

Exploring anatomical uniqueness: A rare case report of the buccomesial groove variation in maxillary lateral incisor and its management

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Abstract

This case report introduces the rare anatomical variation in a maxillary lateral incisor, known as the buccomesial groove (BMG). The BMG is rare and leads to endodontic-periodontal lesions. Due to its subtle presence, funnel-shaped form, and varying depth in the root, it facilitates microbial film adhesion, leading to pathology. A 25-year-old Asian male patient presented with pain in his maxillary left lateral incisor. After comprehensive clinical and radiographic assessments, the diagnosis of pulpal necrosis with symptomatic apical periodontitis associated with BMG in the maxillary left lateral incisor was confirmed. A cone-beam computed tomography preoperatively showed the groove extending from two-thirds of the buccal to the mesial side of the left lateral incisor. This case presents a new anatomical anomaly, highlighting the necessity for precise diagnosis and treatment.

Keywords: Cone-beam computed tomography; development; diagnosis; periapical periodontitis

INTRODUCTION

Dental anomalies are the developmental defects or deformities that are often unrecognized during the diagnosis and the treatment procedures.^[1] Many times, the location of anatomical deformities facilitates plaque formation, making them susceptible to pulp involvement and contributing to endodontic-periodontal lesions.^[2]

Various studies suggested that the developmental malformations like the developmental grooves may be causatively associated with alterations during tooth development and growth, represented by an infolding

of the inner enamel epithelium and epithelial sheath of Hertwig.^[3]

However, technological advancements, including three-dimensional computed tomographic imaging, have led to the development of more precised methods for evaluating tooth anatomy, and cone-beam computed tomography (CBCT) providing high-quality imaging that allows accurate case assessment. Despite these advancements, no new developmental groove configurations have been reported since early 20th-century publications.^[4-6] Therefore, this brief report aims to introduce the discovery of a novel anatomy in a maxillary lateral incisor with the groove extending from the buccal to the mesial side, also referred to as buccomesial groove (BMG) with the two root canals with left lateral incisor.

CASE REPORT

A 25-year-old Asian male patient presented to the department of conservative dentistry and endodontics

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Date of submission : 09.12.2024

Review completed : 04.01.2025

Date of acceptance : 28.02.2025

Published : 03.04.2025

Video available on: <https://journals.lww.com/jcde>

Access this article online

Quick Response Code:



Website:
<https://journals.lww.com/jcde>

DOI:
10.4103/JCDE.JCDE_835_24

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How to cite this article: Kadoo S, Patni PM, Pandey SH, Vaswani R. Exploring anatomical uniqueness: A rare case report of the buccomesial groove variation in maxillary lateral incisor and its management. J Conserv Dent Endod 2025;28:394-7.

with the chief complaint of pain in his upper left front tooth region for 4 days. His medical history was noncontributory. Clinical examination revealed deformation in morphology with a peg-shaped maxillary left lateral incisor in relation to tooth #22. No response was perceived over cold testing when done with Endo-Frost (Coltene, Altstatten, Switzerland), and a positive response to the tenderness of percussion was present in relation to tooth #22. Probing depth was found to be more than 4–5 mm at the mesial side of the left lateral incisor.

Radiographical examination was done with radiovisiograph of the maxillary left lateral incisor, which revealed radiolucency around the periapical area and a line extending from the two-third of the buccal part to the tooth to the mesial side. However, to know the exact extent of the groove, the CBCT was performed preoperatively, which

confirmed the location and extent of the groove and the presence of two canals [Figure 1a and b], and the pulpal necrosis with symptomatic apical periodontitis associated with the BMGs was diagnosed, which prompted endodontic therapy followed by the periodontal management.

Endodontic treatment commenced after obtaining informed consent and implementing sterilization procedures. The tooth was then locally anesthetized using an infraorbital nerve block with a solution containing 2% lignocaine and an adrenaline of 1:200,000 (Themicaïne AD, Themis Medicare Ltd., India), followed by isolation using a rubber dam. The procedure proceeded smoothly without any complications.

A standard endodontic access cavity was created [Figure 1c], and both buccal and palatal canals were negotiated using a DG-16 probe. The working length was determined using

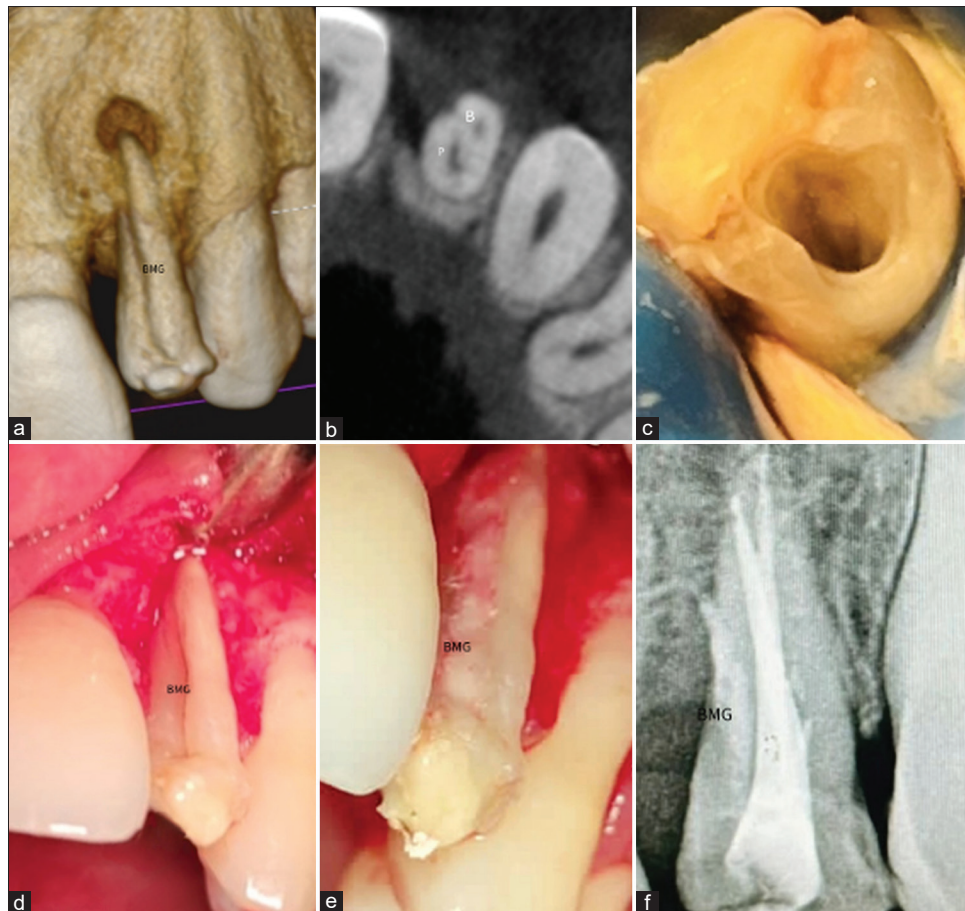


Figure 1: (a) Three-dimensional reformatted image of the cone-beam computed tomography (CBCT) shows the loss of buccal cortical plate in the sagittal aspect and the buccomesial groove (BMG), extending from the two-thirds of the buccal side to the mesial side of the root in maxillary lateral incisors with two root canals. (b) The axial section of the CBCT, with the large field of view, flat panel detector (17 × 13.5 mm in size) operating at 90 kV and 6 mA showing the two canals of the maxillary lateral incisor. (c) Intraoral image of the left maxillary lateral incisor showing the prepared conventional access cavity showing two canals. The canals were assessed in the microscope with the ×3. The image was assessed on a 32" liquid-crystal display screen where image and brightness may vary. (d) The intraoral image showing the BMG extending from the two-thirds of the buccal side to the mesial side of the root in the maxillary lateral incisors with two root canals confirming the finding of CBCT (e) The intraoral image showing a stamping of the BMG with the Bio-C Repair MTA putty (Angelus, Brazil). (f) The intraoral preoperative periapical radiograph showing the follow-up after 6 months. BMG: Buccomesial groove

an apex locator (E-PEX Pro, Orikam Healthcare Ltd., India), and the radiograph was taken. Biomechanical preparation was carried out using rotary files of Neoendo (Orikam Healthcare Ltd., India) employing the technique of crown-down till a size of 25.06%, with irrigation carried out using sodium hypochlorite of 5% (Neelkanth, Jodhpur, India) of 2.5 ml and normal saline administered through side-vented 30G needle. The final irrigation was conducted using 17% ethylenediaminetetraacetic acid (Prevest DenPro, Jammu and Kashmir, India), followed by normal saline. Calcium hydroxide dressing was given for the 14 days as an intracanal medicament. Radiography was taken with the master cones of corresponding sizes. The obturation process involved the application of AH Plus sealer (Dentsply Sirona, Charlotte, USA) along with gutta-percha cones of matching size (Dentsply Sirona, Charlotte, USA). Postendodontic restoration was done with composite (Filtek Z350, 3M ESPE, Seefeld, Germany).

Surgical access procedure

During the secondary phase of endodontic therapy, anesthesia was administered using lignocaine of 2% with the adrenaline of 1:100,000, and a periosteal flap of full thickness was raised on the buccal aspect from teeth #21 to #23 through an intrasulcular incision. Upon flap elevation, a defect was noticed that extended up to the apex with the BMG [Figure 1d], confirming the finding of CBCT. A thorough disinfection of the area surrounding the groove was conducted through precise curettage.

Following that, BMG was contoured using a number two-round diamond bur under continuous air–water spray to ensure a seamless integration with the adjacent surface for accommodating the restorative material. Bio-C Repair MTA putty (Angelus, Brazil) [Figure 1e] was then placed into the BMG after achieving adequate bleeding control. The setting time of the material was around 10–12 min. Subsequently, the flap was sutured and secured with 4-0 silk sutures.

After the procedure, the patient was enrolled in a systematic protocol of follow-up to oversee the persistent results of the procedure. After a thorough 6-month follow-up [Figure 1f], the patient was alright and did not show any symptoms. These observations imply a positive outcome of treatment and highlight an efficacy of the administered endodontic care in enhancing patient contentment.

DISCUSSION

The systemic study of the developmental grooves in different groups of teeth began in the late 19th century, with seminal works from Kovacs, Ennes, and Lara. The groove made its first identity in dental anatomy text in 1917 and was later described by Zeisz Nuckolin in 1949.

In 1957, Oehlers described a radicular invagination of an upper lateral incisor in a Chinese female.^[7-9] Lee *et al.* then formulated the term “groove.”^[10]

The BMG, in this case, extended from two-thirds of the buccal side to the mesial side, closely resembling complex root canal anatomy with two root canals. The presence of an isolated periodontal pocket indicated a long BMG, which likely contributed to concurrent endodontic and periodontal pathology, which often required an interdisciplinary approach for the management.^[11,12]

The maxillary lateral incisor usually has a single root and a single canal. However, cases of maxillary lateral incisors with more than one canal have been reported.^[13] Variations in the number of canals are associated with dental anomalies or intrusive trauma to the primary teeth during the development of the permanent successors.^[14]

As given in the previous studies, the classification of palatogingival groove includes the extent of the groove from the cingulum to the mesial, distal, or central part of the root. In this case, the BMGs [Figure 2] [Video 1] present on the lateral incisor extending from the two-thirds of the buccal side to the mesial side of the root in the maxillary lateral incisor having deep invaginations which are closed to the pulp resembling a complex root canal anatomy with two root canals as observed radiographically and confirmed on flap reflection.^[14] The presence of an isolated periodontal pocket adjacent to an enlarged gingiva indicated a long BMG, which likely led to the concurrent endodontic and periodontal pathology.^[15] Given the inflammation of the pulp of the afflicted tooth, endodontic treatment followed by the periodontal therapy was suggested.^[16]

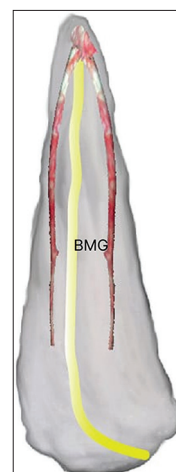


Figure 2: The diagrammatic representation of the BMGs present on the lateral incisor extending from two-thirds of the buccal side to the mesial side of the root in maxillary lateral incisors with two root canals. BMG: Buccomesial groove

Treatment strategies for shallow grooves include saucerization or odontoplasty, while more complicated grooves may require odontoplasty combined with restoration using materials like Bio-C Repair MTA as it has decent mechanical properties, easier handling, and a short setting time of 12 min.^[17,18]

The existence of a BMG might not inevitably lead to pathology that typically arises unless there is a discontinuity in the attachment of the epithelium, resulting in advancing inflammation due to plaque retention.^[18] Therefore, a thorough clinical examination of BMG should be invigorated as part of treatment protocol, and if a groove is conjectured, preventive restoration or regular prophylaxis with constant reevaluation of the concerned tooth is recommended to prevent complications.^[19-21]

CONCLUSION

This case reports the identification of distinctive and unidentified root canal anatomy in the maxillary lateral incisor named as BMG. This new anatomy provides the comprehension to the complexity and anatomy of this group of the teeth without any limitations.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Acknowledgment

The authors would like to thank Dr. Vinod Bhandari, Founder Chairman, Sri Aurobindo Institute of Medical Sciences, Indore, Madhya Pradesh, India, and Dr. Manjushree Bhandari, Chancellor, Sri Aurobindo University, Indore, Madhya Pradesh, India, for their valuable support and guidance.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Ahmed HM, Dummer PM. A new system for classifying tooth, root and canal anomalies. *Int Endod J* 2018;51:389-404.
2. Biswas M, Mazumdar D, Saha B, Agarwala S, Saha KK, Chowdhury K. Cone-beam computed tomographic evaluation to estimate the prevalence of palatogingival groove in the maxillary anterior teeth and its radiographic characteristics: An institutional retrospective study. *J Conserv Dent Endod* 2024;27:233-9.
3. Shrestha A, Marla V, Shrestha S, Maharjan I. Developmental anomalies affecting the morphology of teeth – A review. *Rev Sul Bras Odontol* 2015;12:68-78.
4. Koteeswaran V, Chandrasekaran S, Natanasabapathy V. Endodontic management of double dens invaginatus in maxillary central incisor. *J Conserv Dent* 2018;21:574-7.
5. Lekshmi MS, Sharma S, Gupta SR, Sharma S, Kumar V, Chawla A, *et al.* Prevalence and radiological characteristics of palatogingival groove: A retrospective cone-beam computed tomography study in an Indian cohort. *J Conserv Dent* 2021;24:359-63.
6. Patel S, Brown J, Pimentel T, Kelly RD, Abella F, Durack C. Cone beam computed tomography in endodontics – A review of the literature. *Int Endod J* 2019;52:1138-52.
7. Shah N, Bansal N, Logani A. Recent advances in imaging technologies in dentistry. *World J Radiol* 2014;6:794-807.
8. Oehlers FA. Dens invaginatus (dilated composite odontome). I. Variations of the invagination process and associated anterior crown forms. *Oral Surg Oral Med Oral Pathol* 1957;10:1204-18 contd.
9. Preshaw PM. Detection and diagnosis of periodontal conditions amenable to prevention. *BMC Oral Health* 2015;15 Suppl 1:S5.
10. Lee KW, Lee EC, Poon KY. Palato-gingival grooves in maxillary incisors. A possible predisposing factor to localised periodontal disease. *Br Dent J* 1968;124:14-8.
11. Fabra-Campos H. Failure of endodontic treatment due to a palatal gingival groove in a maxillary lateral incisor with talon cusp and two root canals. *J Endod* 1990;16:342-5.
12. Garrido I, Abella F, Ordinola-Zapata R, Duran-Sindreu F, Roig M. Combined endodontic therapy and intentional replantation for the treatment of palatogingival groove. *J Endod* 2016;42:324-8.
13. Lara VS, Consolaro A, Bruce RS. Macroscopic and microscopic analysis of the palato-gingival groove. *J Endod* 2000;26:345-50.
14. Ennes JP, Lara VS. Comparative morphological analysis of the root developmental groove with the palato-gingival groove. *Oral Dis* 2004;10:378-82.
15. Bhatsange A, Japatti S, Attur K. Palatogingival groove: Management of an innocuous culprit of a perio-endo lesion. *Peoples J Sci Res* 2012;5:43-6.
16. Kim HI, Noh YS, Chang HS, Ryu HW, Min KS. The palato-gingival groove-anatomical anomaly occurred in maxillary lateral incisors: Case reports. *J Korean Acad Conserv Dent* 2007;32:42-5.
17. Rangaswamy P, Tummala S, Magarvalli S, Sujith, Govindappa K. The Palato-gingival groove: A silent nidus. Recognition and an innovative management approach: A report of 3 cases. *IP Indian J Conserv Endod* 2021;6:114-9.
18. Johns DA, Shivashankar VY, Shobha K, Johns M. An innovative approach in the management of palatogingival groove using Biodentine™ and platelet-rich fibrin membrane. *J Conserv Dent* 2014;17:75-9.
19. Karunakaran JV, Fenn SM, Jayaprakash N, Ragavendran N. Successful surgical management of palatogingival groove using platelet-rich fibrin and guided tissue regeneration: A novel approach. *J Pharm Bioallied Sci* 2017;9:S268-73.
20. Varun K, Arora M, Pubreja L, Juneja R, Middha M. Prevalence of dens invaginatus and palatogingival groove in North India: A cone-beam computed tomography-based study. *J Conserv Dent* 2022;25:306-10.
21. Zhu J, Wang X, Fang Y, Von den Hoff JW, Meng L. An update on the diagnosis and treatment of dens invaginatus. *Aust Dent J* 2017;62:261-75.