Anatomy of the Pulp Chamber Floor of the Permanent Maxillary and Mandibular Molars

SUMMARY

Objectives: The purpose of this study was to evaluate the shape of pulp chamber floors of maxillary and mandibular molars.

Methods: A total of 111 maxillary and 248 mandibular extracted molars were used in the study. The crowns of the teeth were removed from the cemento-enamel junction by the help of a diamond bur. Pulp chamber floors of the teeth were filled with temporary restorative material. The shape of the cavities were evaluated by 3 independent observers.

Results: Of the 111 maxillary molars evaluated, 32 teeth had triangular pulp chamber floor. 79 of them had rhomboidal pulp chamber floor like the occlusal form of these teeth. Of the 248 mandibular molars, 170 teeth had rectangular pulp chamber floor, 72 triangular, and only 6 teeth had oval shaped chamber floor.

Conclusion: The shape of the access cavity should be changed from the conventional triangular shape to rhomboidal shape in maxillary molars and to rectangular shape in mandibular molars.

Keywords: Maxillary Molar; Mandibular Molar; Access Cavity, shape

Introduction

One of the most important aspects in contemporary endodontics is a thorough knowledge of internal and external root anatomy. Root canal anatomy has always been one of the most popular subjects in endodontics. In 1969, Weine et al. evaluated 208 maxillary molars and found 51.5% of them to have 2 canals in the mesiobuccal roots. A few years later, in 1971, Skidmore and Bjorndal investigated 45 extracted first molars and found 4 root canals in approximately one third of the teeth. The fourth canal was located in the distal canal. These 2 cornerstone studies were supported by many authors. Studies, in which the root canal configuration of maxillary molars has been evaluated, frequently concluded that “the normal anatomy of the maxillary first and second molars is the 2 canals in the mesiobuccal root”. It has been similar in mandibular molars: distal root of mandibular molars frequently has a root canal system containing more than 1 canal.

In the light of these findings, a discussion was born whether it is logical to prepare a triangular shaped endodontic cavity in posterior teeth or not. It was also proposed that endodontic access cavity should be dictated by the anatomy of pulp chamber floor to find the extracanals. The aim of this study was to evaluate the shape of pulp chamber floors of maxillary and mandibular molars.

Materials and Methods

A total of 111 maxillary and 248 mandibular extracted molars were used in the study. The age, sex and the reasons of the extraction were not recorded. The teeth were placed in 5% NaOCl for 30 minutes to remove the organic tissue. The crowns of the teeth were removed from the cemento-enamel junction by the help of a diamond bur under water coolant. To detect the borders of the pulp chamber floor, the cavities in the roots were filled with temporary filling material (Coltosol, Coltene, Germany). The shape of the cavities was evaluated by 3 independent observers.
Results

Of the 111 maxillary molars evaluated, 32 teeth had triangular pulp chamber floor; 79 molars had rhomboidal pulp chamber floor like the occlusal form of these teeth.

Of the 248 mandibular molars, 170 teeth had rectangular pulp chamber floor, 72 teeth triangular, and only 6 teeth had oval-shaped chamber floor.

Discussion

A major cause of failure in root canal treatment is the inability to locate, debride and fill the frequently present extra-canals. In 1990, Kulild and Peters\textsuperscript{5} evaluated the incidence of second mesio-buccal canal in the extracted teeth. 51 first and 32 second maxillary molars were used in the study. It was found that the incidence of the second canal in these teeth was 54.2\% by the investigation of hand files. However, this ratio rose up to 95.2\% by the help of burs and microscope.\textsuperscript{3} A similar study was performed by Imura et al.\textsuperscript{8} They studied 42 first and 30 second extracted maxillary molars were root canal had been treated by graduate students. The results demonstrated that 52.3\% of the first and 40\% of second molars had 2 canals obturated in mesio-buccal root. On the other hand, after clearing process, the presence of second canals rose to 80.9\% and 66.6\%, respectively.\textsuperscript{5}

Today, it is accepted that maxillary molars frequently have a second canal in the mesio-buccal root, but it is difficult to be located clinically.\textsuperscript{3,5,6} There is no doubt that this second canal, named “mesio-buccal 2” should be expected until radiographic and clinical evaluations show the contrary.\textsuperscript{3} This fact is similar in mandibular molars. Considering the results of root canal configuration studies of mandibular molars, it is not a surprise to locate the second canal in the distal root.\textsuperscript{2,7,9}

According to this data, some authors advised to re-evaluate the design of endodontic access cavities of both maxillary and mandibular molars.\textsuperscript{5,9,11} Actually, the endodontic access cavity should be prepared according to the borders of the pulp chamber floor. The results of our study clearly demonstrate that most of maxillary molars have rhomboidal pulp chamber floor. This result was supported by Vigoroux and Bosaans who evaluated 134 maxillary molars and found that 52.24\% of the teeth had trapezoidal shape. Only 6 of them had triangular pulp chamber floor. In our research, it is also shown that the pulp chamber floor of mandibular molars is frequently rectangular. All these internal anatomy studies showed that conventional triangular-shaped cavity is not enough to locate the fourth canal in both maxillary and mandibular molars.\textsuperscript{9-11} A large opening needs to be made to ensure all morphologic details were accessed. To search the fourth canal, the first step should be to modify endodontic access cavity preparations.\textsuperscript{9-11} The shape of the access cavity should be changed from the conventional triangular shape to rhomboidal shape in maxillary molars and to rectangular shape in mandibular molars. In addition to modified access cavity, radiographs from different angles, loops, dental operation microscopes, bubble test (warmed 2.6\% NaOCl) are other facilities for finding the extra-canals.\textsuperscript{6,8}

References


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