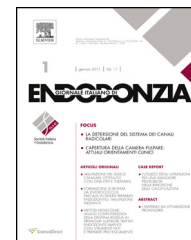




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ORIGINAL ARTICLE/ARTICOLO ORIGINALE

Effect of apical preparation on different needle depth penetration

Influenza della preparazione apicale sulla profondità di penetrazione di differenti aghi da irrigazione

Alexia Vinel^{a,b}, Aline Sinan^c, Mélanie Dedieu^a,
Sara Laurencin-Dalieux^{a,d}, Franck Diemer^{a,e,*},
Marie Georgelin-Gurgel^{a,f}

^a *Faculté de Chirurgie dentaire de Toulouse, Plateau technique de Recherche en Odontologie, CHU de Toulouse, France*

^b *Institute of Metabolic and Cardiovascular Diseases, UMR 1048, France*

^c *Unité de Formation et Recherche d'Odonto-Stomatologie d'Abidjan, Côte d'Ivoire*

^d *INSERM U563, Département LML, CPTP Toulouse France*

^e *Institut Clément Ader, CNRS UMR 5312, Toulouse, France*

^f *Centre de Recherche en Odontologie Clinique, EA-4847 Clermont-Ferrand, France*

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KEYWORDS

Apical shape;
Irrigation;
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Nickel–titanium;
Instruments.

Abstract

Aim: Shaping should be complemented by antiseptic solution. These are often delivered using a needle and syringe. But apical penetration of the irrigation solution is of only 1 mm beyond its tip. The aim of our study was to evaluate the influence of the apical preparation on the penetration depth of some needles.

Methodology: 24 teeth were divided randomly into two groups and prepared in continuous rotation (350 rpm) with Revo-S[®] or ProTaper[®] to sizes AS 30, 35 and 40 and F1, F2 and F3 respectively. Four types of endodontic needles were used. Three sizes of stainless steel needles:

* Corresponding author at: Head of Endodontic and Restorative Department, 3 chemin des Maraichers, 31062 Toulouse, France.

Fax: +33 5 61 25 47 19.

E-mail: franck.diemer@univ-tlse3.fr (F. Diemer).

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PAROLE CHIAVE

Preparazione apicale;
Irrigazione;
Aghi;
Nichel-titanio;
Strumenti.

25, 27 and 30 gauge and one of nickel–titanium needle: 30 Gauge. Each needle was inserted and its length of penetration measured before the root canal preparation and after the finishing files. *Results:* Multivariate analysis of variance showed significant differences for the finishers ($p < 0.0001$) and the kind of needle ($p < 0.0001$). The PLSD Fisher's test can highlight the differences between the six types of apical shaping used (independently of the needle type). The same differences were observed between the four types of needle (independently of the apical finish) ($p = 0.0232$).

Variance analysis between the four different needles is statistically significant for each apical shaping ($p < 0.0001 \times 6$). Variance analysis among the six types of finish is statistically significant for each type of needle ($p < 0.0001 \times 4$).

Conclusions: This study shows that the apical preparation influences the penetration depth of needles. The 27 gauge needles reach the last millimetre only with the Revo-S[®] system shaped with AS 40. Finally, the 30 gauge needles reach it for all finishers except the ProTaper[®] F1.

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Riassunto

Scopo: La preparazione canalare dovrebbe essere integrata dall'utilizzo di soluzioni antisettiche. Queste vengono rilasciate all'interno del canale utilizzando specifiche siringhe ed aghi endodontici, ma la penetrazione apicale della soluzione irrigante è di appena 1 mm oltre la punta dell'ago. Lo scopo del nostro studio è stato quello di valutare l'influenza della preparazione apicale sulla profondità di penetrazione di alcuni aghi endodontici.

Materiali e metodi: 24 denti sono stati divisi casualmente in due gruppi e preparati in rotazione continua (350 rpm) con Revo-S[®] o ProTaper[®] a 6 differenti dimensioni di preparazione, AS30, AS35 e AS40 e F1, F2 e F3 rispettivamente. Sono stati utilizzati quattro tipi di aghi endodonzia, tre in acciaio inossidabile di differenti dimensioni: 25, 27 e 30 gauge e uno in nichel-titanio da 30 Gauge. Ogni ago è stato inserito nel canale e la sua lunghezza di penetrazione misurata prima e dopo la preparazione canalare.

Risultati: L'analisi multivariata della varianza ha mostrato differenze significative per l'ultimo strumento utilizzato ($p < 0,0001$) e il tipo di ago ($p < 0,0001$). Il test di Fisher ha evidenziato delle differenze tra i sei differenti tipi di sagomatura apicale utilizzati (indipendentemente dal tipo di ago) e tra i quattro tipi di aghi utilizzati (indipendentemente della finitura apicale) ($p = 0,0232$). L'analisi della varianza è statisticamente significativa tra i quattro aghi diversi per ogni differente tipo di sagomatura apicale ($p < 0,0001 \times 6$) e tra i sei differenti tipi di rifinitura per ogni tipo di ago ($p < 0,0001 \times 4$).

Conclusioni: In conclusione, questo studio dimostra che la preparazione apicale influenza la profondità di penetrazione degli aghi da irraggiamento. Gli aghi calibro 27 raggiungono il millimetro apicale solo con il sistema di Revo-S[®] di taglia 40. Gli aghi calibro 30 raggiungono il millimetro apicale per tutti gli strumenti da preparazione apicale utilizzati tranne che per il ProTaper[®] F1. © 2016 Società Italiana di Endodonzia. Production and hosting by Elsevier B.V. Cet article est publié en Open Access sous licence CC BY-NC-ND (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

Endodontic cleaning needs to remove all pulp tissue, micro-organisms and dentin debris from the canal during root canal shaping.¹ However, it was shown that the canal preparation is influenced by the great variability of root canal anatomy. Indeed the instruments (both manual and rotary) do not reach certain areas such as cracks, crevices, isthmus, accessory canals and apical deltas.^{2,3}

The action of the instruments should be complemented by antiseptic solution.³ These are often delivered using a needle and syringe. But studies indicate that the apical penetration of the irrigation solution is of only 1 mm beyond the tip of the needle.^{2,4} The aim of our study was to evaluate the influence of the apical preparation on the penetration depth of some needles.

Materials and methods

24 teeth from the tooth bank of the Endodontic Department of the Dental Faculty of Toulouse were selected. Only single-rooted teeth having a mature apex and a root curvature less than 15° were included in this study. Those with cracked roots, root caries, resorbed or immature apex or endodontic treatment were excluded.

The teeth were divided randomly into two groups of 12. The access cavity was performed using a turbine, diamond bur (diameter 12) and endo-Z[®] (ref 801-012FG and E0152FG Stoner France, Toulouse, France). Then the initial penetration was performed using K files diameter 10 (Micro-Mega, Besancon, France). Working length (WL) was determined under a stereo-microscope (Wild M3B, Leica, Heerbrugg, Switzerland) at $\times 16$ magnification. When this file reached

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