Retention and growth of plaque microorganisms occurs in presence of this groove in maxillary incisor region. Abdulaziz Al-Rasheed\textsuperscript{18} reported that maxillary lateral incisors with palatogingival grooves (PRG) anomaly particularly those with apical extension of the groove were significantly associated with poorer periodontal health status manifesting as more susceptibility for bleeding on stimulation and tendency to attain deeper probing depth.

In our case an intrabony defect directly related to LCVG on 21 was noticed. Similar findings were reported in 1988 by Kozlovsky\textsuperscript{7} in a case wherein he described a periodontal lesion with vertical interdental bone loss directly associated to maxillary central incisor labial groove in a 25 year old female patient. Radicular labial groove when presents along with periodontal destruction, they can be managed by\textsuperscript{19} grinding and flattening of the groove or restoring the groove by placement of a physical barrier between the tooth and soft tissue flap after thorough debridement. Intraosseous defect can be treated by regenerative procedures using various bone grafts. Defective dentogingival relationships associated with deep labial radicular groove may be managed by gingivectomy/gingivoplasty or root coverage mucogingival procedures.
Srinivas et al. presented a case report of bilateral facial radicular groove in maxillary central incisors of a 24 year old male patient. Periodontal destruction with respect to maxillary central incisor was observed on periodontal examination. After phase one therapy flap surgery was performed following which facial groove was eliminated by restoring it with glass ionomer cement. Mishal P. Shah reported a case of a 47-year-old male patient with complain of pus discharge from maxillary left central incisors with dull intermittent pain. Periodontal examination revealed labial-cervical-vertical groove (LCVG) and probing pocket depth of 8 mm on midbuccal aspect of #21 with no mobility. On radiographic examination, a tear-shaped radiolucency was present with localized bone loss in #21. The intrabony defect was treated by flap surgery and platelet rich fibrin after restoration of groove with glass ionomer cement. Kishan et al. also reported a unilateral palato-radicular groove on the maxillary right lateral incisor which was restored with glass ionomer cement and guided tissue regeneration technique was used to regenerate the lost periodontal structures reporting considerable reduction in pocket depth. In present case report, we also restored the facial groove using glass ionomer cement. In support of this, Thiago et al. reported biocompatibility of both glass ionomer cement and composites to gingival tissues. Dexton sealed palatogingival groove with Biodentine & associated intrabony defect was restored using bone graft followed by platelet-rich fibrin (PRF) membrane placement. This resulted in gain in attachment, reduction in pocket depth, and bonefill in the osseous defect at 24 month follow-up. Recently mineral trioxide aggregate (MTA) & re implantation have also been used in case of severe periodontal destruction caused due to radicular grooves. However Nevil et al. in an in-vitro study compared the cytotoxicity of glass ionomer cement, MTA & Biodentine on Human Gingival Fibroblasts cell line & found that the degree of cytotoxicity decreased from Glass-ionomer cement type IX to MTA Angelus & Biodentine in the cell line tested for both 24hr and 48 hrs exposure period.

Conclusion
This case report presented the successful treatment of localized periodontitis maxillary central incisor associated with radicular labial groove. The key to achieving long-term favorable results in this particular type of developmental anomaly is accurate diagnosis and elimination of inflammatory irritants and contributory factors. Clinician’s awareness of existence of such an anomaly may help to avoid misdiagnosis and improper treatment of these patients. It is strongly recommended that whenever LCVG is detected, the dentist should alert the patient to this deformity so that cautious oral hygiene can be implemented.

Reference
17. Shpuck N, Dayan T, Mass E, Vardimon AD. Labial cervical vertical groove (LCVG) distribution and