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AN EX VIVO METHOD OF THE ROOT CANAL WORKING LENGTH DETERMINATION

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Relevance. Determining the correct working length of the root canal, which is the distance between the coronal reference point and apical constriction, is one of the most critical steps in endodontic treatment. The apical constriction is the smallest diameter of the root canal and the ideal end limit for endodontic therapy, it is usually located 0.5–1 mm short of the apical foramen. Precisely locating the apical constriction is difficult because of its variable shape and position.

Aim: to find the methods of root canal working length determination in ex vivo conditions to improve the quality of educational process of the students on practical classes.

Materials and methods. Ten extracted teeth were included in the study. All teeth had fully formed apices of root. Teeth with root resorption, metallic restorations and previously root canal treated were not included in the study. In all the teeth coronal reference point was fixed and all pulp tissue was removed, after irrigation of the root canal, paper point was used to dry the canal. A K file of a proper size was inserted with silicone stop and advanced it until the file's tip was visible through the apical foramen under a magnifying glass. The distance between the file tip and silicone stopper was measured. Each measurement was repeated thrice, and the mean value was calculated. Finally, 0.5 mm was subtracted from the calculated measurements. Thus, the accurate working length of the tooth was determined and recorded.

In the first part of the research a mould was manufactured using 10 natural extracted teeth and alginate impression material to simulate oral conditions for electronic measurement of the working length of the root canal by apex locator (ex vivo). The working length was calculated by digital reading with manual K File from coronal fixed point to apical constriction by electronic apex locator.

In the second part of the research each tooth was measured on a diagnostic radiograph from the incisal/occlusal reference point to the radiographic apex. The instrument (K-file) was inserted into the tooth to the working length determined by apex locator and radiograph was taken. The difference between the tip of the K-file inserted and the radiographic apex was measured.

Then the data of the measurements of electronic and radiographic methods of working lengths determination were analyzed and compare with the accurate working length to prove the idea that this method can be used in the educational process of the students on practical classes.

Results and their discussion. The results of this study shows that electronic apex locator can accurately determine the apical constriction in 95% of canals by ex vivo method of the root canal working length determination. At the same time, the results of accuracy of apex locators were more reliable (95 % in this study) than the radiographic accuracy (80% in this study). Radiographs showed 80% accuracy within ± 0.5 mm of actual working length and 98% accuracy within 1.0mm of actual working length. The results of this study showed that if a file is placed at the radiographic apex, its tip will, in most cases, cross the apical foramen and if root canal filling is done, it will be over obturated in almost all the cases.

Conclusion. The proposed ex vivo method of the root canal working length determination is suitable for clinically acceptable measurements and can be used in the educational process of the students on practical classes to improve their knowledge in endodontic treatment.