Original paper

Access Cavity- the First Step in a Successful Endodontic Treatment

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ABSTRACT The purpose of this paper is to prove that corect access cavity is an important step in endodontic treatment and all the other steps depend on this preliminary phase.**Material and method.** In our study we used a number of 50 monoradicular and pluriradicular teeth, with different grades of radicular curvature. Cavity access was made using the adequate burs in order to obtain outline form and facilitate the action of canal instruments. **Results.** In order to obtain outline form cavity walls often have to be extended to permit both corect cleaning and shaping and corect tridimensional obturation. **Discussions.** An access cavity that has been prepared improperly in terms of position, depth or extent will hamper the achievement of proper results in endodontic treatment and will ultimately lead to failure by either root perforation, „ledge" or „shelf" formation within the canal, instrument breakage, zipping or apical transportation. **Conclusions.** Complete control of the clinician over the enlarging instruments is very important and this is very easy to obtain by creating a corect access cavity

KEY WORDS *mechanical root canal treatment, Ni-Ti files, ProTaper manual system*

Introduction

Endodontics has known an important development over the past 10-20 years, there were discovered numerous concepts and theories, there were invented new instruments and special tecniques, all these serving the final purpose of endodontic treatment that is maintaing the perfect health of the tooth and the surroundig tissues and preventig any periapical lesions.

It is universally accepted that a successful outcome in endodontic treatment depends on three factors: cleaning and shaping, desinfection and three-dimensional obturation of the root canal system.

Although it is impossible to determine which of the three factors is the most important it is obvious that the clinician should grant equal attention to all steps in endodontic treatment. However, there is one step that precedes these three factors and that is preparating the correct cavity access. This preliminary step permits localization, cleaning and shaping, desinfection and three-dimensional obturation of the root canal system therefore should not be undervalued or neglected. The success of endodontic treatment depends entirely on precise, proper execution of this step.

Material and method

In our study we used a number of 50 monoradicular and pluriradicular teeth, with different grades of radicular curvature. We followed all the steps in order to obtain a correct access cavity in terms of position, depth and extent. Therefore we used round diamond burs mounted in a high-speed handpiece in order to remove the enamel and penetrate the the pulp chamber.

For the enlargement phase we used round burs mounted on a low-speed

handpiece. The diameter of the active portion of the burs is smaller than that of the preceding burs and the shaft is longer for improved penetration and visibility. For the finishing and flaring phase we used non-end-cutting burs mounted in a high-speed handpiece. The non-end-cutting head of the bur precludes modification of the very important floor anatomy of the pulp chamber. In order to enlarge the first portion of the root canal we used manual and rotative

ProTaper instruments and also the classic endodontic instruments. The first step in endodontic treatment was preparing the cavity access, following the basic principles:

- Outline form
- Convenience form
- Removal of the remaining carious dentin
- Toilet of the cavity

Results and discussions

The access cavity must make the succeeding steps of the endodontic treatment easier and safer and offer the clinician complete control over the instruments, therefore we accomplished the following criteria:

The access cavity must be extended enough to permit complete removal of the endodontic content of the pulp chamber. Considering this, we completely removed the roof of the pulp chamber and its content avoiding at the same time reinfection of the endodontic space with remaining cavity dentin. Another inconvenient of incomplete removal of the endodontic content, that may apear later in time, is discoloration of the endodontically-treated tooth, especially the front teeth.

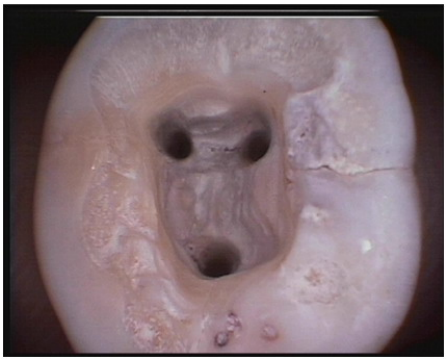

Fig. 1. Complete removal of the roof of the pulp chamber.

The access cavity must permit complete, direct vision of the floor of the pulp chamber and canal openings. This applies particulary to the posterior teeth because the floor frequently has natural grooves and at the end of this grooves canal openings are located.

The access cavity must facilitate the introduction of canal instruments into the root canal openings and the entire working lenght as well as the desinfecting substances used in endodontic treatment. During endodontic treatment, root canal instruments should not be deflected by any obstruction in the crown, they should move freely, especially in the apical one third.

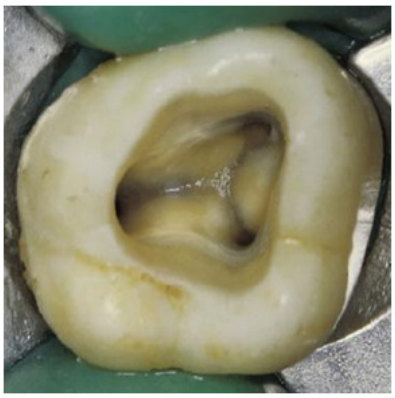

Fig.2. Direct vision of the canal openings at the end of the natural grooves.

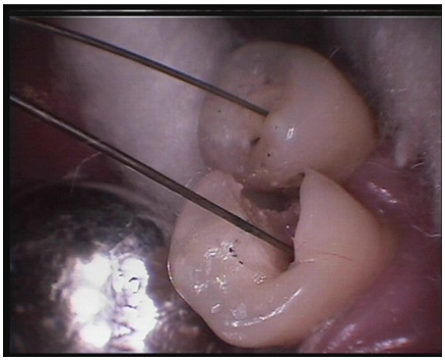

Fig.3. Endodontic instruments move freely on the entire working lenght.

An incorect access cavity, for example too narrow will force the clinician to work only one wall of the canal while the other remains completely untouched, leading to deformation of the apical foramen.

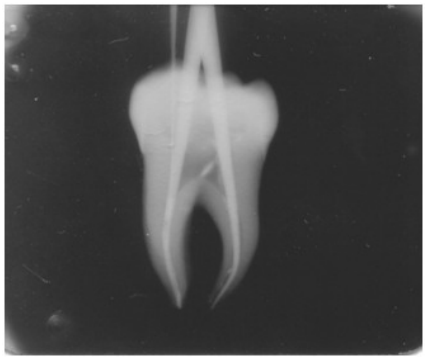

Fig.4. Direct access of endodontic instruments and filling materials.

Another negative effect of an incorect access cavity may be facture of the instrument due to friction of the instrument shaft against the coronal obstruction and the force required to overcome this obstruction. In order to avoid these complications access cavity must be wide enough to permit the endodontic instruments unhindered

entry, not even a minimal contact with the cavity walls.

The access cavity must facilitate the introduction of both endodontic instruments on the entire working lenght and canal filling instruments.

The access cavity must provide a positive support for temporary fillings.In many cases endodontic treatment requires several meeting therefore the temporary cement must form an hermetic seal to avoid contamination of the endodontic space. At the same time the temporary cement must remain unaltered and must not collapse into the chamber and canal openings therefore the cavity walls must be flared slightly in the shape of a funnel, so that the occlusal surface is slightly wider than the floor, otherwise the temporary cement would be displaced during mastication.

The access cavity must have always four walls for the correct positioning of the rubber dam and maintaining during treatment the pulp chamber constantly flooded with as much irrigating solution as possible without damaging periodontal tissues. If one or several walls of the access cavity are missing because of carious distruction they must be reconstructed with adequare materials. We have now modern composites especially created to restaure teeth before endodontic treatment, materials that have great sealing properties and also satisfy esthetic demands.

Fig.5. The access cavity has always four walls

During preparation of access cavity we considered three factors of internal anatomy:

- size of pulp chamber; in young patients the preparations are more extensive than in older patients in whom the pulp chamber is smaller in all three dimensions.

- shape of pulp chamber; the outline form of access cavity must reflect the shape of the pulp chamber. For example, the floor of the pulp chamber in an upper molar is usually triangular in shape owing to the triangual position of the canal openings, hence the final occlusal cavity outline form is generally triangular.

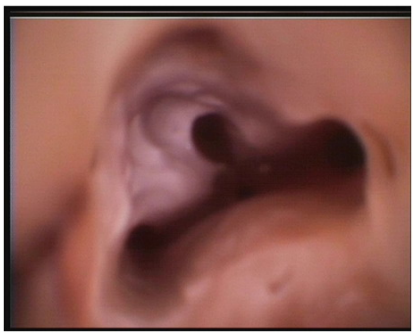

Fig.6. The floor of the pulp chamber in an upper molar is triangular in shape owing to the triangual position of the canal openings.

- number, position and curvature of root canals; to prepare each canal efficiently without interference cavity walls often have to be extended.

When removing the roof of the pulp chamber, especially in posterior teeth, the walls must be slightly extended mesial to offer direct and complete inspection of the canal openings.

Fig.7. Modified convenience form in order to gain access to suplimentary canals.

In certain teeth, extra precautions must be taken to search for additional canals so the convenience form must be modified by removing even more of the tooth tissues. One must always bear in mind the position and curvature of these extra root canals, such as:

- Lower incisors with two canals, one buccal and one lingual
- Maxillary firs molars, frequently present two mesio-buccal canals, in less cases even three mesio-buccal canals
- Mandibular molars with two distal root canals
- Mandibular molars with C shaped root canals which are obviously more challenging in terms of instrumentation and obturation techique

Conclusions

Access cavity must be prepared correctly in terms of position and depth in order to permit complete action of endodontic instruments over the entire working length.

After complete removal of the roof of the pulp chamber the clinician must have direct vision of the floor and the canal openings.

An access cavity that has been prepared improperly in terms of position, depth or extent will hamper the achievement of proper results in endodontic treatment and will ultimately lead to failure by either root perforation, „ledge" or „shelf" formation within the canal, instrument breakage, zipping or apical transportation.

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