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Combined Endodontic-Periodontal Treatment of a Palatogingival Groove-Acasereport

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ABSTRACT

A palatogingival groove is a developmental defect that increases the risk of a serious periodontal disease developing in the affected tooth. Due to the interdisciplinary nature of diagnosis and treatment planning, these grooves frequently pose a clinical problem. The effective treatment of a left maxillary lateral incisor with a deep palatogingival groove, alarge periodontal pocket, and pulp necrosis of the affected tooth is described in this casereport. A combination of endodontic therapy, periodontal therapy, and a period on talregenerative method using a protein complex generated from the enamel matrix (Emdogain; Straumann, Basel, Switzerland) were used in the collaborative management process. Thetooth lesion healed even though a bad prognosis was anticipated. The report additionally examines the

reasoning behind the various	therapy approaches.

INTRODUCTION

The maxillary incisor region is a devoted embryological location. One aberration related todevelopment that could arise in this region is the palatogingival groove.[1] A palatogingivalgroove, which is typically found on the palatal portion of a maxillary incisor, is described as a developmental groove in a root.[2] This anomaly typically begins in the maxillary central and lateral incisors' central fossa, crosses the cingulum, and moves distoapically to different distances. Theanomaly'srangeofdepthandintricacyisunrestricted.[1]
Thepalatalsurfaceofthemaxillarylateralincisorsiswherethisabnormalityismostcommonly found. Although studies with isolated results as high as 44.6% have been reportedin the literature, its occurrence ranges from 2.8% to 8.5%. Some authors have speculated thatthere maybea racialorethnicassociation.[1]
There is ongoing debate regarding the palatogingival groove's origin. Some have described itas a moderate form of dens invaginatus, resulting from an infolding of the enamel organ andtheHertwigepithelialsheath.Athirdtheorylinkstheexplanationtochangedgeneticpathways,while anothercontendthatthetoothgermis tryingtobuilda new root.[1]
Clinically, the tooth is vulnerable to developing periodontal inflammation along the groove asa result of this developmental defect giving bacteria a way to enter the periodontal ligament.The pulp and peridontium of teeth with radicular grooves can occasionally be joined. The majority of the time, accessory canals allow for this communication.[4]
Therefore, itis quite easy for pulp-periodontal bacterial contamination to spread in bothdirections.Becauseofthis,apatient'ssymptomsmightvaryfromalocalizeddeepperiodontal pocket to a periodontal abscess, and their pulp nerve involvement determineswhether they test positive or negative. As a result, the prognosis of teeth with palatogingivalgrooves varies and is mostly determined by the groove's location, the degree of period on taldisease,the defect's accessibility, and the type of groove (long/shortorshallow/deep).[5]
Over the years, there have been many different and effective therapeutic approaches for this illness, however their results have not always been as good as anticipated. This paper details a case with a maxillary lateral incisor that received combined endodontic and periodontal therapy, leading to appropriate tissue recovery.[1]

CASEREPORT

A35-year-old woman was reported to our department of Conservative Dentistry & Endodontics with a pain in upper left front tooth region since 1 week. Patient also complaint of discoloured tooth in upper front tooth region (fig.1(A)) Pain was sudden in onset . dull ,aching & intermittent in nature .Periradicular radiolucency associated with the upper left lateral incisor (fig.3(A)). The patient reported that she had a history of trauma to the left anterior maxilla 5 years earlier, but the injury had not caused any dental problems to date. A periapical radiograph showed 2 radiolucent lesions: one at the apical level and the other at the middledistolaterallevel(fig.3(A)).Aftertakingallthepresentingsymptomsintoconsideration ,provisional diagnosis of localised apical periodontitis were made. After closely examining the picture, a radiolucent line that corresponded to the palatogingival groove was seen running from the root to the apical third (fig.3(A)).While the neighboring teeth responded normally, the pulp sensibility tests using Endo-Ice (Roeko Endo-Frost, Coltene Whaledent, Langenau,Germany) spray and a dental pulp tester (Vitality Scanner; Sybron Endo, Boston, MA)werebothnegative.

Figure 1(A) Clinical photograph of maxillary left lateral incisor from facial aspect

Figure 1(B) Clinical photograph of maxillary left lateral incisor from palatal aspect showing palatogingival groove.

Consequently, the diagnosis shifted toward pulp necrosis of the affected tooth (fig.3(A). The patient reported sensitivity to percussion, whereas grade II mobility associated with respected tooth. Periodontal probingwasphysiologicalalongthegingivalsulcus,withtheexceptionofa 5mm narrow periodontal pocket located on the palatal surface of the tooth concomitant withthe palatogingival groove (fig.1(B)) .The contralateral lateral incisor was inspected becausethe anomaly often affects both sides of the arch; in this case, however, tooth 12 appearednormal.
To confirm the diagnosis, cone-beam computed tomographic (CBCT) imaging was carriedout.Thismadeiteasiertoseeanypotentialcommunicationbetweenthepulpandperiodontium regarding the impacted tissues, as well as to precisely measure the radiculargroove'slength anddepth and clarify theinternal structure of the canal.Thelesions ofendodontic and periodontal origin were shown to beindependently and noncommunicative,as proven by CBCT imaging. The palatogingival groove was not joined to the pulp space, asdemonstratedbyaxialsections(Fig.2).

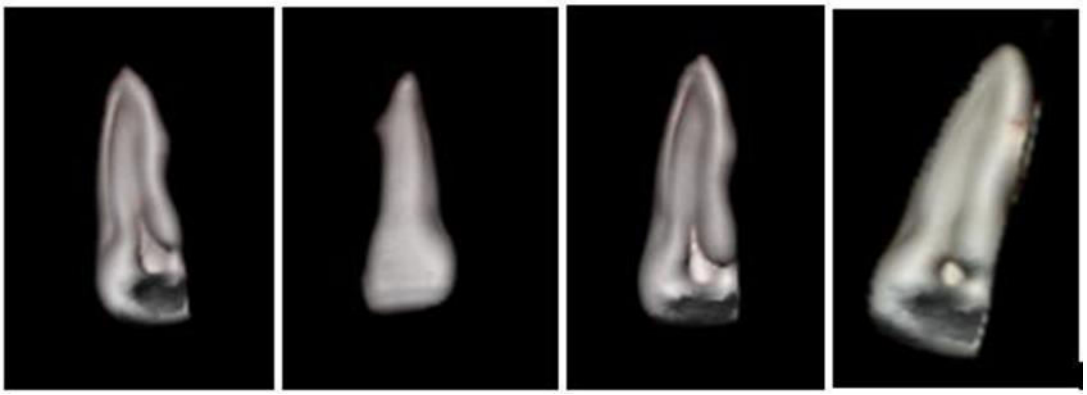

Figure2 Photographsshowingthatthepalatogingivalgrooveisconcomitantwith the period on tallesion, but it is not connected to the pulp space. The endodontic and periodontal lesions areindependent

Thelesionwasidentifiedaspost-traumaticpulpnecrosiswithasymptomaticapicalperiodontitisbasedontheclinicalandradiographic evidences.Thepatientdecidedtoundergo treatment even though the tooth's prognosis was uncertain after learning about thepotential consequences.The treatmentplan consisted of endodontic treatment of tooth 22withsubsequentrestorationofthe palatogingivalgroove with Glassionomercement.
Toenhance dental hygiene,basic periodontal therapy was administered,andthepatientreceived the necessary instructions. Two stages of root canal therapy were carried out. Underlocal

anesthesia, (2% lidocaine) & Rubber Dam isolation (fig.3(B)), following access cavitypreparation, 2 canals (1 main canal and another secondary canal) were negotiated (Fig 3(D)).Usinghandfiles sized #10 K to#20 K, patency was established on the firstvisit. Using aRoot ZX apex locator (J Morita Manufacturing,Kyoto, Japan), the workinglength wasdetermined. Subsequently radiograph was taken toconfirm working length determination(Fig3(D)).TheProTaperNext,X1throughX3(DentsplyMaillefer,York,PA)wasuse dtoinstrument the canal, and 5.25% sodium hypochlorite was used as irrigation.The ProTaperX3 was used to instrument the main canal, while hand files up to #30 were used in thesubsidiary canal. Before the canal was finally closed two weeks later, it was irrigated with amixture of 17% EDTA liquid and 5.25% sodium hypochlorite,both of which had beenactivated with EndoActivator (Dentsply Tulsa Dental Specialties, Tulsa, OK).The canal wasthensealed & obturatedusing AH Plus sealer & cold lateral condensation technique (Fig3(I)). Finally, a postendodontic restoration was done using aGlass ionomer cement(GCGold label 2). Following root canal treatment splints were givenfrom canine to canine for 2weeks(Fig.3(J)

Figure 3A. Preoperative radiographof22

Figure 3B. Rubberdam isolationof22

Figure 3C. Access cavity preparationin22

Figure 3D. Clinicalphotographofworkinglengthdeterminationof22presenting2canals

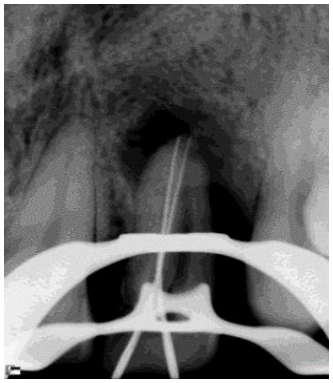

Figure 3E. Workinglengthdeterminati on radiograph.

Figure 3F. Clinical photograph of master cone.

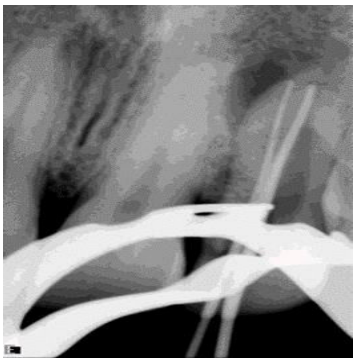

Figure 3G. Master cone radiograph

Figure 3H. Clinicalphotograph showing presence of significant palatogingival groove

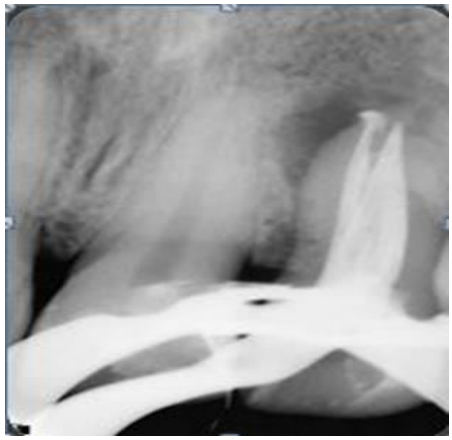

Figure 3I. Post obturation radiograph

Figure 3J. Clinical photograph showing splints given from caninetocanine

One week later, the patient underwent surgical treatment to address the palatogingival grooveand a subsequent periodontal problems. Under local anesthesia, 2% lidocaine and a 1:100000concentrationofepinephrinewereusedtobeginthetreatment.Afull-thicknessmucoperiosteal flap was reflected following a intracrevicular incision made on the maxilla'spalate(Fig.4(A)).Fromthedefect,granulationtissuewascuretted(Fig.4(D)).Directvisualization allowed observation of a 11mm groove depth which was then restored usingGlass ionomer cement (GC Gold label 2) (Fig.4(E)). The bony defect was then filled with abonegraft..Becauseoftheextremebonelossandexposeddentinalsurfaces,Emdogainwasusedin an attempt to induce apposition of new acellular cementum.These cells stimulate the repair ofthe alveolar bone and peridontal ligament and repopulate the dentin. After that, the palatal

flapwas secured using a 3-0 silk suture sling suture technique (Fig.4(F)), and periodontal dressing(Coe-pak)was appliedtotheaffectedarea.

Figure4(A)

Figure4(B)

Figure4(C)

Figure 4(D)

Figure4(E)

Figure4(F)

FIGURE 4 (A) initial Crevicular incision given. (B) Full thickness mucoperiosteal flap raised for directaccess.(C) direct access topalatogingivalgroove.(D)Granulationtissuesobtainedaftercurettage.(E)Restorationofpalatogi

ngivaldonewithGlass Ionomercement.(F)complete suture after surgery

The patient received postoperative instructions and prescriptions for the following drugs: 500mg of amoxicillin taken twice daily for 5 days, 10mg of Ketorol dt used twice daily for five days, and twice daily use of0.12%CHXmouthwashfortwoweeks.
Sutures and periodontal dressing were taken out ten days post-surgery. Splints were removedafter 2 weeks After surgery, a recall program was planned for the 1, 3 &6 months. Thepatienthad no complaints and her tooth movementhad restored to normal at the conclusionof the treatment. Probing revealed no bleeding and a 4 mm reduction in probing depth. Thebone defectwas filledradiographically.

DISCUSSION

Inacasedescribedinthisstudy,pulpnecrosiscoexistedwithsignificantperiodontalproblemsin amaxillary lateral incisor with a palatogingival groove on the palatal surface. The course of treatment was difficult and called for a multidisciplinarystrategy.[1]
The relationship between the pulpal and periodontal organs is demonstrated by the evidenceforsuchendoperiodontallesions.[6,7,8]Anoptimallocationforbacterialbuildupandsubsequ ent periodontal damage is the radicular groove. Additional pathways for bacterialinvasion of the pulp are the lateral canals and auxiliary foramina along the groove's wall orfloor, as reported by Gao et al.[9] Because of the periodontal lesion-induced inflammatoryresorption of the exposed dentinal tubules, there are additional pathways via which bacteria can migrate from the groove to the pulporgan.[9]
As a result, a primary periodontallesionwithsecondary pulpinvolvementistypicallyobserved. On the other hand, it is also feasible that the bacteria in an essentially infected rootcanal spread to the apex and posterior coronal advancement, leading to a serious period on tal defect. Consequently, the entire length of the periodontal breakdown will be completed by the apical defect joining the lesion from the groove,raisingdoubtsabout the prognosis.[10]
Furthermore, as we believe occurred in thisinstance,itispossiblethat thepulpal andperiodontal lesions have unrelated etiologies and are just coincidental in time.[7,11] Diagnosingdisorders related to the palatogingival groove is usually complicated due to the variability indouble bacterial invasion. When 14 lateral maxillary incisors with radicular grooves wereexamined using electron microscopy,itwas found thatan accessory foramen was oftenpresent in an invagination [9], serving as the main channel of communication between the pulpand periodontium. This instance was unique, though, in that CBCT imaging was used toconfirm the lack of connection between the pulp and pariodontium and that pulp necrosis waslinkedtopriortrauma.
Currently, dental CBCT imaging can produce three-dimensional pictures that allow for athoroughassessmentoftheanatomyandthespatialcorrelationsbetweendiseaseandanatomic structures, overcoming many of the limitations of conventional radiography.[12] Thisdiagnosticmethod is significantly more sensitiveand accurate than traditional radiographyforapicalperiodontitis.Becauseitcandetectperiapicalbonedegradationlinkedtoendo dontic infections before such damage is visible in an x-ray, this diagnostic method forapicalperiodontitisissignificantlymoresensitiveandaccuratethanconventionalradiography.[13]
Additionally, distinct flaws in cortical and spongy bone can be distinguishedusing CBCT imaging; both types of lesions were present in the patient studied here. Withinthe field of endodontics, CBCT imaging serves a multitude of purposes, such as identifyingcasesofapicalperiodontitis;evaluatingcanalstructure,traumaticdentalinjuries,andpos sible surgical sites; and diagnosing vertical fractures, various forms of root resorption, orsinusinvolvement.[14]
Moreover, CBCT imagingis helpful for evaluation and treatmentplanningin

situationsinvolving anatomic and morphologic abnormalities that call for endodontic therapy, such as apalatogingival groove [15]. The fact that the pulp necrosis in this instance was not associatedwiththe palatogingivalgroovemade CBCTimagingcrucial.

In the literature, numerous substitute solutions for radicular groove issues have been offered.These therapies often depend on how severe the lesion is. These consist of the following:management with gingivectomy or subgingival scaling and root planing if the groove is mild[2,3]; placement of an amalgam restoration[23] or glass ionomer[1] in mild cases or deep defects;granulation tissue removal through a flap [12]; removal of the defect at the level of crestal boneusingrotatoryinstruments(calledsaucerization)[3,11,12]withorwithoutguidedtissueregeneration techniques[24]; deliberate extraction of a problematic tooth to achieve completeremovalofthegroove;andsubsequentreimplantation[32],orthodonticextrusion,andexodontia[3,12]. These methods can all be used with or without appropriate treatment of the rootcanalsystem,as thecasedemands.

Intherealmof periodontics,aderivativeofenamelmatrixcalledEmdogainhasbeenemployed for regeneration in recently reported cases[20], and it seems to raise the levels ofclinical attachment and radiographic bone[22]. Following the administration of these proteins,freshly published investigations have demonstrated clinical evidence of tissue regenerationthroughthedepositionofcementontherootsurface[21].Emdogaintreatmentinvolvesmimicking the natural processes that take place while the root develops. The enamel organ'sapical extension is the Hertwig root sheath. Proteins of the enamel matrix are secreted by theroot sheath during root formation, and these proteins aid in the development of the acellularcementum[23]. Therefore, it appears that this unique compound made of proteins taken fromenamel matrix has the ability to induce promotion of the acellular cementum, which plays anvery important role in role in the formation, regeneration and healing of the periodontalligament and alveolar bone [24]. After a year of treatment, the periodontal ligament was boundand the alveolarbone healedintheinstance thatisbeingshown here.

The postoperative stability of the wound, which is attained by a stable suture method, isanother beneficial aspect of the healing process. The stability of the flap and the techniqueused for suturing determine the wound integrity during the initial stages of healing[25]. Anotherimportant consideration is the suture material. Research has demonstrated that monofilamentsuture materials, such as Gore-Tex, are linked to decreased plaque buildup[26], increased fluidresistance,andimprovedhealing[27].

Another contentious issue has been when sutures should be removed following surgery. Inspite of this, it is usually recommended to take out the sutures two to seven daysfollowingthe intervention[28]. However, other elements such as the patient's root canal morphology,microbiota,overallhealth,oxygenation,andtissuecarealsoplay aroleinthehealingprocess.

The prognosis of a tooth with a palatogingival grooveis primarily determined by the degreeof the periodontal disease and the width and accessibility of the groove, despite the fact thatthere are many other variables that affect the treatment plan that is outlined below[20]. As aresult,treatingtheperiodontalabnormalityappropriatelyisessentialtoasuccessfuloutcome [29]. Nonetheless, a successful resolution necessitates a comprehensive strategy that takes intoaccounteveryaspectofthe illness process.

Conclusion

Onthepalatalaspectofthemaxillarylateralincisors,apalate-gingivalgrooveisnotuncommon, and not knowing that it exists can result in improper treatment and ultimatelytooth loss. Therefore, the dentist and oral health professional should be aware of the existenceofthis groovewhendoingexaminations.

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