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POSTER SESSION/SESSIONE POSTER

Removal of fiber posts during endodontic retreatments using ultrasonic tips: A comparison between two different endodontic fiber posts

Ritrattamento di denti trattati endodonticamente e ricostruiti con perni in fibra: Tecniche di rimozione, vantaggi e limiti

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KEYWORDS
Fiber post;
Retreatment;
Ultrasonic tips;
Temperature increase;
Thermographic measurements.

Abstract
Aim: The purpose of this study was to evaluate temperature changes generated on radicular surface of extracted monoradicular teeth during ultrasonic removal of fiber posts.
Methodology: Forty intact monoradicular teeth, with not less than 15 mm root canal length, with mature apex and without root fractures, were selected. After root canal instrumentation and obturation of teeth, dowel space preparation was obtained at 9 mm length. Samples were randomly divided into two groups according to the type of fiber post used: the first group received quartz fiber posts D.T. Light Post n. 0.5; the second group cemented silica fiber post TECHOLE S with central hole. Removal technique was performed with microblades ultrasonic tips, in particular Start-X #3. Operative protocol provided succession of dry use of ultrasonic inserts for a period of 25 s, air cooling for 25 s and water cooling for 25 s, until posts entire removal. Thermographic measurements were recorded taking photography and videos using Thermal Imaging Camera FLIR-One.
Results: Results show that dry use leads to rapid increase in root surface temperature beyond critical limit, while both air cooling and water one decreases it to lower value for both of groups. The best results were obtained by water cooling.

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Conclusions: Air or water cooling seems to be essential during the use of ultrasonic tips to reduce the risk of periodontal tissue and bone damage due to an excessive temperature raise. It's necessary to increase the samples number to conduct statistical analyses.

PAROLE CHIAVE
Perni in fibra;
Ritrattamento;
Punte ultrasoniche;
Aumento temperatura;
Misurazioni termografiche.

Riassunto
Obiettivi: Lo scopo di questo lavoro è quello di valutare su denti estratti le variazioni di temperatura che si sviluppano lungo la superficie radicolare durante la rimozione ultrasonica di due tipologie di perni endocanalari in fibra.
Materiali e metodi: Sono stati selezionati 40 denti integri monoradicolari, con lunghezza canalare minima di 15 mm, apice maturo e assenza di fratture radicolari. Dopo preparazione ed otturazione canalare, è stato preparato un "dowel space" della profondità costante di 9 mm. I campioni sono stati divisi in due gruppi: nel gruppo A sono stati cementati perni in fibra di quarzo D.T. Light Post n. 0.5; nel gruppo B perni cavi in fibra di silice TECHOLE S. La procedura abrasiva dei perni è stata effettuata con punte ultrasoniche multilama StartX #3, alternando 25 secondi di lavoro a secco, con raffreddamento ad aria e con raffreddamento ad acqua fino alla completa rimozione del perno ed effettuando le misurazioni termografiche tramite Termocamera ad infrarossi Flir-One.
Risultati: Il lavoro a secco ha mostrato un brusco innalzamento della temperatura sulla superficie radicolare in entrambi i gruppi, mentre entrambe le tipologie di raffreddamento sono state efficaci nel mantenere bassi valori di temperatura. Il raffreddamento ad acqua ha ottenuto i risultati migliori.
Conclusioni: Risulta di primaria importanza la fase di raffreddamento durante l'uso degli inserti ultrasonici per evitare un eccessivo aumento della temperatura con la possibilità di indurre danni al tessuto parodontale circostante e all'osso alveolare. È necessario aumentare il numero dei campioni per ottenere risultati con possibili differenze statisticamente significative tra i due gruppi.

Introduction

When an endodontic retreatment of an element restored with fiber post is needed, it will be necessary to remove the post to complete "disassembling phases"; during this phase, however, an increase in the temperature of the root surface can occur, that could be a detrimental effect on the cells of the periodontal ligament and the alveolar bone.

The purpose of the study is to evaluate, through a thermographic analysis, if the temperature variations, that occur on the root surface of extracted teeth during the removal of two types of fiber posts with dedicated ultrasonic tips, go beyond physiologically values consented from the hard tissues surrounding the dental element.

Materials and methods

Forty single-rooted teeth (27 premolars, 8 incisors, 5 canines) with a root canal length greater than 15 mm, mature root apex and no signs of infractions or fractures on the root surface, were selected. Pulp chambers were opened and probing, pre-flaring and shaping of all the samples were performed with Protaper Universal from S1 to F2; later, the obturation of the canals was carried out with System B technique and Top Seal endodontic cement.

All clinical crowns were transversely sectioned at 1 mm from the cemento-enamel junction; then, a constant depth of 9 mm Post Space was performed with calibrated drill D.T. Light Universal #0.5. The samples were divided into two groups of 20 elements each:

- Group A: quartz fiber post (D.T. LIGHT-POST #0.5) cementation with dual Core-X Flow cement (Fig. 1A—H).
- Group B: silica fiber posts with central hole (TECHOLE S) cementation with NEW TECHCEM dual self-adhesive cement (Fig. 2A—H).

The removal due to wear of fiber post was performed with ultrasonic tips Start-X # 3, until their total removal, alternating:

- 25 s of dry work;
- 25 s of work with air cooling of Stropko syringe;
- 25 s of work with water cooling by waterport of ultrasonic tip.

During the procedure, the thermographic measurements were performed by means of Flir-One Infrared Thermal Imaging Camera, recording the highest and lowest values of the temperature reached on the root surface for all the phases of the working protocol and taking thermographic images after each phase.

Results

Dry use of ultrasonic inserts led to a more abrupt temperature raising on the root surface up to a maximum value of 46.6 °C (Fig. 3). Higher values of temperature were recorded during dry use in group A, with a difference of 4.1 °C compared to Group B. Air cooling using Stropko syringe, although