

An In-vitro Study To Evaluate Tactile Method Of Determining Working Length In Open Apices

Abstract

Thirty anterior teeth were prepared to create open apices. The correct working length (CWL) for each canal was determined by introducing a file into the root canal until it was visible at the apex. Consequently, the tactile working length (TWL) was determined by the 'Tactile Method' using a K-file that was bent at the tip.

Key Words

Open Apices, Tactile working Length, Correct Working Length

Introduction

The term 'open apex' is used to indicate the presence of an exceptionally wide root canal at the apex. Successful root canal treatment occurs when over-instrumentation and overfilling are avoided and filling materials confined to the limits of the canal. Accordingly, accurate working length determination is essential in achieving optimal healing. Unfortunately, open apices pose many difficulties to contemporary methods of canal length determination.^{[1],[2]}

Radiographic methods known for their inherent interpretation difficulties are even more challenging in open apices where dentinal walls frequently end at different levels and have irregular margins. Consequently, the apical end of the canal that is circumferentially surrounded by dentine is located a few millimetres short of the radiographic apex, which results in overestimation of the radiographic working-length.^{[3],[4],[5]}

Apex locators have been shown to be highly accurate in locating the apical foramen and constriction. Unfortunately, in open apices they give incorrect measurements because wide root canals associated with open apices, adversely influence the function of apex locators.^[6] Paper point techniques may be used to determine canal length in open apices.^[7] These techniques require the canal to be completely dry and the periapical tissues to be relatively moist.^[2]

Therefore, present study was designed to evaluate tactile method for working length determination in teeth with open apices.

Materials and Method

30 extracted anterior teeth, were selected after excluding curved roots (>10 degrees). To simulate immature open apices, the apical 3–4 mm of the roots was removed and the canal were widened with large files and Gates Glidden burs to obtain 0.5–1.5 mm dentinal walls thickness at the apex.

Correct Working Length:

The CWL for each root canal was determined by inserting a file into the canal to the level of the shortest dentinal wall. A silicon stopper was adjusted to a coronal reference point. The length of the file corresponding to the CWL was measured using a digital micrometer under a Dental operating microscope at 12X magnification.^[1]

The Tactile Method:

After recording Correct Working Length the root ends specimen teeth were covered with wax and then mounted in cold cure acrylic moulds. A K-File size 25 curved and bent at the tip, was used (Fig.



Tactile Working Length

¹ Ankur Vats

² Anjali S Vats

³ Vaishali Parekh

⁴ Paras Kothari

¹ Senior Lecturer

² Senior Lecturer,

Dept. of Conservative Dentistry & Endodontics

Bhojia Dental College, Baddi

³ Prof & HOD

⁴ Ex-PG Student,

Dept. of Conservative Dentistry & Endodontics

K.M Shah Dental College & Hospital

Address For Correspondence:

Dr. Ankur Vats

I-104 MBD Flats Near Anees School

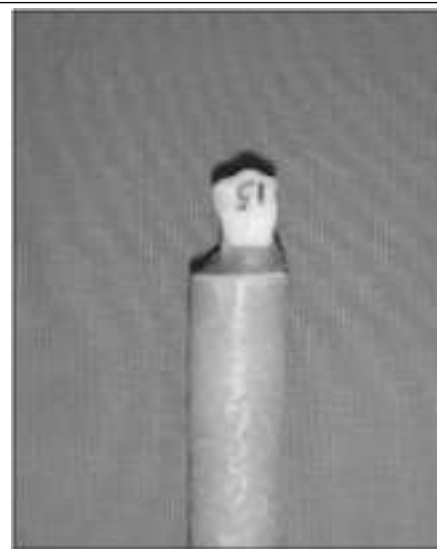
Shivjot Enclave, Kharar Mohali 140301

M : 09876064652

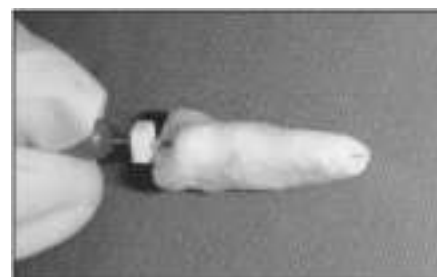
Submission : 6th March 2013

Accepted : 1st December 2013

Quick Response Code



Mounted Specimen



Correct Working Length



Schematic Diagram of Tactile Working Length

1). The bent tip was placed against a dentinal wall in the root canal and displaced apically until it engaged the edge of dentinal wall at the apex. The rubber stop was adjusted to a coronal reference point and the file was then rotated to disengage the bent tip. When a shorter length was detected the silicon ring was readjusted, the shortest adjusted length of the file represented the TWL. The file length (from the bent tip to the silicon ring) was measured using a digital micrometer under magnification (12X).

Results

All the results were recorded and were tabulated. The data was subjected to statistical analysis. Paired T test was used for evaluation of the significance of the results using the SPSS software 14.0 Paired Sample Test

Discussion

Root canal treatment involves removing microorganisms from within the pulp space, and the filling of the root canal system to prevent reinfection. In other words; the goal of root canal treatment is

Paired Sample Test			
	Std.Deviation	t	Sig. (2 - Tailed)
Pair 1 CWL-TWL	.3474	.000	1.000

to control infection through the debridement, disinfection and filling of the root canal system.^[8]

The accuracy of TWL, calculated in teeth with simulated open apices, was high (97.7%). It seems that the wide, short and straight root canals used in the present study facilitated the measuring procedure. Nevertheless, the Tactile Method is not feasible in curved canals or in teeth with an apical size smaller than 80. Apical resorption is one factor that may affect the electronic working length in open apices, but the associated wide root canals, is another factor. Although, different studies have showed that wide canals may not affect the accuracy of apex locators it must be emphasized that the maximum size of the examined canals was 60, which is not comparable with the large sized canals associated with open apices.^{[9],[10]}

Conclusion

In teeth with open apices, the presented Tactile Method may offer an accurate alternative to contemporary methods of working length determination like the expensive electronic apex locators.

References

1. A. El Ayouti, E. Dima. A tactile method for canal length determination in teeth with open apices. *International Endodontic Journal*, 42, 1090–1095, 2009
2. Baggett FJ, Mackie IC, Worthington HV. An investigation into the measurement of the working length of immature incisor teeth requiring endodontic treatment in children. *British Dental Journal* 10, 96–8, 1996
3. Ebrahim AK, Wadachi R, Suda H. Ex

vivo evaluation of the ability of four different electronic apex locators to determine the working length in teeth with various foramen diameters. *Australian Dental Journal* 51, 258–62, 2006

4. Hulsmann M, Pieper K. Use of an electronic apex locator in the treatment of teeth with incomplete root formation *Endodontics and Dental Traumatology* 5, 238–41 1989
5. Wu YN, Shi JN, Huang LZ, Xu YY. Variables affecting electronic root canal measurement. *International Endodontic Journal* 25, 88–92, 1992
6. Allen R, Mackie IC. Management of the immature apex a clinical guide. *Dentistry Update* 30, 437–41, 2003
7. Burch JG, Hulen S. The relationship of the apical foramen to the anatomic apex of the tooth. *Oral Surgery, Oral Medicine, and Oral Pathology* 34, 262–8, 1972
8. Mackie IC, Hill FJ. A clinical guide to the endodontic treatment of non-vital immature permanent teeth. *British Dental Journal* 186, 54–8. 1999
9. Mente J, Seidel J, Buchalla W, Koch MJ. Electronic determination of root canal length in primary teeth with and without root resorption. *International Endodontic Journal* 35, 447–52, 2002
10. Gutmann JL, Heaton JF. Management of the open (immature) apex. 2. Non-vital teeth. *International Endodontic Journal* 14, 173–8. 1981

Source of Support : Nil, Conflict of Interest : None declared