

INTRODUCTION

The knowledge of root canal morphology is important for dentistry. The success of root canal treatment depends on achieving a complete three-dimensional cleaning, shaping and sealing, so the knowledge about root canal morphology is essential¹⁻³. The population of Yucatan, Mexico, descends from the Maya ethnic group, which presents variety in root morphology similar to the mongoloid group⁴⁻⁷. Therefore, clinicians practicing in this region of Mesoamerica must be aware of the specific morphological characteristics of this population and its variability in order to achieve a successful treatment. Objective: to describe the internal and external root morphology of upper first premolars in a Yucatecan sample using tomography.

METHODS & MATERIAL

Sample Selection

The images were obtained from Cone Beam Computed Tomography (CBCT) at the Radiology Department of the Dental School of the Universidad Autónoma de Yucatán (UADY). UADY's Medical Ethics Committee approved this study. All the CBCT scans were taken as part of the diagnosis and treatment plan of patients who required different kinds of surgical procedures and were analyzed retrospectively by two of the authors. Therefore, the reasons for CBCT were independent of this study. Nonetheless, all patient signed a consent form to allow the use of their clinical data for academic purposes without compromising their confidentiality. All the available tomographic images in which both upper first premolars were visible were selected, for a total of 884 teeth.

CBCT Analysis

The cone-beam computed tomography images were obtained using a CBCT scanner (17-19 iCAT® Imaging System, Spain) at 120 kV and 5 mA with an exposure time of 26.9 s, to 16 cm x 13 cm field of view, voxel size of 200 μm and coupled to an iCAT Vision® (Spain) software. The number of roots and root canal configurations were determined in each tooth by moving the cursor to the Z-axis (figure1) in three planes (coronal, sagittal, and axial). The configuration of root canals were identified, observed and recorded according to Vertucci's classification (see figure 2).

Figure 1. A CBCT scan with the upper first premolars (the right with two and the left one with three roots).

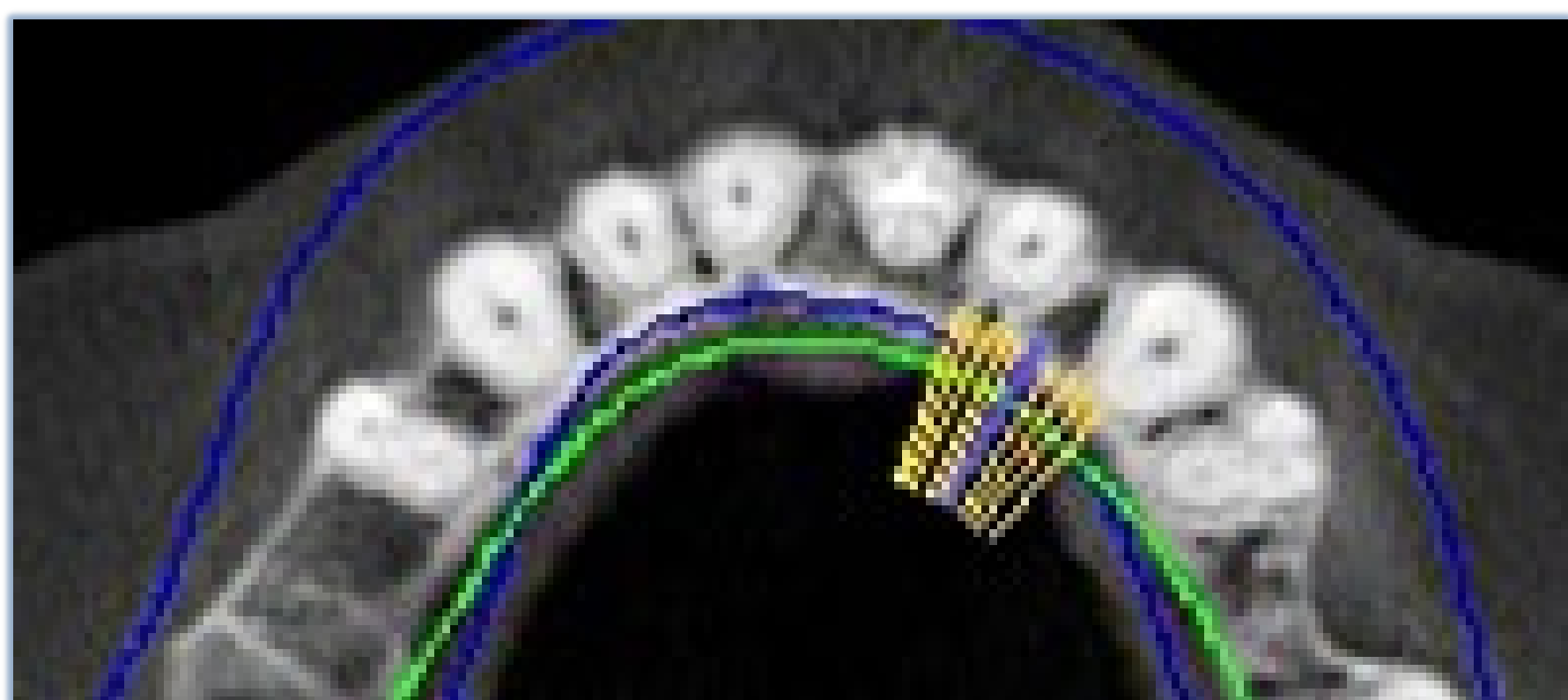
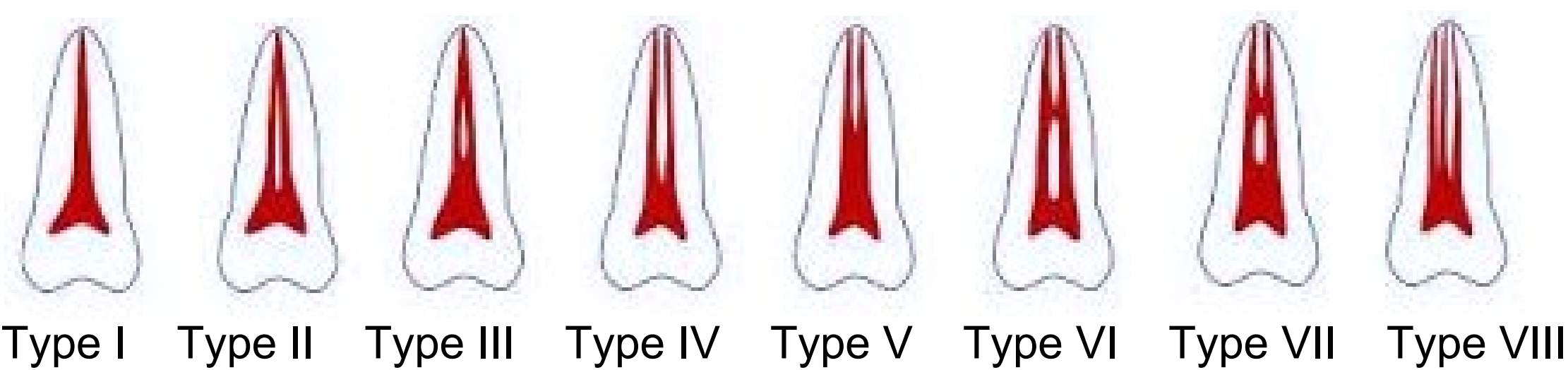


Figure 2. Vertucci's classification¹.



The qualitative and quantitative features that characterized the root and root canals, were reported in an Excel® data base, and frequencies were calculated. Chi-Squared (X^2) test was used to analyze the differences between independent groups.

RESULTS

A total of 1114 CBCT scans were studied, of which 442 had both upper first premolars, making a total of 884 analyzed teeth. Of these, 588 had only one root (66.51%), 293 had two (33.14%) and 3 (0.33%) three roots. The distribution of the number of roots is observed in table 1.

Table 1. Distribution of the number of roots of the upper first premolars according to the side (right and left) and sex.

	1 y 1 n (%)	1 y 2 n (%)	2 y 2 n (%)	2 y 3 n (%)	Total n (%)
Female	182 (65.46)	36 (12.94)	57 (20.50)	3 (1.07)	278 (59.14)
Male	84 (51.21)	20 (12.19)	60 (36.58)	0 (0.00)	164 (34.89)
Total	266 (60.18)	56 (12.67)	117 (26.47)	3 (0.68)	442 (100.00)

Vertucci's type I predominated in the internal morphology. The single-rooted ones presented internally greater variability. By the other side, 100% of the cases with 2 and 3 roots had one canal in each root. The distribution of the root canal morphology is observed in table 2.

Table 2. Distribution of the root canal morphology of the single-rooted upper first premolars according to Vertucci's classification and sex.

	VERTUCCI'S CLASSIFICATION							Total n (%)
	I n (%)	II n (%)	III n (%)	IV n (%)	V n (%)	VI n (%)	VII n (%)	
Female	193 (48.25)	65 (16.25)	32 (8.00)	65 (16.25)	34 (8.50)	7 (1.75)	4 (1.00)	400 (68.03)
Male	64 (34.04)	35 (18.62)	11 (5.85)	41 (22.81)	24 (12.77)	11 (5.85)	2 (1.06)	188 (31.97)
Total	257 (43.71)	100 (17.01)	43 (7.31)	106 (18.03)	58 (9.86)	18 (3.06)	6 (1.02)	588 (100.00)

Statistically significant differences were found according to sex by side ($X^2 = 13.5541$, $p = 0.00114$) and between the single-rooted ones ($X^2 = 18.7183$, $p = 0.004667$).

DISCUSSION & CONCLUSION

The upper first premolar is considered a tooth with high variation in its root anatomy and canal morphology. Similar to other authors, most of the upper first premolars have 1 root followed of 2 roots and in some cases they have 3 ones. Internally they mostly have 2 canals distributed in different ways^{2,9}. Single-rooted teeth showed greater variability as most of the studies reported in the literature^{2,4}. On the other hand, the biradiculars were more regular since they presented one canal for each root. A significant difference was found about the number of roots by sex and between the sex and the internal root canal morphology in the single-rooted ones.

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