



Morphologic analysis of C-shaped root using 3-D reconstruction

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C-shaped canal configuration is very difficult to treat because that clues about preoperative canal anatomy cannot be ascertained from clinical crown morphology and limited information can be derived from the radiographic examination.

This study was done to get more informations about the root and canal configuration of C-shaped root by 3-dimensionally reconstructing for the purpose of enhancing success rate of endodontic treatment.

30 mandibular molars with C-shaped root were selected. Teeth had been extracted from periodontal problems with sound crown and root portion, including teeth with caries lesion limited crown portion only.

Gross tissue and calculus were removed with an ultrasonic hand scaler. Six photo images from occlusal, apical, mesial, distal, buccal, lingual directions and radiographic view were taken as preoperative ones to compare them with 3-D image. After crown reduction to the level 1~2mm over pulpal floor was performed, teeth were stored in 5.25% sodium hypochlorite solution for removal of pulp tissue and debris. They were cleaned under running water, allowed to bench dry and embedded in a self-curing resin. This resin block was serially ground with a microtome (Accutom- 50, struers, Denmark) and the image of each level was 0.25mm. Photographs of serial sections through all root canal were digitized using Adobe Photoshop 5.0 and then minimum thickness of open and closed sites were measured (open site is the surface containing occluso-apical groove : closed sites were measured (open site is the surface containing occluso-apical groove : closed site is opposite). After digitization using 3-D Doctor (Able software Corp, USA), 3D classification of C-shaped roots was performed from this 3-D reconstructed image.

The results were as follows:

1. Most C-shape rooted teeth showed lingual groove(28/30). According to Vertucci' s classification, type I, II, III, V, VII were observed.
2. New canal types such as 1-2-3-2, 2-3-2, 2-3-2-3, 1-2-3-2-1 were shown.
3. There was little difference in minimum thickness on coronal and apical portions, but open site were thinner than closed site on mid portion.

Conclusively, 3D reconstruction method could make the exact configurations of C-shape root possible to be visualized and analyzed from multi-directions. Data from minimum thickness recommend cleaning and shaping be more carefully done on dangerous mid portion.