

Dimensions of Pulp Chamber and Furcal Dentin in Mandibular First Molar in South Indian Population - A Radiographic Study.

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Abstract:

Aim: To estimate the height of the pulp chamber and the distance between the floor of the chamber and the furcation in permanent mandibular first molars.

Objective : This study is done to investigate radiographically the height of pulp chamber from ceiling to the floor of the pulp and the distance between the floor of chamber and furcation in permanent mandibular first molar.

Background: The pulp chamber's roof and walls are made up of outlying dentin. By estimating their exact thickness of the dentin between the floor of the pulp chamber and furcation of the molar, helps to avoid mishaps like perforation and estimating the height of the chamber will help in locating the canals during access opening. This helps in avoiding iatrogenic injuries.

Reason : This study is done to help in locating the canals and avoid perforating the tooth at the furcation.

INTRODUCTION:

Ideal access cavity which exposes all the canals with minimum loss of tooth structure is challenging for any dental clinician performing endodontic procedure. One of the iatrogenic errors in endodontics is molar tooth perforation and the clinician has to rely on his tactile perception which gives undesirable results again leading to increased chances of perforations. Perforation of molar tooth will slow down the prognosis of the tooth and extraction will be required some cases [1]. Therefore precise knowledge of the dimensions and measurements of pulp chamber will give clear-cut idea and caution on depth and exact location of the pulp for access opening. There are studies done using the panoramic and bite wing in investigating the pulp chamber dimensions. The dimensions of the pulp chamber also depends on the age since dentin deposition is more in the furcation areas as age progresses. In this study, IOPA (Intra oral periapical) films are used. In a clinician day to day practice, IOPA is commonly used diagnostic tool. Panoramic [2] or CBCT are available in a laboratories or hospitals because they

either require space, they are expensive and also unnecessary radiation exposure. This study is done to relate age with dimensions of pulp chamber in South Indian population and to better avoid perforating the molar tooth.

MATERIALS AND METHOD:

A total of 200 Intra Oral Periapical Radiographic films was taken. They were divided in to four groups based as Group 1: 21-30, Group 2: 31-40, Group 3: 41-50 and Group 4: 51-60. Using the radiographs, 4 values were measured using Dental Imaging software 6.14.7. The medial horn is measured from the roof to the floor of the pulp chamber. The central portion of the pulp chamber was measured from the roof to floor of pulp chamber. The distal horn is measured the same. The distance from the floor to furcation of the molar root is measured from the floor of the pulp chamber to the furcation area. These value were measured in millimetres. Then statistical analysis is done by calculating average values based on their age and graph is drawn.

RESULTS:

Age	Vertical dimension of Mesial horn to the floor of the pulp chamber	Vertical dimensions of the Distal horn to the floor of the pulp chamber	Vertical dimension of the floor of the chamber to furcation of the molar tooth	Vertical dimension of the roof of the chamber to floor of the pulp chamber
21-30	2.76 mm	2.03 mm	1.54 mm	1.42 mm
31-40	2.76 mm	2.63 mm	2.17 mm	1.24 mm
41-50	2.36 mm	1.81 mm	2.65 mm	1.12 mm
51-60	2.11 mm	1.65 mm	2.83 mm	0.83 mm

Fig. 1: Average of vertical dimensions in relation to age

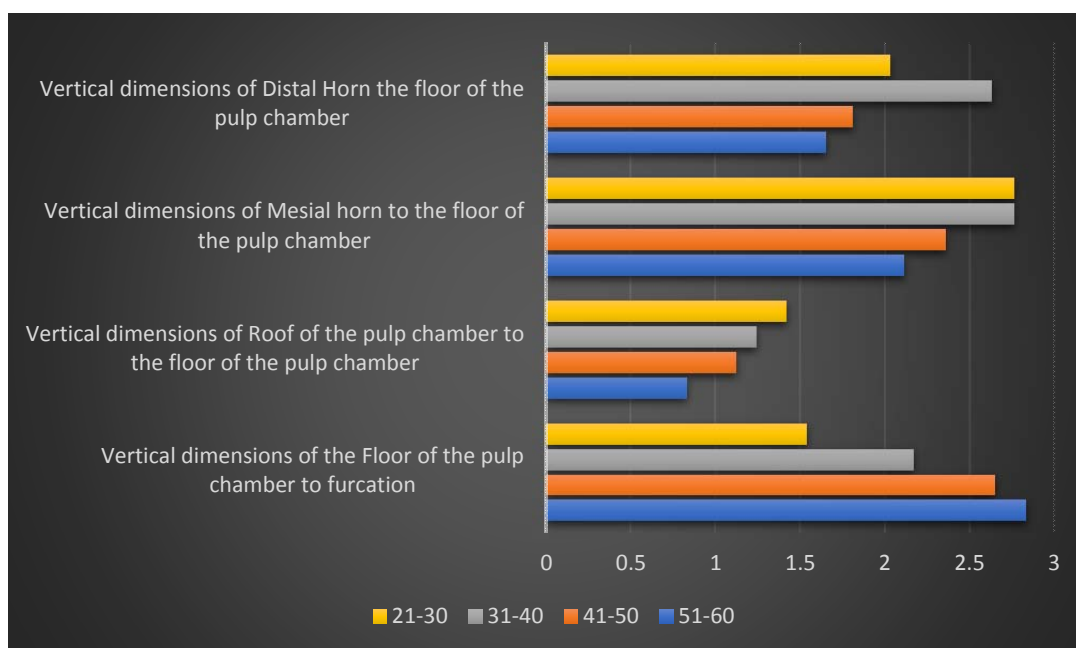


Fig. 2: Graphical representation of the average results

DISCUSSION:

The knowledge of the dimensions of pulp chamber is important to avoid iatrogenic perforations. In this study, there is difference in vertical dimensions of the mesial and distal pulp horn to floor of the pulp chamber.

Mesial horn being bigger in size in most patients, this shows that the chances of pulp exposure in class II mesial placed restoration is higher. Based on age, there is regression in size of mesial pulp horn and distal pulp horns to the floor of the pulp chamber in the order of 21-30>31-40>41-50>51-60 age groups. So precaution should be taken will doing access cavity.

There is also increase in the distance between the floor of the chamber to the furcation as age progresses. The thickness of the pulp chamber decreases with age indicating that dentin is being deposited. The age should be related with dimensions of pulp chamber, it is important during access cavity preparation because when the pulp chamber is small there no need to wait for the drop effect.

A study done by Tsatsoulis et al who measured the pulp chamber morphological measurement with panoramic radiograph, mentioned that the accuracy is more and radiation is less when compared to 14 IOPA [2]. But IOPA is a better indication for diagnosing a single tooth and panoramic can be used if full mouth evaluation is required. Bitewing is also a good diagnostic tool which can be used to measure the dimensions of pulp chamber. In other study done by Deutsch and Musikant used RVG to measure the anatomical landmarks of the pulp chamber and found the mean distances as: Pulp chamber floor to furcation 2.96 ± 0.78 and pulp chamber ceiling to furcation 4.55 ± 0.91 [3]. Khosjastpour et al measured the size of the pulp chamber in mandibular first molar of age groups 18-25 and 50-65. He

found that the mean distance from the furcation to the pulp chamber floor is 2.89 ± 0.61 3.31 ± 0.43 and roof to the floor of pulp chamber is measured to be 2.32 ± 0.56 1.65 ± 0.50 mm. He concluded that changes occurs in the mandibular first molar with age using bitewing radiograph [4]. The mean measurement found in this study is much lesser than in a study done by Khosjastpour et al.

CONCLUSION:

Preoperative radiograph should be studied properly before starting access cavity preparation. The age of the patient determines the outcome of the cavity preparation because there will be changes in pulp chamber dimensions as age progresses due to natural dentin deposition. So there will not be any drop effect in older patients and the caries involving the medial horn of the pulp is higher in younger patients. IOPA is the most commonly used diagnostic radiograph. So it is practical to use this type of radiograph for measuring the pulp chamber dimensions.

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