

In vitro study of the incidence and the type of canal isthmuses and accessory canals in the first permanent molars following instrumentation : A clinical hints for surgical endodontics

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I . Objectives

The purpose of this *in vitro* study was to investigate the incidence and the type of the isthmuses and accessory canals of the mesiobuccal (MB) root in the maxillary (Mx) first permanent molars and the mesial root in the mandibular (Mn) first permanent molars with 2 canals following ProFile rotary instrumentation.

II . Materials and Methods

Thirty eight human MB root of MB first molars and 40 human mesial root of Mn first molars with 2 canals were used in this study

Each tooth was instrumented to size 30 using ProFile .06 taper rotary files. Because of the identification of prepared canal (main canal), a non-standard medium-sized gutta-percha cone was coated with Tubliseal and placed into the prepared canal without pressure. Minitome was used to section the each root at 2, 3, 4, and 5mm level from the root apex, perpendicular to the long axis of the root. The resected surface of each root was stained with 2% methylene blue dye and rinsed in water and dried. Only the apical side of each section were examined at $\times 60$ to $\times 300$ magnification with the Micro Hiscope System and captured as jpeg images. Using this photograph, each section was viewed and the presence or absence of isthmuses and accessory canals were determined. The isthmus and accessory canals on resected root canal surface were classified by the modified classification method.

III . Results

- Six configurations were observed in this study and could be classified as the following.
Type A : One canal or 2 canals merged into one.
Type B : Two separated canals.
Type C1 : Two canals with one or more partial isthmuses.
Type C2 : Two canals with complete isthmus.
Type D1 : Two canals with one or more accessory canals which are located between canals with or without isthmus.
Type D2 : Two canals with one or more accessory canals which are located in the outside canals with or without isthmus.
- The incidence of the configuration type were different among Mx and Mn molars and among Type II and Type III canals.
- The incidence of isthmus and accessory canal (Type C1+C2+D1+D2) was highest at the level of 4 mm in the MB root of Mx first molars and mesial root of Mn first molars which showed respectively 63.2% and 82.5%.
- The incidence of type D2 was 3 to 4 roots (7.9% to 10.5%) in 2 to 4 mm level of MB root of Mx first molars.
- In the type III mesial root of Mn first molars, no type A configuration was shown at the level of 2-5 mm and at the level of 3 mm, the incidence of the isthmuses and accessory canals was the highest, 85%.

IV . Conclusion

Most of MB root of Mx first molars and mesial root of Mn first molars with two canals have a various canal configuration which contain isthmuses and accessory canals. Therefore a close inspection of resected root surface and joining of those two canals in the root-end preparation during the surgery are essential for successful treatment.