EVALUATION OF CANAL ORIFICE INTER-RELATIONSHIP AND CO-RELATION TO OCCLUSAL MORPHOLOGY IN HUMAN PERMANENT MANDIBULAR FIRST MOLAR TEETH: A IN-VITRO STUDY

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INTRODUCTION: Successful treatment outcomes of endodontic therapy is consistently achievable by adequate awareness of anatomy of the root canal and its relationship to the morphology of the root and surrounding structures. The complexities of the root canal system have been analysed by various researchers as the clinician needs a clear and precise perspective of the presenting canal anatomy.

AIM: The purpose of this study was to to evaluate the interrelationship of orifices and correlate the landmarks on the occlusal surface in the human permanent mandibular first molar teeth.

MATERIALS AND METHODS: A total of 314 extracted permanent human mandibular first molar teeth were used. Group L consisted of 155 molars and Group R consisted of 159 molars. Cupal tip of each tooth was marked and occlusal imaging done.All samples were sectioned at the level of the cemento-enamel junction using a diamond saw with water coolant. The samples were then placed on the same custom sample placement block and the imaging procedure done using the customized jig setup with the same reference markers, used for the occlusal imaging process.All the samples were analyzed under a operating microscope under 12.8x magnification. The pulp chamber floor was searched for root canal orifice . The observations were recorded. The various angles between the orifices were also calculated using, an image analysis software. The set of angle relationshipsbetween the orifices

mesiobuccal, mesiolingual, distal and distolingual were calculated and recorded. The cusp tip to orifice distances, inter cuspal distances were calculated using an image analysis software and the results recorded. The final images of the pulp chamber floor with orifices were analysed after super-imposition with the occlusal image by a stacking process using a image processing software and Further a frequency distribution map was also generated

RESULTS: Results shows that teeth with single distal orifices were (69.40%), Two distal orifices (26.10%), Disto-lingual orifices (4.40%) and Angles A(19.1), B(21.3), C(40.1), D(65.4), E(72.7), F(20.81), G(21.16), H(62.85), I(66.83), J(85.98), K(25.79),L(106.27). Distances a (1.93mm), b (2.0mm), c (3.05 mm), d (3.16 mm), e (2.05 mm), f (1.98 mm),g (2.40 mm), h (2.19 mm), i (1.22 mm).The mesiobuccal orifice was located closest to the mesiobuccal cusp tip at 1.93 mm distally, towards the mesio-distal midline, the mesiolingual orifice was located closest to the lingual cusp tip at 2.00 mm distally, towards the mesio-distal midline, the distal orifice was located from the disto-buccal cusp tip at 3.00 mm towards the mesio-distal midline and distolingual cusp tip at 3.16 mm onwards the mesio-distal midline with a slight distal tilt and the cusp tips could be used as a constant reference point for location of the orifices and designing access preparation.

CONCLUSIONS: Based on the results of the analysis, the orifices were fairly consistently located in relation to each other, irrespective of the size or the position of the tooth. The angles and distances were fairly symmetrical for the L and R groups which confirms the concept of quantifiable pulpal floor morphology.