



ORIGINAL ARTICLE

Crown morphology of the mandibular first molars with distolingual roots



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Received 26 August 2013; Final revision received 30 June 2015

Available online 15 March 2016

KEYWORDS

distolingual root;
mandibular first
molar;
morphology;
tooth crown

Abstract *Background/purpose:* Most mandibular first molars have two roots. A major common variation of this tooth is the presence of a distolingual root, which is a common Mongoloid trait in certain populations. The aim of this article was to examine crown morphology in relation to the presence of the distolingual root.

Materials and methods: Using dental casts, the crown morphology of 141 mandibular first molars from 71 Taiwanese individuals was analyzed. Periapical radiographs were used to detect distolingual roots. The length and width of the crowns and the crown units (i.e., trigonid and talonid) were measured. Ten intercuspal distances and five cusp angles were examined.

Results: The buccolingual dimension of the crown and its ratio to the mesiodistal dimension were significantly increased in molars with a distolingual root, compared to molars without a distolingual root. Mesiodistal crown dimensions were similar; however, the crown unit dimensions were different: molars with a distolingual root had a shorter mesiodistal trigonid dimension but a longer talonid dimension, compared to molars without a distolingual root. The intercuspal distances from the three buccal cusps to the distolingual cusp were significantly longer, however, the distance between the mesiobuccal cusp and mesiolingual cusp was significantly shorter in teeth with a distolingual root than in teeth without a distolingual root. A significantly wider mesiolingual angle and narrower distolingual angle were observed in molars with a distolingual root, compared to molars without a distolingual root.

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Conclusion: The presence of a distolingual root significantly increased the buccolingual dimension of the crown and the location of distolingual cusp is significantly closer to the lingual side. Copyright © 2015, Association for Dental Sciences of the Republic of China. Published by Elsevier Taiwan LLC. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Most mandibular first molars have two roots (one mesial and one distal) and three canals (two mesial and one distal).¹ A major variant of this tooth type is the presence of a third root, or a supernumerary lingual root, called radix entomolaris.^{2,3} In Caucasians, the highest reported prevalence of distolingual root is 5%^{4–6}; therefore, a distolingual root is an unusual or dysmorphic root morphology.

A high percentage (20–35%) of mandibular first molars with a distolingual root in Taiwanese people has recently been observed in our study and in other studies.^{7–13} Similar prevalence rates of three-rooted molars have been demonstrated in populations with Mongoloid traits such as Chinese, major group of Eskimo people, and Native Americans.^{14–16} Because of the high prevalence,^{12,17} the extra root should be considered a normal morphological variant (i.e., eumorphic root morphology).

Awareness of the presence of a distolingual root is important for successful root canal treatment and periodontal care.^{3,7,17} The root morphology correlated with the molars with and without a distolingual root has been examined^{12,18,19}; however, there is limited information on crown morphology in relation to the presence of the root. The aim of the study was to analyze the variation in the crown morphology of mandibular first molars with and without the distolingual root by examining the dental cast models.

Materials and methods

The dental stone models were obtained from 71 patients (31 men and 40 women) with a mean age of 33.1 years old. They had attended the dental clinic at Tri-Service General Hospital (Taipei, Taiwan) or a private dental clinic from September 2008 to October 2012. The inclusion criteria were that the patients had: (1) Han Chinese ethnicity; (2) Angle's Class I occlusion with minor or no crowding; and (3) well-aligned dental arches. The rejection criteria were: (1) gross restorations or crowns that may alter the morphology of the tooth; (2) congenital defects or deformed teeth; and (3) obvious interproximal or occlusal wear. The presence or absence of the distolingual root was examined on dental radiographs modified from previous studies.^{7,9} Periapical ultraspeed film (Eastman–Kodak, Rochester, NY, USA) and a parallel film holding system (Rinn XCP film holding system, Friadent, Mannheim, Germany) were used. In the present study, 68 teeth with a distolingual root and 73 without a distolingual root were included.

The tooth size variables were divided into the crown dimension,²⁰ the crown unit dimension (i.e., cuspal

component), the intercusp distance,²¹ and the three-cusp angle (Figure 1).²² The trigonid (TR, the mesial half of the crown) and talonid (TL, the distal half of the crown) were used to define the two crown units.²⁰ The dimensions of the tooth crown were defined as the maximum mesiodistal (maxMD) and maximum buccolingual (maxBL) crown diameters and measured parallel to the occlusal plane. The dimensions of two crown units, the TR and the TL, were the mesiodistal (MD) and buccolingual (BL) diameters of the TR and TL (i.e., TRMD, TLMD and TRBL, respectively). Furthermore, the buccolingual dimensions of the two distal cusps on the talonid (DcBL) were also measured in the present study. The boundaries between the TR and TL follows the definition used in the study by Kondo and colleagues²⁰: the midpoint between the mesial central fossa and the intersection of the buccal groove with the protoconid-hypoconid ridge. The measurement was recorded to the nearest 0.01 mm using a digital caliper.

The cusp tips of the dental casts were first marked with a sharp pencil to create five small dots, based on the anatomy of cusps and grooves on the crown. These five dots were then used as the reference points to calculate the intercusp distance and the three-cusp angles, which were modified from previous studies.^{21,23} In brief, the distances

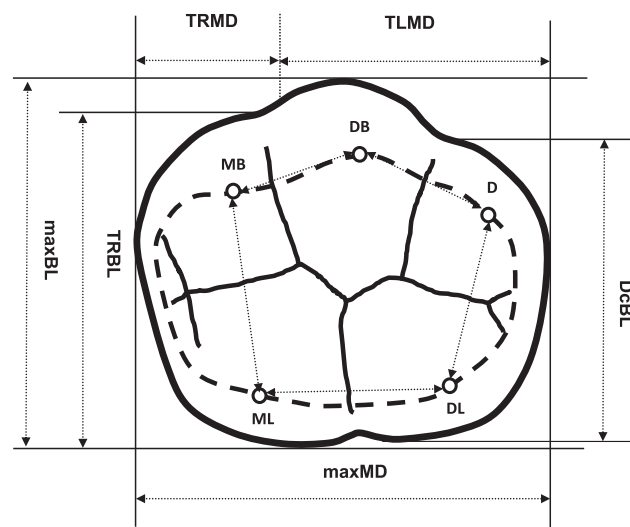


Figure 1 Measurements of the crown dimensions, the crown unit dimensions, and the intercusp distances of the mandibular molar. DcBL = buccolingual dimension of distal cusp; maxBL = maximum buccolingual dimension of the crown; maxMD = maximum mesiodistal dimension of the crown; TLMD = mesiodistal dimension of the talonid; TRBL = buccolingual dimension of the trigonid; TRMD = mesiodistal dimensions of trigonid.

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