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Morphological Assessment of Upper First Premolars Using Cone-Beam Computed Tomography

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Objectives Upper first premolars usually have two roots and two canals, however due to their numerous variations, detail cone-beam computed tomography (CBCT) analysis is required for successful root canal treatment (RCT). The aim of this study was to evaluate the furcation level, furcation groove presence, wall thickness and canal shape using CBCT.

Methods The sample size consisted of 30 extracted maxillary first premolars with two separate roots. After flattening the occlusal planes to the level of the central fissure, trepanation and gaining patency (K#08), each canal was irrigated with 20ml of 0.5% NaOCl. The teeth were scanned on Cavo CBCT 3D. Subsequently, the furcation depth, furcation groove, wall thickness and canal shape were analyzed in OnDemand3D CD Viewer program. The results were statistically analyzed in IBM SPSS Statistics 25.0. program.

Results The mean furcation distance from the cement-enamel junction was 2.48 ± 0.71 mm. Twenty six out of thirty premolars had a furcation groove on the buccal root and in most cases it was extended to the transition from the middle to the apex third. The average thickness of the middle third of the buccal root palatal wall was 0.93 ± 0.40 mm, and even in 62.5% of cases it was less than 1 mm. The buccal root in most of the samples (63.63%) was S-shaped, while the palatal root showed a more even distribution of shapes, with a slightly higher prevalence of C-shaped canals.

Conclusions The common presence of the furcation groove and irregularities in wall thickness indicate the importance of being familiar with problem zones during RCT.