

**3rd International Congress
XXXIV Congresso Nazionale**

Minima invasività

Mito o realtà?



Minima invasività. Mito o realtà?
Minimal invasiveness Myth or reality



26-28 febbraio 2026

Venerdì 27 febbraio 17.30-19.00

WORKSHOP

**Nano-trattamento in endodonzia:
il futuro della strumentazione canalare**

Gianluca Fumei



ShapeIT[®]



PICCOTTI

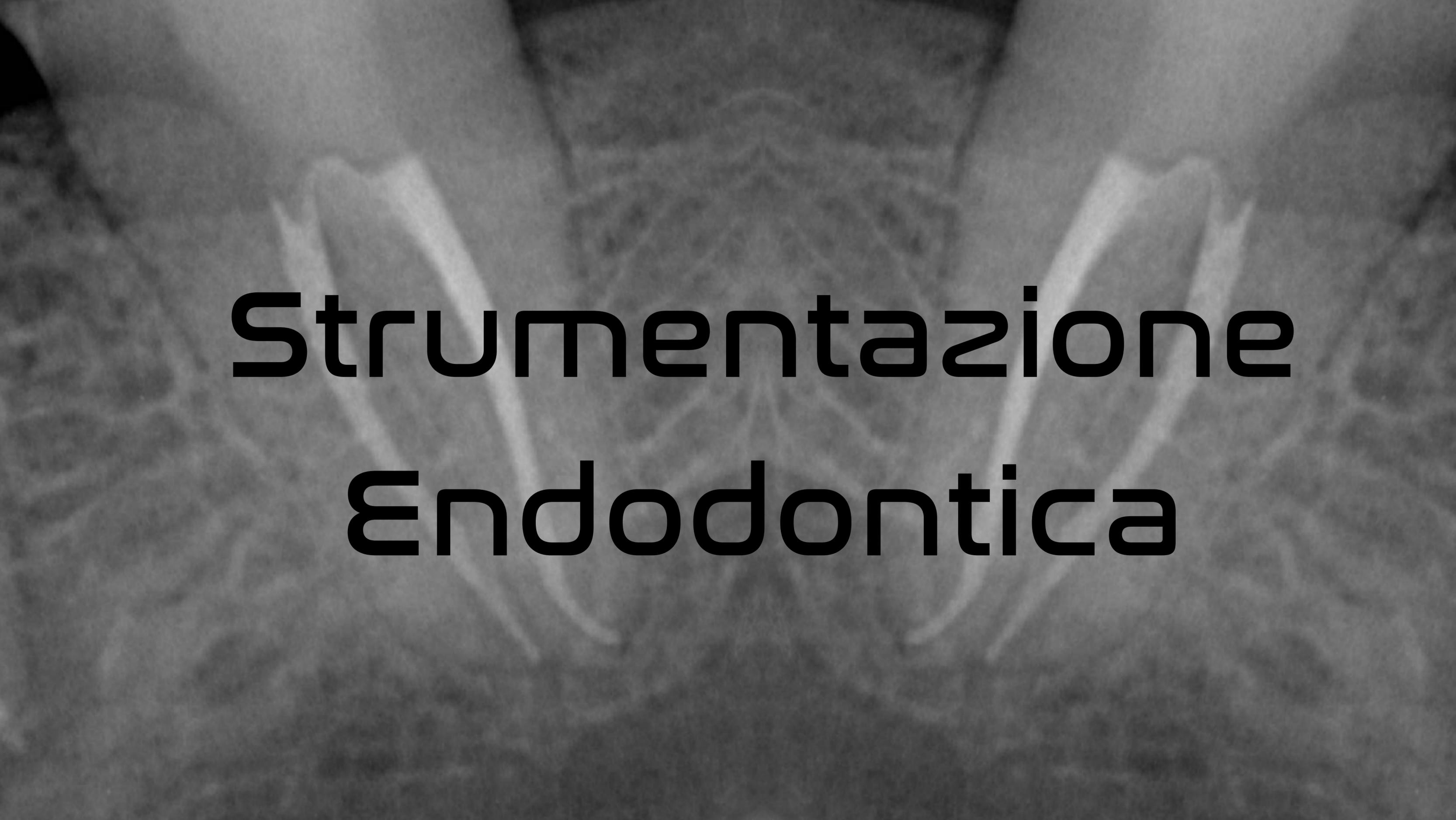
BALOCCO

FUMEI

SUARDI

BUCCI

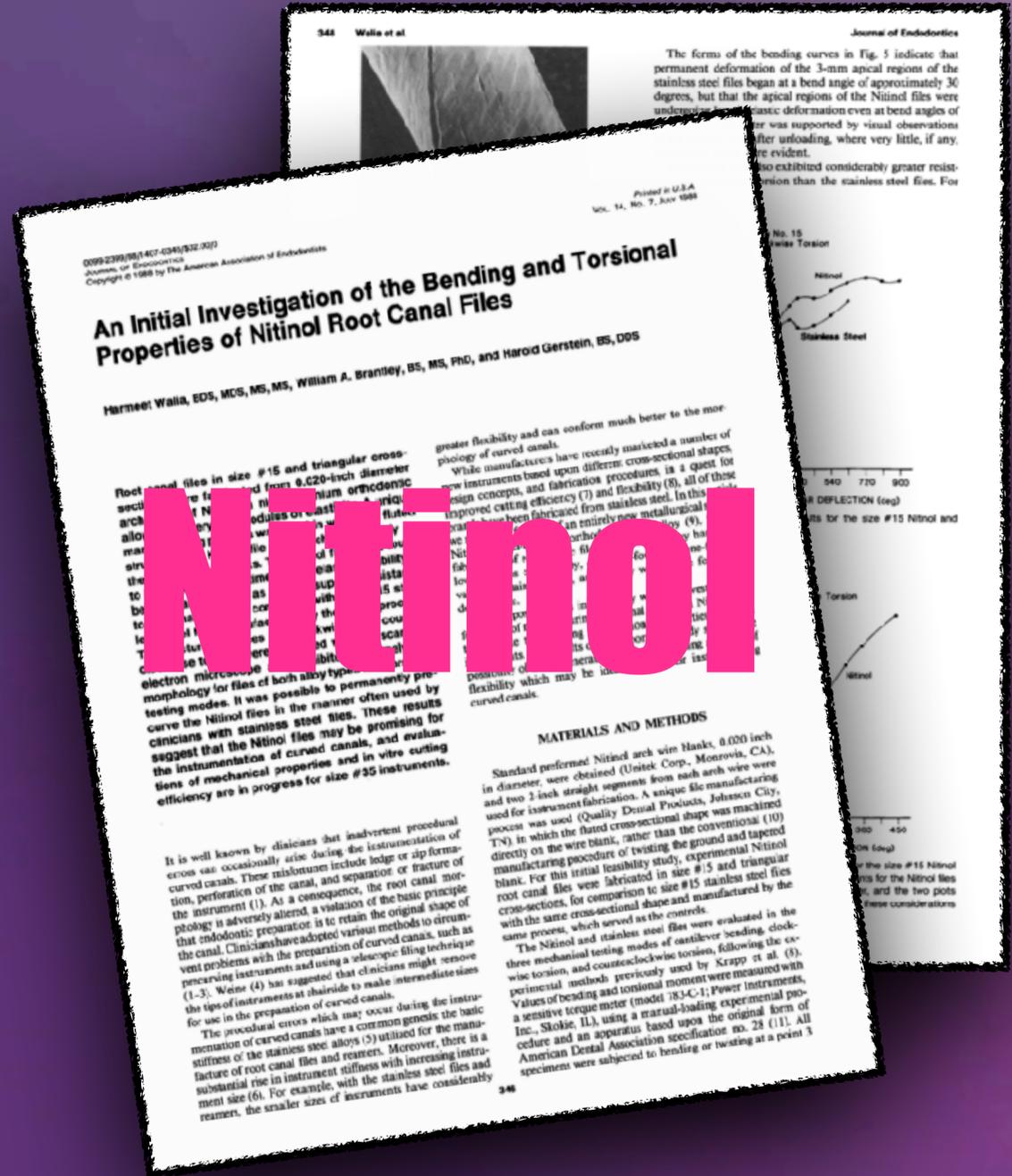
Sharing is the key to success



Strumentazione Endodontica



STAINLESS STEEL



Nitinol

An Initial Investigation of the Bending and Torsional Properties of Nitinol Root Canal Files

Harmeet Walia, EdS, MGS, MS, MS, William A. Brantley, BS, MS, PhD, and Harold Gerstein, BS, DDS

Root canal files in size #15 and triangular cross-section... While manufacturers have recently marketed a number of new instruments based upon different cross-sectional shapes, design concepts, and fabrication procedures, it is a quest for improved cutting efficiency (7) and flexibility (8), all of these have been fabricated from stainless steel. In this study, an entirely new metallurgical alloy (9), Nitinol, has been used to fabricate root canal files. Nitinol is a nickel-titanium alloy that exhibits superelasticity and shape memory. It is known for its greater flexibility and can conform much better to the morphology of curved canals. While manufacturers have recently marketed a number of new instruments based upon different cross-sectional shapes, design concepts, and fabrication procedures, it is a quest for improved cutting efficiency (7) and flexibility (8), all of these have been fabricated from stainless steel. In this study, an entirely new metallurgical alloy (9), Nitinol, has been used to fabricate root canal files. Nitinol is a nickel-titanium alloy that exhibits superelasticity and shape memory. It is known for its greater flexibility and can conform much better to the morphology of curved canals. While manufacturers have recently marketed a number of new instruments based upon different cross-sectional shapes, design concepts, and fabrication procedures, it is a quest for improved cutting efficiency (7) and flexibility (8), all of these have been fabricated from stainless steel. In this study, an entirely new metallurgical alloy (9), Nitinol, has been used to fabricate root canal files. Nitinol is a nickel-titanium alloy that exhibits superelasticity and shape memory. It is known for its greater flexibility and can conform much better to the morphology of curved canals.

MATERIALS AND METHODS

Standard performed Nitinol arch wire Hanks, 0.020 inch in diameter, were obtained (Unitek Corp., Monrovia, CA), and two 2-inch straight segments from each arch wire were used for instrument fabrication. A unique file manufacturing process was used (Quality Dental Products, Joliet, IL) in which the flat cross-sectional shape was machined directly on the wire blank, rather than the conventional (10) manufacturing procedure of twisting the experimental Nitinol blank. For this initial feasibility study, experimental Nitinol root canal files were fabricated in size #15 and triangular cross-sections, for comparison to size #15 stainless steel files with the same cross-sectional shape and manufactured by the same process, which served as the controls. The Nitinol and stainless steel files were evaluated in the same process, which served as the controls. The Nitinol and stainless steel files were evaluated in the same process, which served as the controls. The Nitinol and stainless steel files were evaluated in the same process, which served as the controls.

1988

WALIA ET AL JOE

Ni-Ti in endodontics

+35 years



Le caratteristiche geometriche e il trattamento termico potrebbero influenzare le proprietà meccaniche e le prestazioni cliniche degli strumenti NiTi, come l'incidenza della separazione del file e la distribuzione dello stress attraverso la parete dentinale durante la sagomatura del canale radicolare.



Shen 2012-2013; Gambarini 2011

LA MAGGIOR PARTE DEI NUOVI
STRUMENTI NEL MERCATO SONO
TRATTATI TERMICAMENTE



THE FUTURE





SISTEMATICHES NI-TI ROTANTI NANO-COATED



Advancing Nitinol: From heat treatment to surface functionalization for nickel–titanium (NiTi) instruments in endodontics

Wai-Sze Chan, Karan Gulati^{*}, Ove A. Peters^{*}

The University of Queensland, School of Dentistry, Herston, QLD, 4006, Australia



BMEF

A SCIENCE PARTNER JOURNAL

REVIEW ARTICLE

Application of Nanomaterials in Endodontics

Farzaneh Afkhami^{1†}, Yuan Chen^{2,3†}, Laurence J. Walsh¹,
Ove A. Peters¹, and Chun Xu^{1,2,4*}

¹School of Dentistry, The University of Queensland, Brisbane, QLD4006, Australia. ²Sydney Dental School, Faculty of Medicine and Health, The University of Sydney, Camperdown, NSW 2006, Australia. ³School & Hospital of Stomatology, Wenzhou Medical University, Wenzhou, Zhejiang 325027, China. ⁴Charles Perkins Centre, The University of Sydney, Camperdown, NSW 2006, Australia.

L'introduzione dei nanomateriali mira a superare i limiti della strumentazione migliorando l'efficacia clinica rispettando la mini-invasività del trattamento.

I rivestimenti nano-coated applicati

agli strumenti Ni-Ti consentono:

- Riduzione dell'attrito con le pareti canalari
- Miglioramento della resistenza alla fatica ciclica
- Maggiore uniformità superficiale
- Aumento della sicurezza clinica

PRO FLEX NHA

NANO RIVESTITO ATTIVAZIONE TERMICA

ESTREMA
FLESSIBILITÀ

MAGGIORE
RESISTENZA

TECNOLOGIA
CONTROL MEMORY

RIVESTIMENTO
NANO-COATED

I nanomateriali sono definiti come materiali con almeno una dimensione compresa tra 1 e 100 nm.

Il nanorivestimento è uno strato superficiale ultrasottile applicato alla lega Ni-Ti.

Il rivestimento non altera la metallurgia del nucleo, ma migliora significativamente le caratteristiche superficiali del file.

PDF of Nanoparticle coatings of Ni-Ti alloy and possibilities in Endodontics: A narrative review

Nanoparticle coatings of Ni-Ti alloy and possibilities in Endodontics: A narrative review

Ali Imad Abdulkareem¹, Ahmed Hamid Ali¹, Francesco

PDF of Nanoparticle coatings of Ni-Ti alloy and possibilities in Endodontics: A narrative review

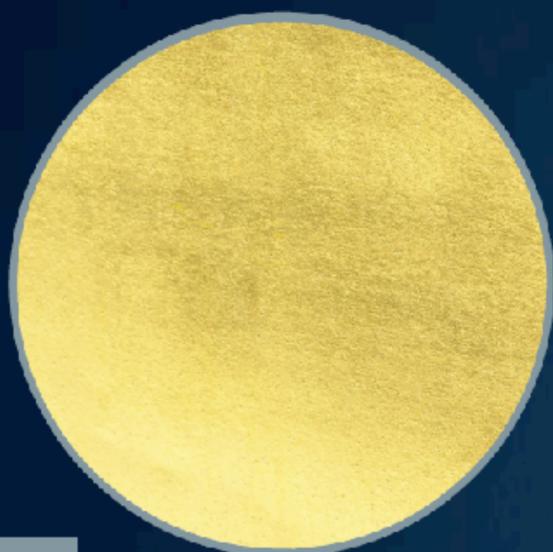
Table 2: Classification types of Nanoparticles.

Origin	Size	Structure	Composition	Shape
Natural	-Zero-dimensional	- Carbon-based	- Inorganic	- Particles
	-One-dimensional nanorods	- Metal	- Metals	- Spheres
Artificial	-Two-dimensional thin films	- Dendrimers	- Polymeric	- Rods
	-Three-dimensional nanocones	- Composites	- Quantum dots	- Plates
			- Modified	



I RIVESTIMENTI DI NANOPARTICELLE OFFRONO NOTEVOLI OPPORTUNITÀ PER IL MIGLIORAMENTO DELLE QUALITÀ MECCANICHE

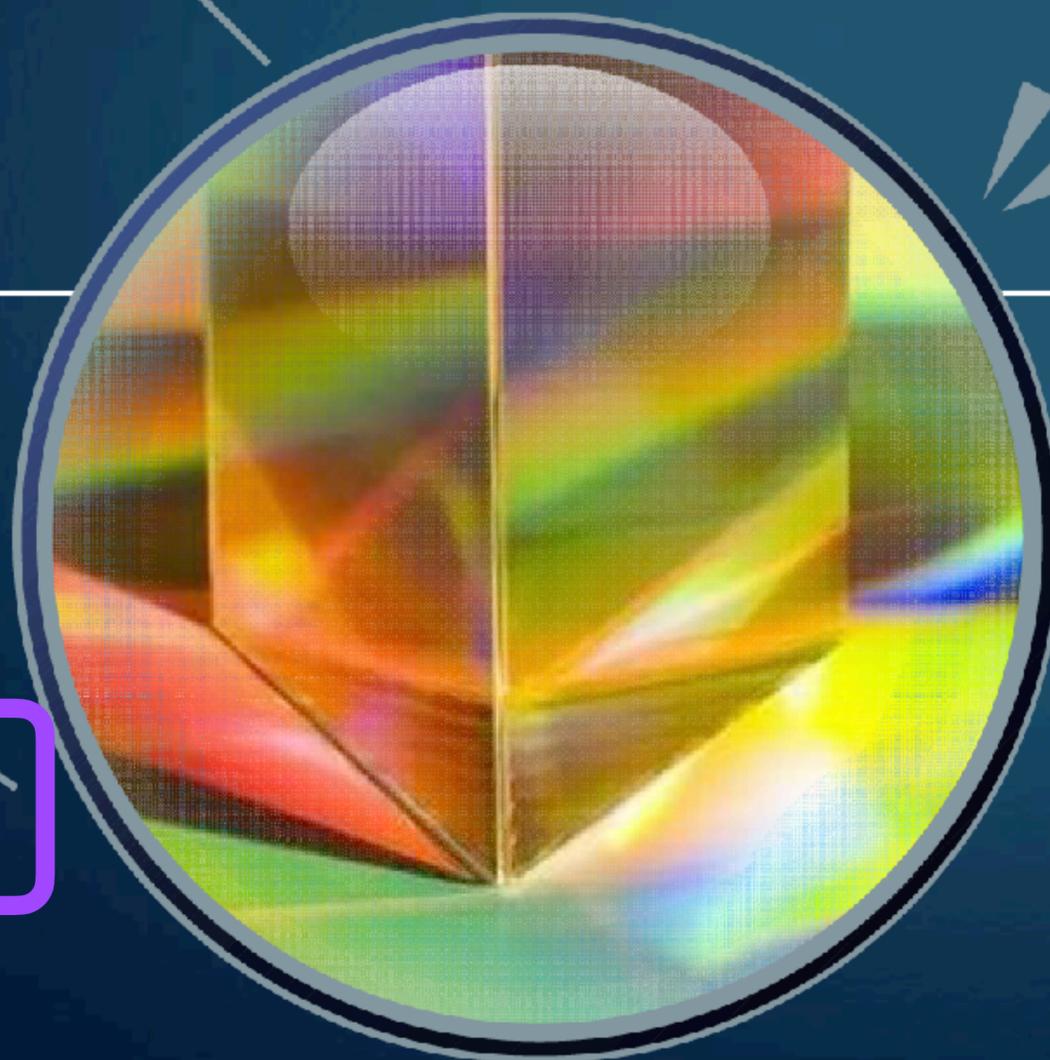
Materiale
metallico



Nitruro di titanio

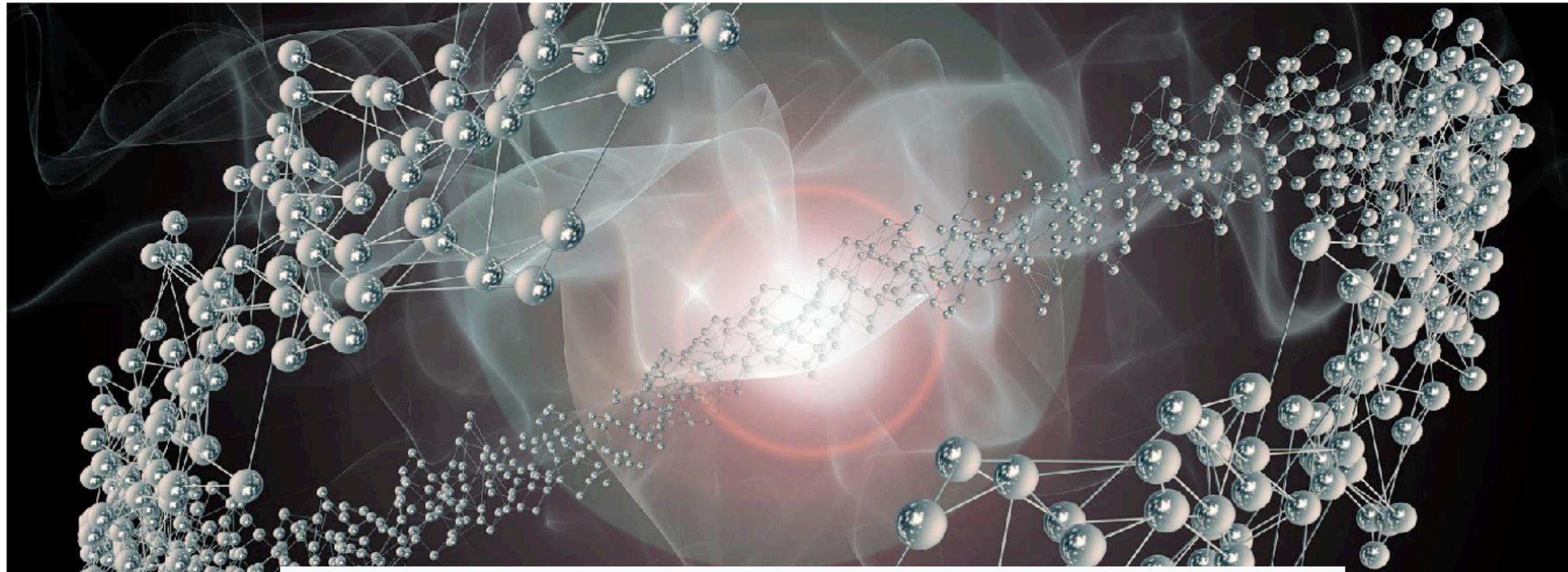
Il nitruro di titanio (TiN) (talvolta noto come “Tinite” o “TiNite” o “TiN”) è un materiale ceramico estremamente duro, spesso utilizzato come rivestimento su leghe di titanio, acciaio, carburo e componenti in alluminio per migliorare le proprietà superficiali del substrato.

Applicato come rivestimento sottile, il TiN viene utilizzato per indurire e proteggere le superfici di taglio e di scorrimento, per scopi decorativi (grazie al suo aspetto dorato) e come rivestimento non tossico per gli impianti medici. Nella maggior parte delle applicazioni, viene applicato un rivestimento inferiore a 5 micrometri (0,00020 in).



Materiale ceramico

Cos'è il nano-rivestimento

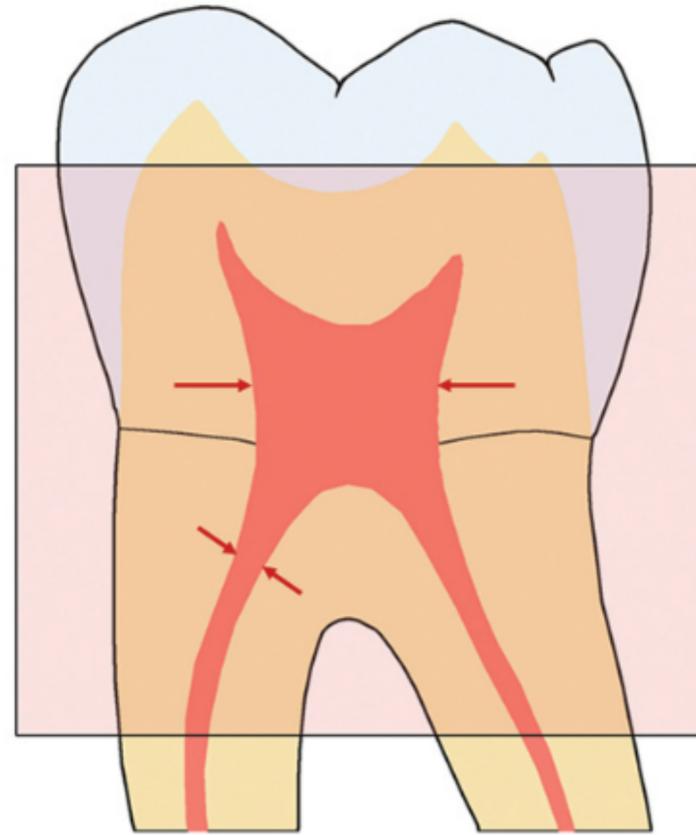


Il rivestimento superficiale è progettato per:
ridurre l'attrito, migliorare lo scorrimento, limitare l'adesione dei detriti.

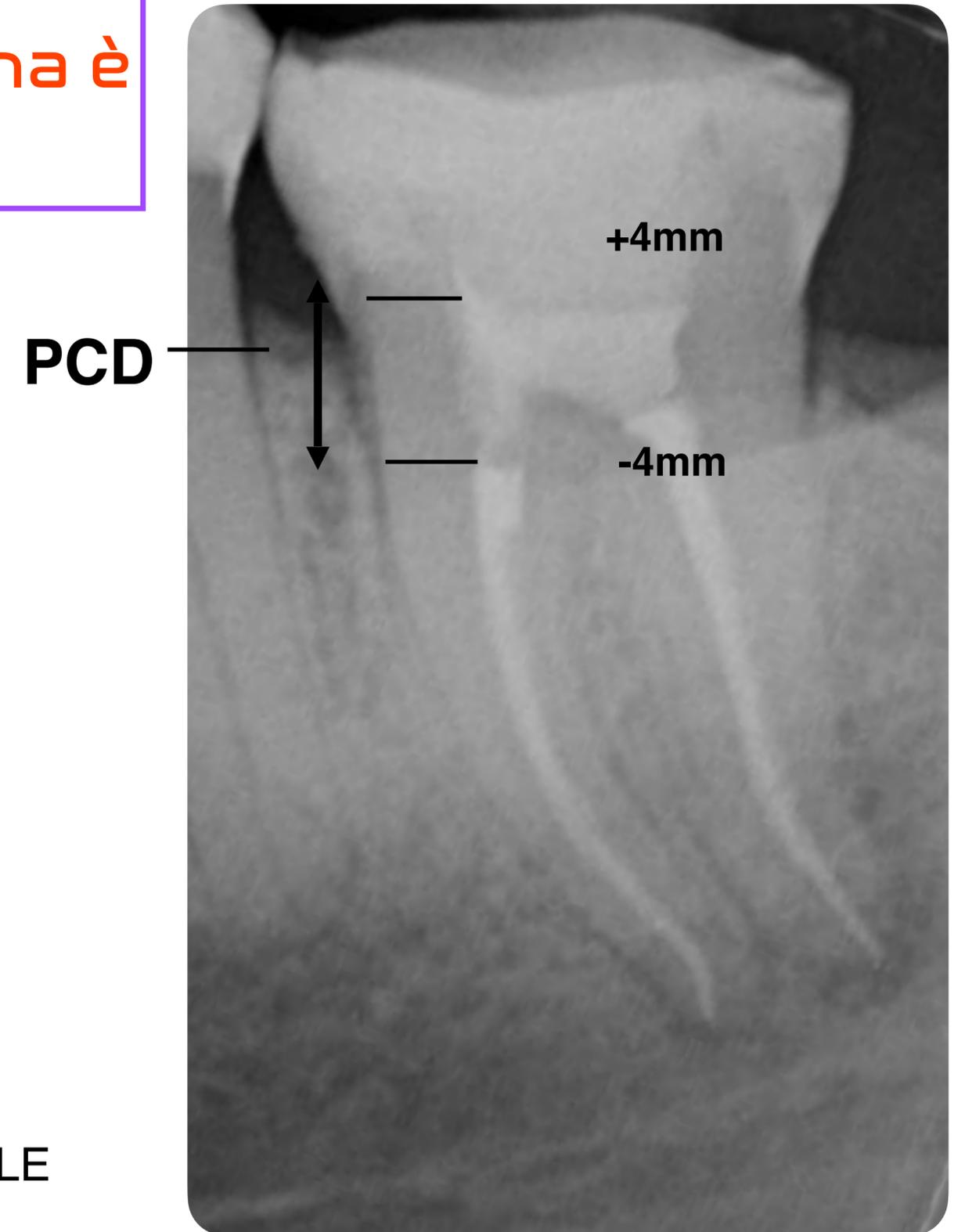
La sagomatura è più controllata, in particolare nelle anatomie canalari curve e complesse, con una riduzione dello stress torsionale e un minor rischio di separazione imprevista.

Questi concetti risultano perfettamente coerenti con i principi di sagomatura mini-invasiva, in cui la preservazione della dentina è un obiettivo prioritario.

CONSERVAZIONE
DELLA DENTINA
PERICERVICALE



1. LA DENTINA PERICERVICALE È LOCALIZZATA GENERALMENTE A 4MM CORONALMENTE E APICALMENTE ALLA CRESTA ALVEOLARE
2. LA DENTINA PERICERVICALE È INSOSTITUIBILE



Caratteristiche della ceramica

La durezza del rivestimento è estremamente elevata - più di tre volte la durezza dell'acciaio per utensili e stampi - e può addirittura raggiungere valori superiori a 4000 HV. Il rivestimento è sottile e liscio, con un basso coefficiente di attrito.

Lo strato di rivestimento non aderisce facilmente al metallo, evitando l'accumulo di detriti e migliorando la qualità della superficie dei pezzi lavorati. Il rivestimento presenta una buona stabilità termica; alcuni rivestimenti possono persino resistere a temperature di lavoro superiori a 1000°C.

Caratteristiche del metallo

Tenacia, resistenza agli urti, resistenza agli shock, conduttività e proprietà magnetiche superiori.

Altre caratteristiche

I grani del rivestimento sono estremamente piccoli e la struttura è eccezionalmente compatta, garantendo una buona resistenza alla corrosione di acidi e alcali. Il rivestimento è atossico, non pericoloso e non dannoso per l'ambiente, ed è quindi adatto a dispositivi medici, coltelli utilizzati nella lavorazione degli alimenti (ad esempio, macchine per la produzione di succhi di frutta) e applicazioni simili.

Tinite



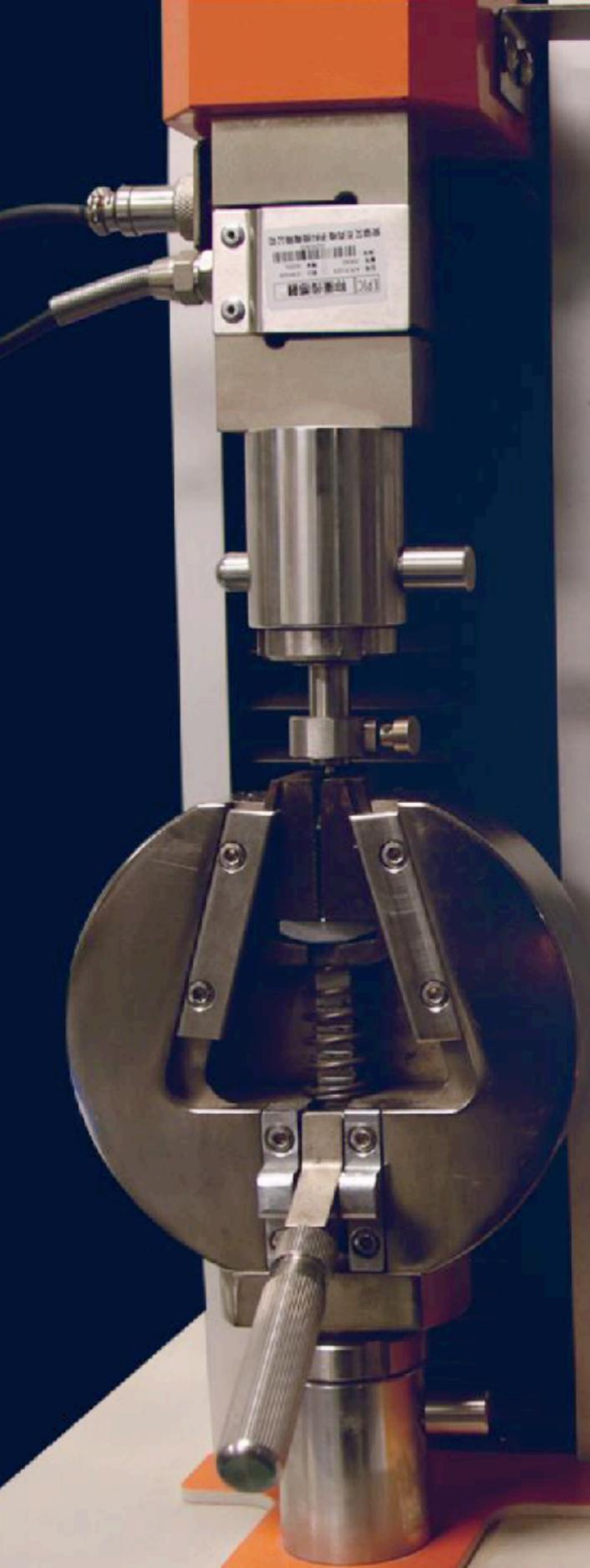
DUREZZA



RESISTENZA



COMPATTEZZA





UNIVERSITÀ DEGLI STUDI DI CATANIA

DIPARTIMENTO DI CHIRURGIA GENERALE E SPECIALITÀ MEDICO-CHIRURGICHE

CORSO DI LAUREA MAGISTRALE IN ODONTOIATRIA E PROTESI DENTARIA

RANDISI SALVATORE

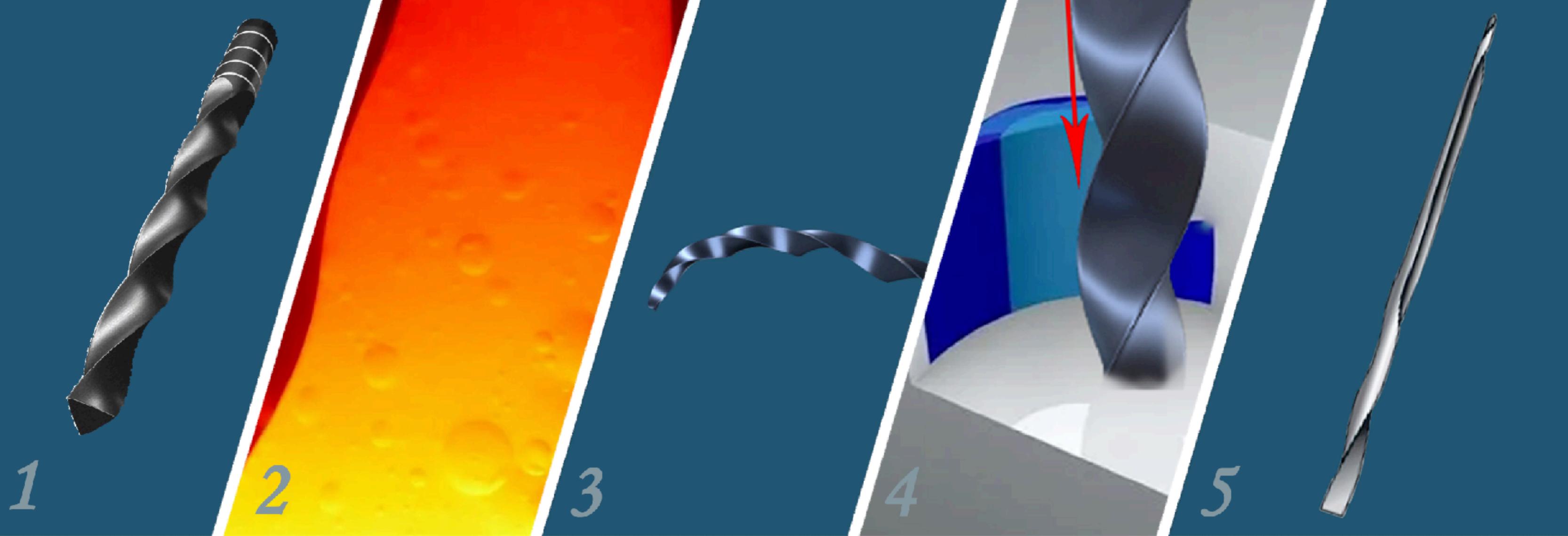
**EFFICIENZA DI TAGLIO DOPO USO MULTIPLO DI
STRUMENTI ENDODONTICI REALIZZATI CON DIVERSI
TRATTAMENTI**

TESI DI LAUREA

RELATORE

Prof. Eugenio Pedullà

**Proflex N.H.A. sembra
offrire un chiaro
vantaggio in termini di
durata e prestazioni di
taglio costanti, in
particolare quando gli
strumenti vengono
riutilizzati più volte**



1

2

3

4

5

Strumenti in NiTi

Attivazione termica

Flessibilità

Riduzione dell'efficienza di taglio

Sfilameto

Tecnologia di attivazione termica convenzionale:

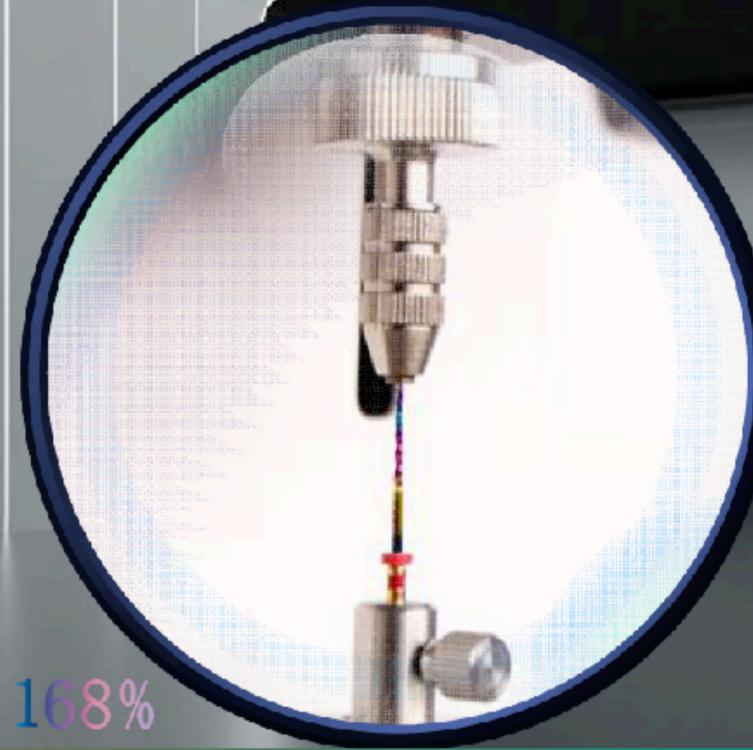


Oggi gli strumenti canalari in nichel-titanio sono prodotti con una tecnologia di trattamento termico che rende la lama più flessibile e risolve in gran parte il problema della rottura dello strumento nei canali radicolari curvi. Tuttavia, poiché la lama diventa più flessibile, la sua forza di taglio si riduce e tende a sfilarsi quando incontra canali radicolari calcificati.

Caratteristiche del nano-rivestimento

Sulla base del trattamento termico del materiale in nichel-titanio, la tecnologia di tempra laser viene utilizzata per aumentare la durezza superficiale degli strumenti canalari del 168%. Il nano-rivestimento riempie gli interstizi della struttura reticolare sulla superficie, formando una nuova tecnologia di strumenti canalari in nichel-titanio che combina attivazione termica, tempra laser e nano-rivestimento.

168%



- Aumento della resistenza all'abrasione di 3-10 volte.
- Miglioramento della qualità della superficie e riduzione dei difetti.
- Rivestimento sottile e uniforme con un basso coefficiente di attrito.
- Nano-rivestimento sottile, circa 3 μm ; pertanto, non influisce sull'accuratezza dimensionale del taglio.

ATTIVAZIONE TERMICA

TEMPRA LASER

NANO-RIVESTIMENTO

Strumenti in NiTi

Attivazione termica

Tempra laser

Nano-rivestimento

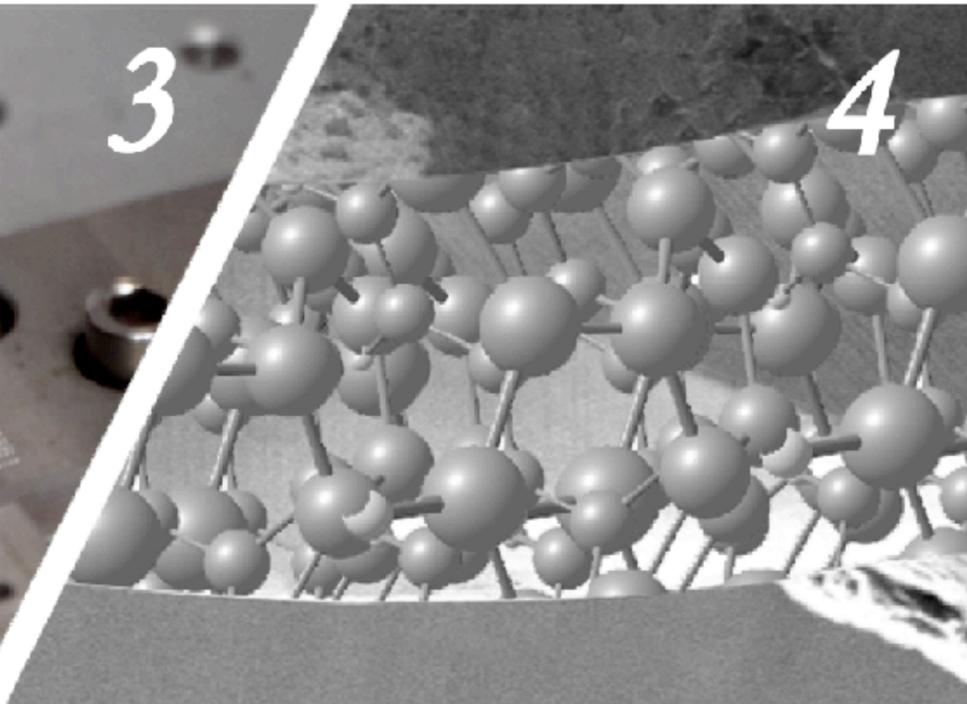
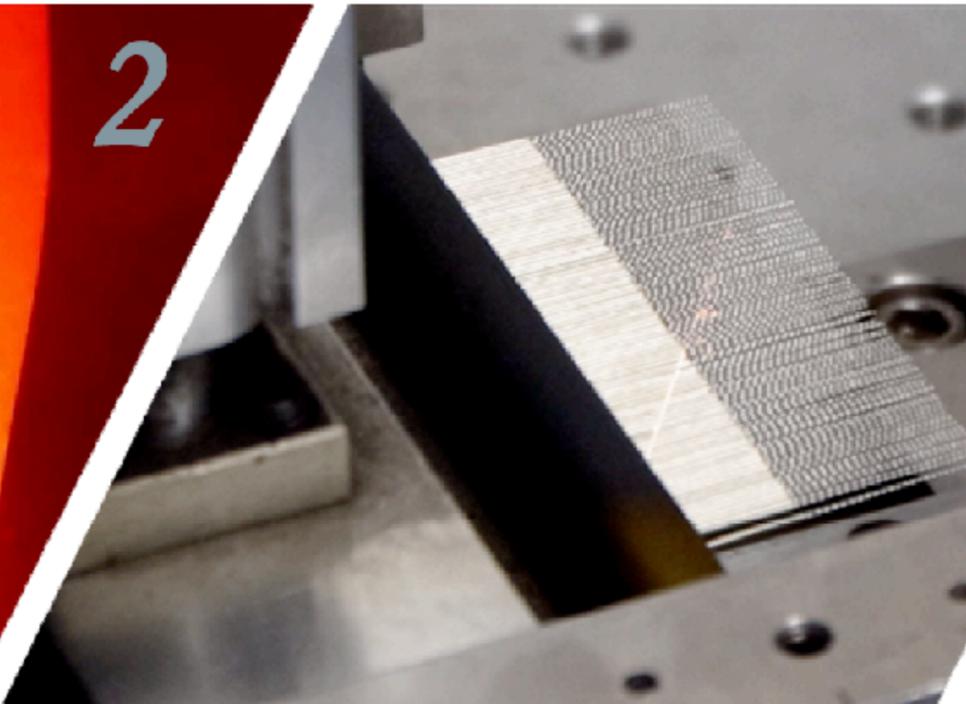
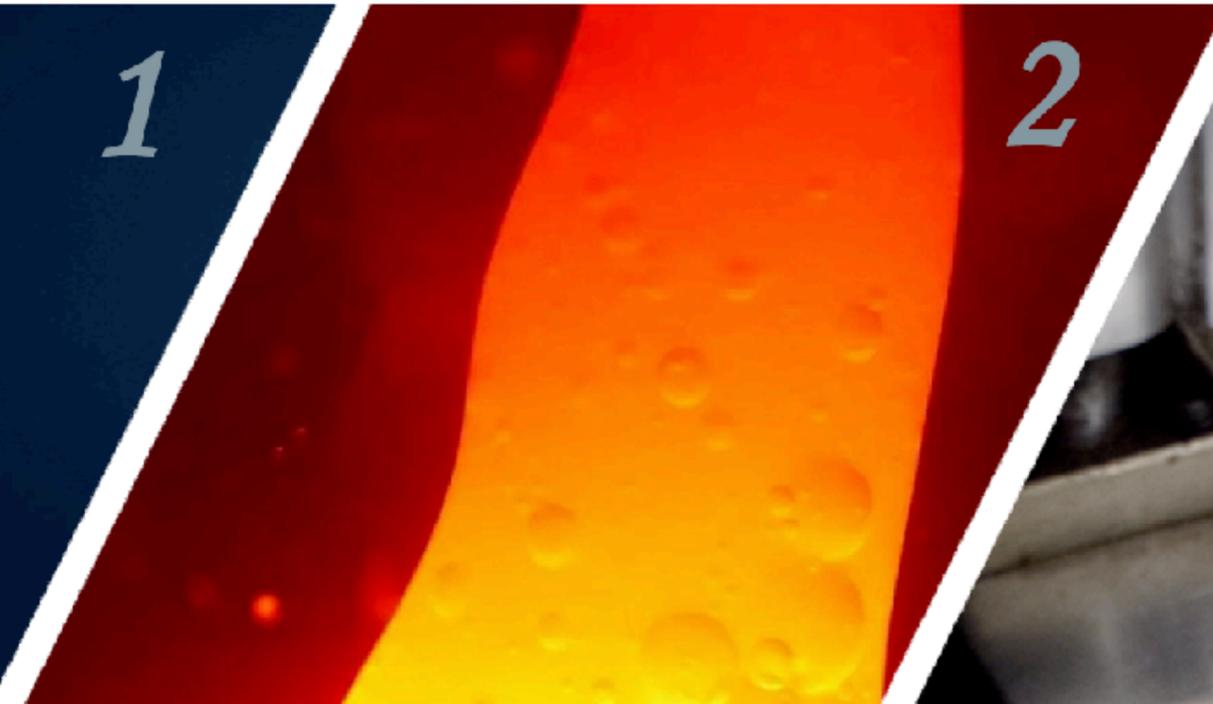


1

2

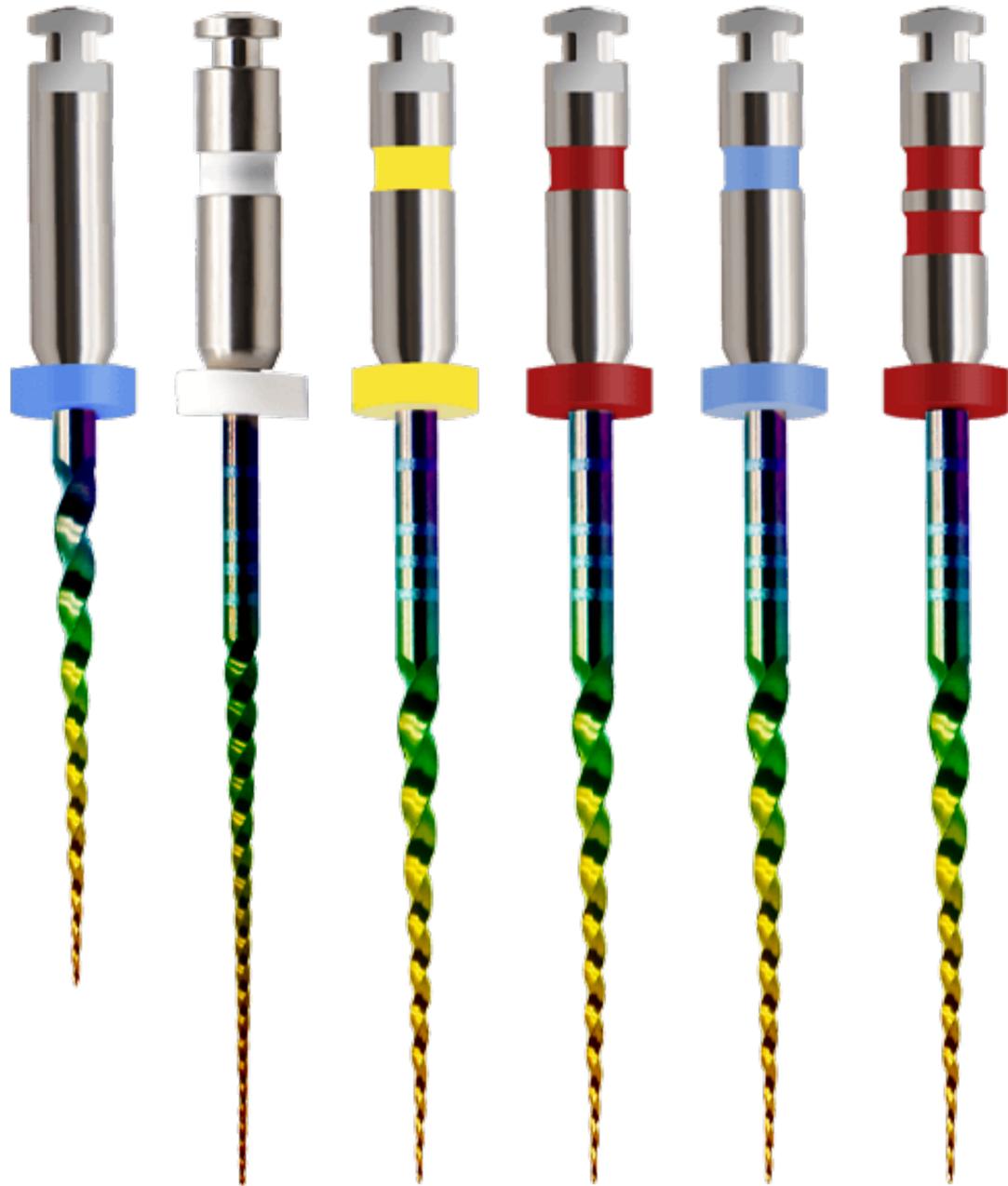
3

4

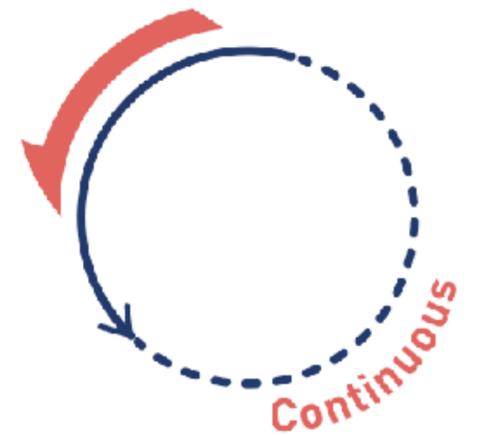


PRO FLEX NHA

NANO RIVESTITO ATTIVAZIONE TERMICA

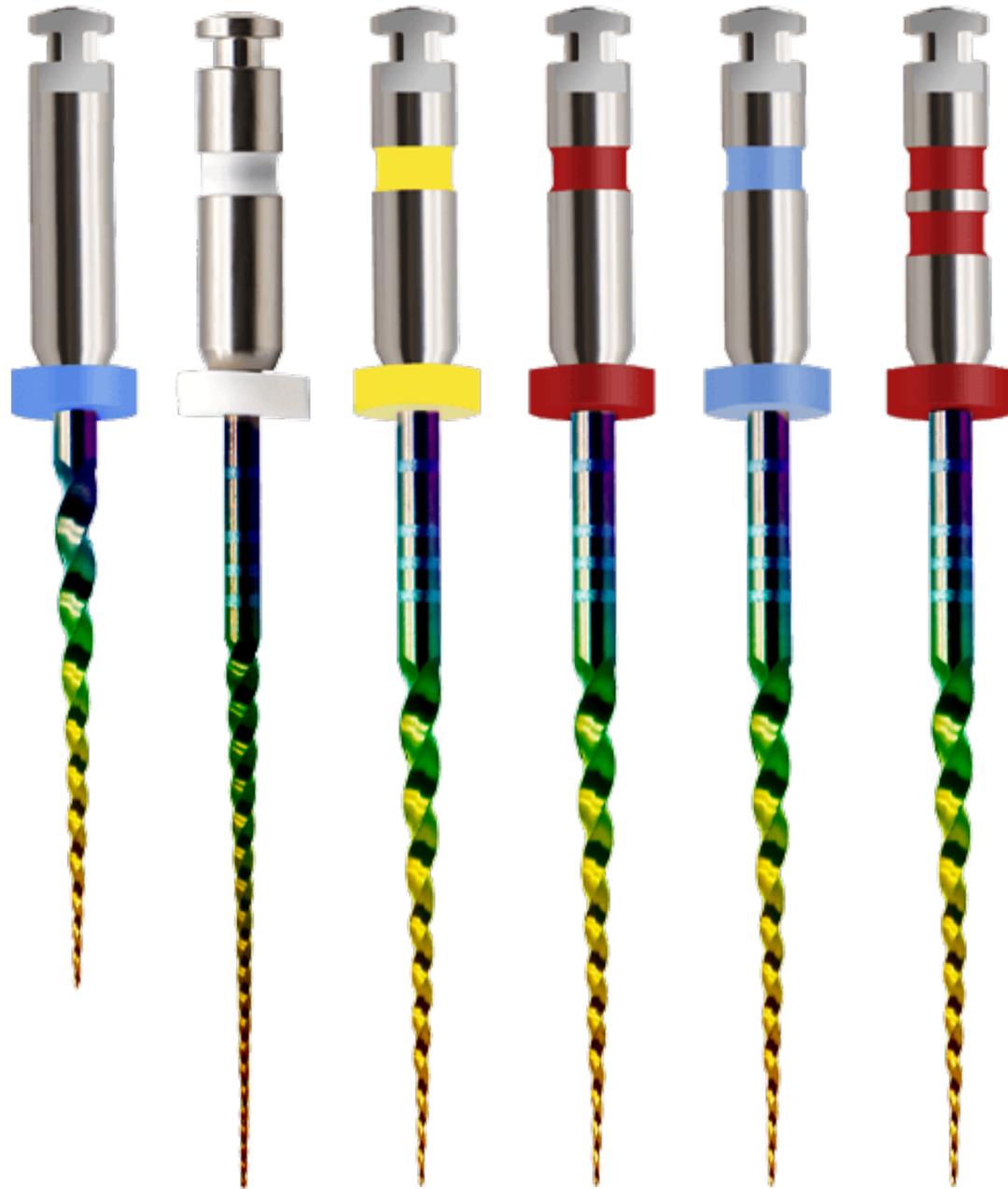


C  **NTROL**
MEMORY



PRO FLEX NHA

NANO RIVESTITO ATTIVAZIONE TERMICA



CONTROL MEMORY

La tecnologia *Control Memory* degli strumenti canalari garantisce stabilità e precisione durante la pulizia del canale radicolare anche quando non viene applicata forza sullo strumento.



NI-TI RAINBOW

Il nuovo materiale *Ni-Ti Rainbow* garantisce resistenza e flessibilità durante il trattamento endodontico, offrendo una maggiore durata e resistenza nella pulizia dei canali radicolari grazie alle sue proprietà avanzate.



ROTAZIONE CONTINUA

Gli strumentini canalari *Pro Flex NHA* sono *compatibili con i motori endodontici a rotazione continua*, garantendo una maggiore velocità di lavoro, una maggiore capacità di rimuovere i detriti durante la sagomatura e una maggior linearità del taglio.

PRO FLEX NHA									
	Ø	%	N/cm	RPM	21 mm	25 mm	31 mm	Cross-section	Match gutta point
R	20	10	2,5	350	17 mm REF: 144900550				
○ 016	15	2-6	2,5	300	144900551	144900561	144900571		-
● D1	20	4	2,5	250-300	144900552	144900562	144900572		● 20/04
● D2	25	4	2,5	250-300	144900553	144900563	144900573		● 25/04
● D3	30	4	2,5	250-300	144900554	144900564	144900574		● 30/04
● D4	25	6	2,5	250-300	144900555	144900565	144900575		● 25/06
016-D4	--	--	2,5	--	144900556	144900566	144900576		-

Legenda / Legend
 - Ø Diametro / Diameter
 - % Conicità / Taper
 - N/cm Torque
 - RPM Velocità / Speed

* La velocità o il torque sono indicativi e possono variare a seconda del dispositivo utilizzato e delle preferenze dell'operatore
 Speed and torque are approximated and can change in relation to the device and to the operator choices

SEQUENZA PRO FLEX H.A.

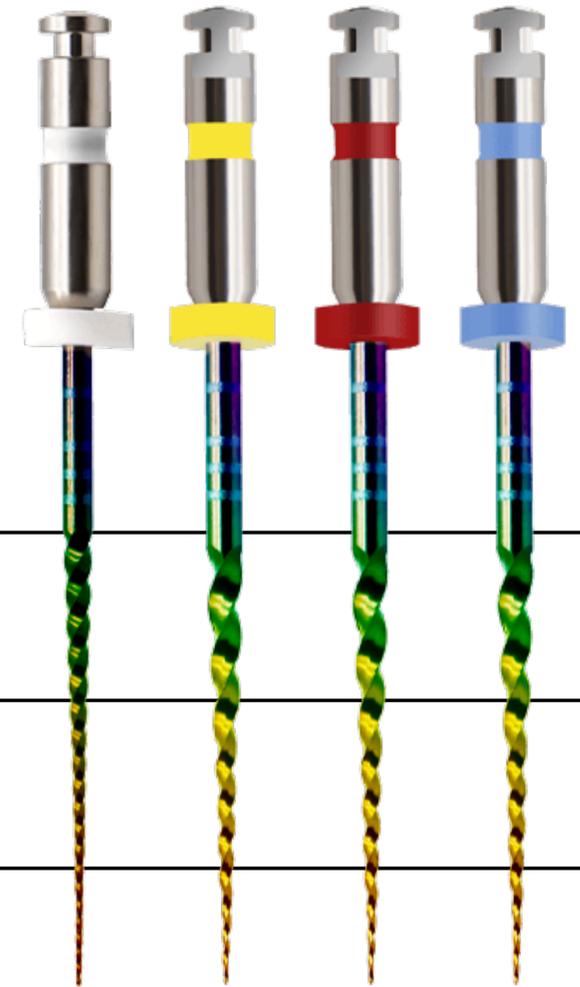
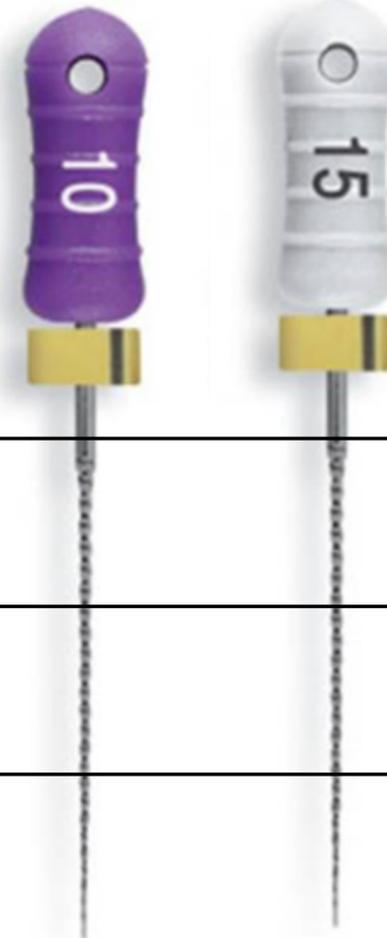
20.10

15./2-6

20.04

25.04

30.04



1/3 CORONALE

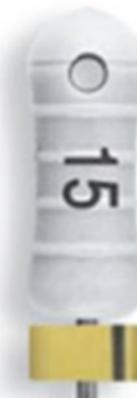
1/3 MEDIO

1/3 APICALE

SEQUENZA PRO FLEX H.A.



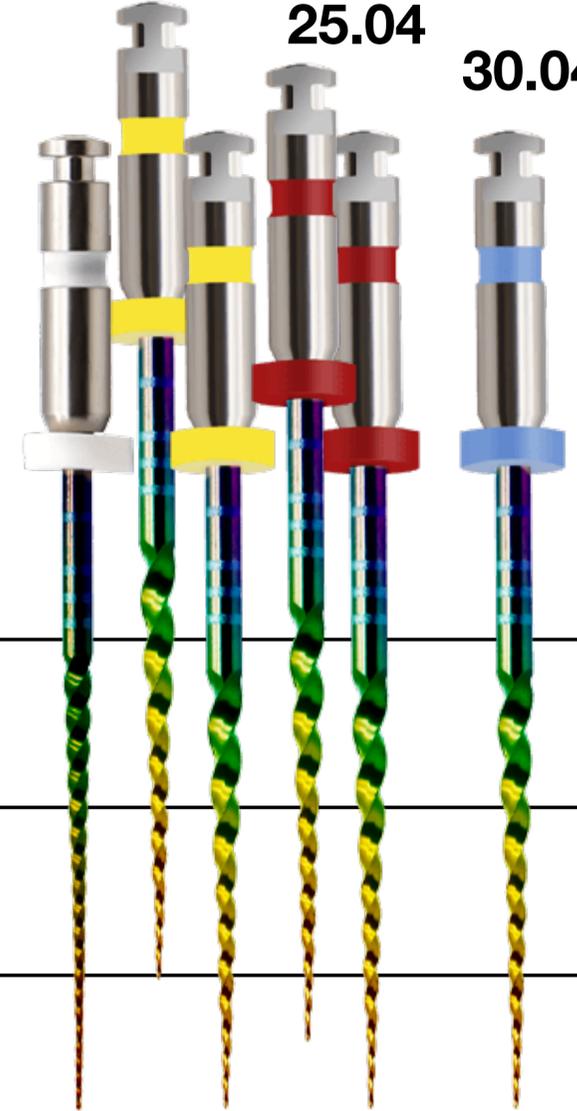
20.10 15./2-6



20.04

25.04

30.04







PreFlaring e Diametro Apicale

Il PreAllargamento del terzo cervicale e medio del canale radicolare migliora la determinazione del diametro anatomico



Influence of cervical preflaring on apical file size determination

J. D. Pecora¹, A. Capelli¹, D. M. Z. Guerisoli¹, J. C. E. Spanó¹ & C. Estrela²

¹Ribeirão Preto Dental School, University of São Paulo, Ribeirão Preto, SP, Brazil; and ²Department of Endodontics, Federal University of Goiás, Goiânia, GO, Brazil

Abstract

Pecora JD, Capelli A, Guerisoli DMZ, Spanó JCE, Estrela C. Influence of cervical preflaring on apical file size determination. *International Endodontic Journal*. 38, 430-436, 2005.

Aim To investigate the influence of cervical preflaring with different instruments (Gates-Glidden drills, Quantec Flare series instruments and LA Axxess burs) on the first file that binds at working length (WL) in maxillary central incisors.

Methodology Forty human maxillary central incisors with complete root formation were used. After standard access cavities, a size 06 K-file was inserted into each canal until the apical foramen was reached. The WL was set 1 mm short of the apical foramen. Group 1 received the initial apical instrument without previous preflaring of the cervical and middle thirds of the root canal. Group 2 had the cervical and middle portion of the root canals enlarged with Gates-Glidden drills sizes 90, 110 and 130. Group 3 had the cervical and middle thirds of the root canals enlarged with nickel-titanium Quantec Flare series instruments. Titanium-nitride treated, stainless steel LA Axxess burs were used for preflaring the cervical and middle portions of root canals from group 4. Each canal was sized using manual K-files, starting with size 08 files with passive movements until the WL was reached. File sizes were increased until a binding sensation was felt at the WL, and the instrument size was recorded for

each tooth. The apical region was then observed under a stereoscopic magnifier. Images were recorded digitally and the differences between root canal and maximum file diameters were evaluated for each sample.

Results Significant differences were found between experimental groups regarding anatomical diameter at the WL and the first file to bind in the canal ($P < 0.01$, 95% confidence interval). The major discrepancy was found when no preflaring was performed (0.151 mm average). The LA Axxess burs produced the smallest differences between anatomical diameter and first file to bind (0.016 mm average). Gates-Glidden drills and Flare instruments were ranked in an intermediary position, with no statistically significant differences between them (0.093 mm average).

Conclusions The instrument binding technique for determining anatomical diameter at WL is not precise. Preflaring of the cervical and middle thirds of the root canal improved anatomical diameter determination; the instrument used for preflaring played a major role in determining the anatomical diameter at the WL. Canals preflared with LA Axxess burs created a more accurate relationship between file size and anatomical diameter.

Keywords: apical file size determination, coronal flaring, instrument type.

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Correspondence: Prof. Dr Jesus D. Pecora, Departamento de Odontologia Restauradora, Faculdade de Odontologia de Ribeirão Preto, Universidade de São Paulo, 14040-904, Ribeirão Preto, SP, Brazil (Tel.: +55 16 602 3982; fax: +55 16 633 0999; e-mail: pecora@forp.usp.br).

Introduction

Current standards in root canal treatment are based on cleaning and shaping the root canal prior to filling (West & Roane 1998). Some authors suggest that the amount of apical enlargement to be achieved during shaping of the canal should be based on the estimation of initial apical diameter and by three file sizes greater

Cyclic Fatigue Resistance of Nickel-titanium Rotary Instruments according to the Angle of File Access and Radius of Root Canal



Eugenio Pedullà, DDS, MS, PhD,* Giusy Rita Maria La Rosa, DDS,* Chiara Virgilio, DDS,* Ernesto Rapisarda, DDS,* Hyeon-Cheol Kim, DDS, MS, PhD,† and Luigi Generali, DDS‡

ABSTRACT

Introduction: The aim of this study was to compare the influences from different access angles and curvature radii on cyclic fatigue resistance of nickel-titanium rotary files. **Methods:** Two file systems (2Shape [TS; MicroMega, Besançon, France] and HyFlex CM [HCM; Coltène/Whaledent, Allstatten, Switzerland]) were used. A total of 192 instruments of TS #25/.04 (TS1), TS #25/.06 (TS2), HCM #25/.04, and HCM #25/.06 were evaluated at 3 insertion angles (0°, 10°, and 20°) and 2 radii (5 mm and 3 mm) in 18-mm stainless steel artificial canals with a 60° curvature. Cyclic fatigue resistance was determined by the number of cycles to failure (NCF) using a customized testing device. Data were analyzed statistically with the significance level established at 95%. **Results:** In the 3-mm radius canal, the instruments showed lower cyclic fatigue resistance than in the 5-mm radius canal ($P < .05$). HCM #25/.06 and all .04 taper instruments had a significant NCF reduction at 20° and 10° in the 3-mm radius canal ($P < .05$), whereas TS2 showed no significant differences. In the 5-mm radius of curvature, although .06 taper instruments had no significant NCF reduction for each angle tested, .04 taper files exhibited significant NCF reduction when tested at 20° ($P < .05$). Comparing the same size instruments, HCM had higher NCF than TS ($P < .05$). Instruments with a .04 taper exhibited higher NCF than the .06 ones with the same heat treatment ($P < .05$). **Conclusions:** An inclined insertion into the canals decreased cyclic fatigue resistance of thermal-treated instruments with a .04 taper at all radii of curvature tested. The synergistic effect of a small radius of curvature and access angulation of heat-treated instruments decreases their fatigue resistance. (*J Endod* 2020;46:431–436.)

KEY WORDS

2Shape; angle of file access; canal curvature; canal radius; cyclic fatigue resistance; HyFlex CM

SIGNIFICANCE

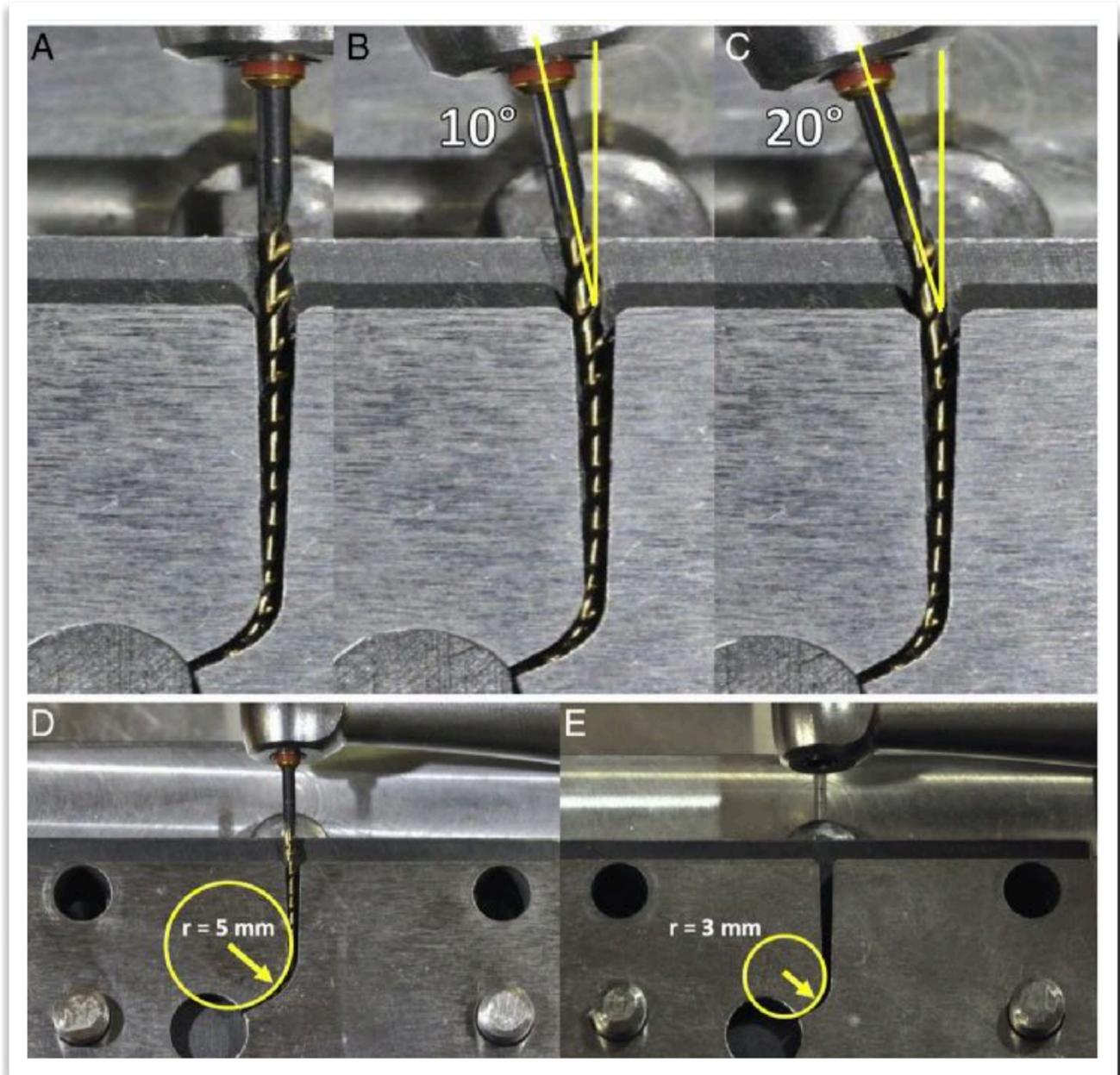
The angulated file access and/or severe curved canal curvature with a small radius could influence (reduce) cyclic fatigue resistance of heat-treated nickel-titanium instruments.

From the *Department of General Surgery and Surgical-Medical Specialties, University of Catania, Catania, Italy; †Department of Conservative Dentistry, School of Dentistry, Dental and Life Science Institute, Dental Research Institute, Pusan National University, Yangsan, Korea; and ‡Department of Surgery, Medicine, Dentistry and Morphological Sciences with Transplant Surgery, Oncology and Regenerative Medicine, University of Catania.

Nickel-titanium (NiTi) rotary instruments may exhibit a higher risk of intraoperative fracture within the root canal¹. Fracture may occur due to torsional failure, which is the most prevalent cause of “unexpected” break crack propagation caused by repeated tensile loading².

Several factors influence the fracture of treatment, and metallurgical properties of instrument fracture is the radius of curvature³ shaped curvatures^{4,10}. Another parameter is anatomic access configuration and operator endodontics, the recent contracted endodontic NiTi instruments².

Heat treatments have been attempted characteristics of traditional NiTi instruments¹¹



.05). Conclusions: An inclined insertion into the canals decreased cyclic fatigue resistance of thermal-treated instruments with a .04 taper at all radii of curvature tested. The synergistic effect of a small radius of curvature and access angulation of heat-treated instruments decreases their fatigue resistance. (*J Endod* 2020;46:431–436.)



GLIDEPATH



15./2-6

Basic Research

Use of Nickel-Titanium Rotary PathFile to Create the Glide Path: Comparison With Manual Preflaring in Simulated Root Canals

Elio Berutti MD, DDS ^{*}, Giuseppe Cantatore MD, DDS [†], A
Chiandussi MSc, PhD [‡], Francesco Pera DDS ^{*}, Giuseppe

.001). No expertise-related difference was found within instrument groups ($P > .05$), whereas the inexperienced clinician produced more conservative shaping with Pathfiles than did the expert with manual preflaring ($P < .01$).

Glide Path Preparation in S-shaped Canals with Rotary Pathfinding Nickel-Titanium Instruments

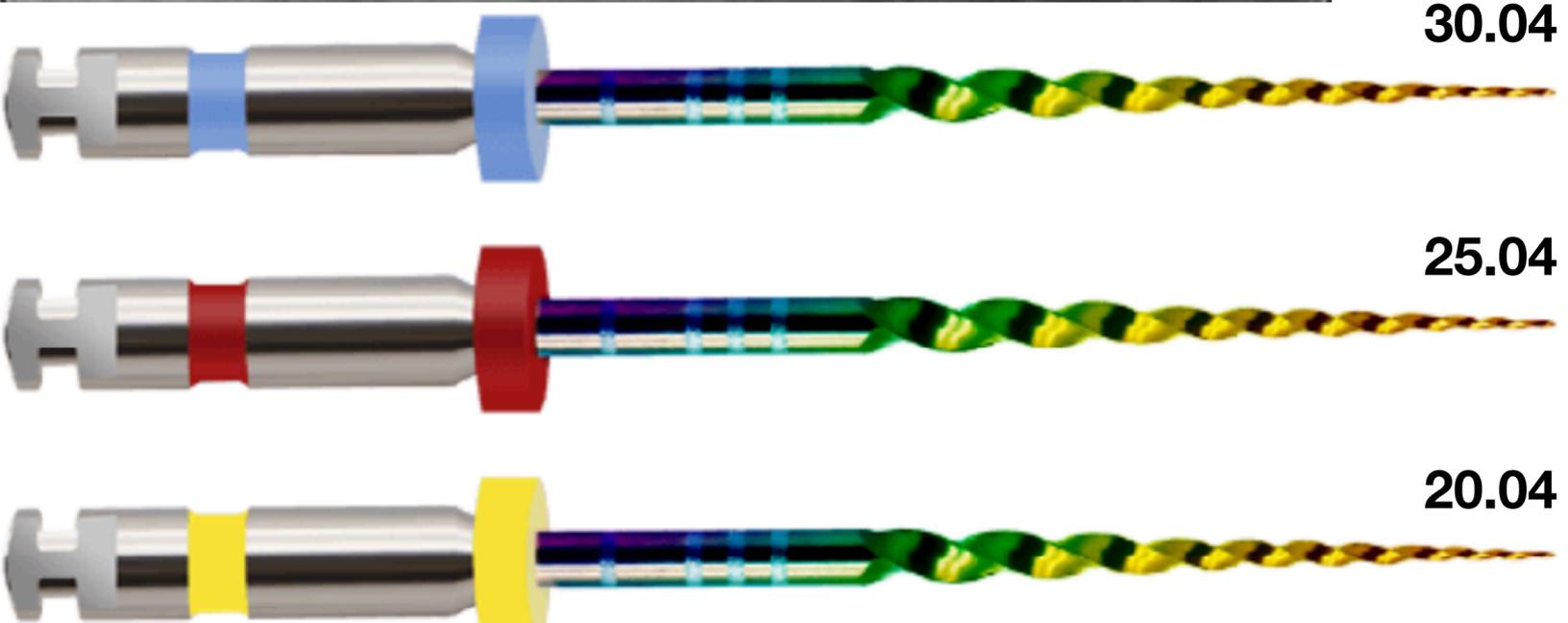
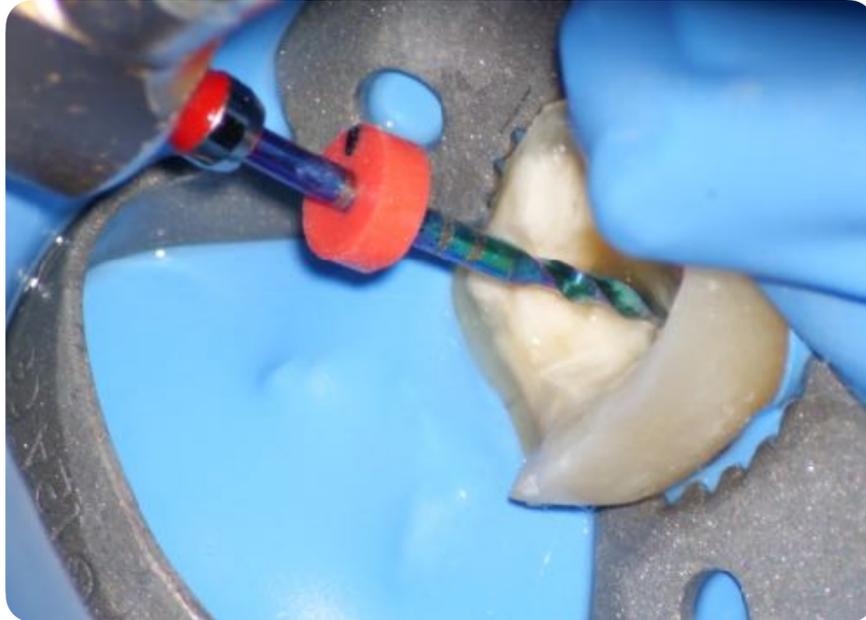
Natasha C.C. Ajuz, DDS ^{*} · Luciana Armada, PhD ^{*} · Luc
José F. Siqueira, Jr., PhD [‡] 

Conclusions

Findings suggest that rotary NiTi instruments are suitable for adequate glide path preparation because they promoted less deviation from the original canal anatomy when compared with hand-operated instruments. Of the 2 rotary pathfinding instruments, Scout RaCe showed an overall significantly better performance.



SHAPING



DIAMETRO DELLA PREPARAZIONE

Better microbial removal and more effective irrigation occurs when canals are instrumented to larger apical sizes

30-35



INTERNATIONAL ENDODONTIC JOURNAL

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REVIEW

Master apical file size – smaller or larger: a systematic review of healing outcomes

A. Aminoshariae¹ & J. C. Kulild²

¹Department of Endodontics, Case School of Dental Medicine, Cleveland, OH and ²Dental School, IMEC, Kansas City, MO, USA

Abstract

Aminoshariae A, Kulild JC. Master apical file size – smaller or larger: a systematic review of healing outcomes. *International Endodontic Journal*, 48, 639–647, 2015.

The purpose of this systematic review was to determine in patients undergoing root canal treatment, whether apical enlargement affected the healing outcome. A PICOT (population, intervention, comparison and outcome) strategy was developed to identify studies dealing with apical size of canal and healing outcome as measured clinically and radiographically. The MEDLINE, Embase, Cochrane and PubMed databases were searched. Additionally, the bibliography of all relevant articles and textbooks was manually searched. Based on inclusion and exclusion criteria,

two reviewers independently articles. Four articles were included. There were 100 teeth included in the meta-analysis. The meta-analysis confirmed research in this area is needed. The evidence suggests that for and periapical lesions, enlargement would result in an increase in terms of clinical and radiographic healing outcome. master apical file size.

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cultured bacteria-free. Chemomechanical preparation devices problem but is not able to (Dalton et al. 1999; 2005; Alves et al. 2013). In a quest for the contaminants from authors have suggested that instrumentation may be the key (Prestavik et al. 1994; Shulman et al. 2013). Rolleston et al. declined the need for the apical preparation larger than the file. This was not

The Role of Apical Instrumentation in Root Canal Treatment: A Review of the Literature

Dean Baugh, DDS, and James Wallace DDS, MDS, MSD, MS

Abstract

The issue of final apical preparation size remains controversial despite considerable clinical and in vitro research. The apical clinician must be aware of this research before choosing any instrumentation system because the instrument clinician's choice must be guided by the best available evidence-based information. This review article generated a Medline-based search strategy to disclose these studies and provides a critique and summary of the results.

From the University of Pittsburgh School of Dental Medicine, Pittsburgh, Pennsylvania. Address reprint requests to Dean Baugh, DDS, E-mail: baugh@pitt.edu. Copyright © 2005 by the American Association of Endodontists

The most important objective of root canal therapy is to minimize the number of microorganisms and radicular debris in root canal systems to prevent or treat apical periodontitis. This process of chemomechanical debridement, or cleaning of the root canal system, has been described as the removal of all of the contents of the root canal system before sealing the apex. (1) biomechanical cleaning is the most important part of root canal therapy. Schilder (2) also considered cleaning and shaping as the foundation for successful endodontic therapy.

Through instrumentation of the apical region has long been considered to be an essential component in the cleaning and shaping process. It was discussed as a critical step as early as 1911 by Groves (3). Simon (4) later recognized the apical area as the critical zone for instrumentation. Other authors (5, 6) concluded that the low level of evidence that approach the apical for most is critical to the non-resolution process. Mechanical instrumentation and irrigation are sound endodontic principles and essential components of successful endodontics (7, 8). Research has shown that mechanical instrumentation greatly reduces the number of microorganisms remaining in the root canal system. Mechanical instrumentation (9) has been shown to reduce bacterial count even without irrigants or dressings. A combination of mechanical instrumentation and irrigation (9, 10) further reduced the number of microorganisms by 100 to 1000 times. However, mechanical instrumentation with irrigation does not reliably eradicate an infected root canal system (11–14).

Manufacturers developed a wide variety of instrumentation systems to facilitate the cleaning and shaping process. They are popular because of their appearance of use and reduced number of instruments. However, Youngberg (15) noted that the strong emphasis on reducing the number of instruments and limiting apical preparation to small sizes does not produce clean apical preparations indicated work. Given the controversial and inconsistent reports, we conducted a Medline search of the literature to characterize the major factors involved in apical canal instrumentation. Table 1 provides the Medline search strategy used to identify relevant articles for this review. A secondary search was then conducted using the references from the computer-generated list of articles. We have organized this review to cover the major factors impacting the selection of the final apical size, namely the anatomy of the apical constriction, apical canal diameter, apical instrumentation, and bacteria.

The Apical Constriction

The apical constriction (cementodentinal junction or CEJ) has long been advocated as the terminal end of instrumentation and obturation (3, 4). It is in theory the narrowest part of the canal and the location where the pulp ends and the periodontium begins. Ricucci (15) advocated instrumenting to the apical constriction because impingement outside this junction may delay wound healing or it may hinder the efficacy of the outcome of endodontic therapy. Materials or medicaments extruded beyond the constriction may provoke inflammation and a foreign body reaction. Ricucci and Langeland (16) showed that instrumentation and obturation to the apical constriction agree the best prognosis. A poorer prognosis was observed when obturating material extended beyond the apical constriction. A literature review by Wu et al. (17) agreed with the major findings of Ricucci and Langeland. However, it is worth noting that the apical constriction may not always be present or easily identifiable (4, 18).

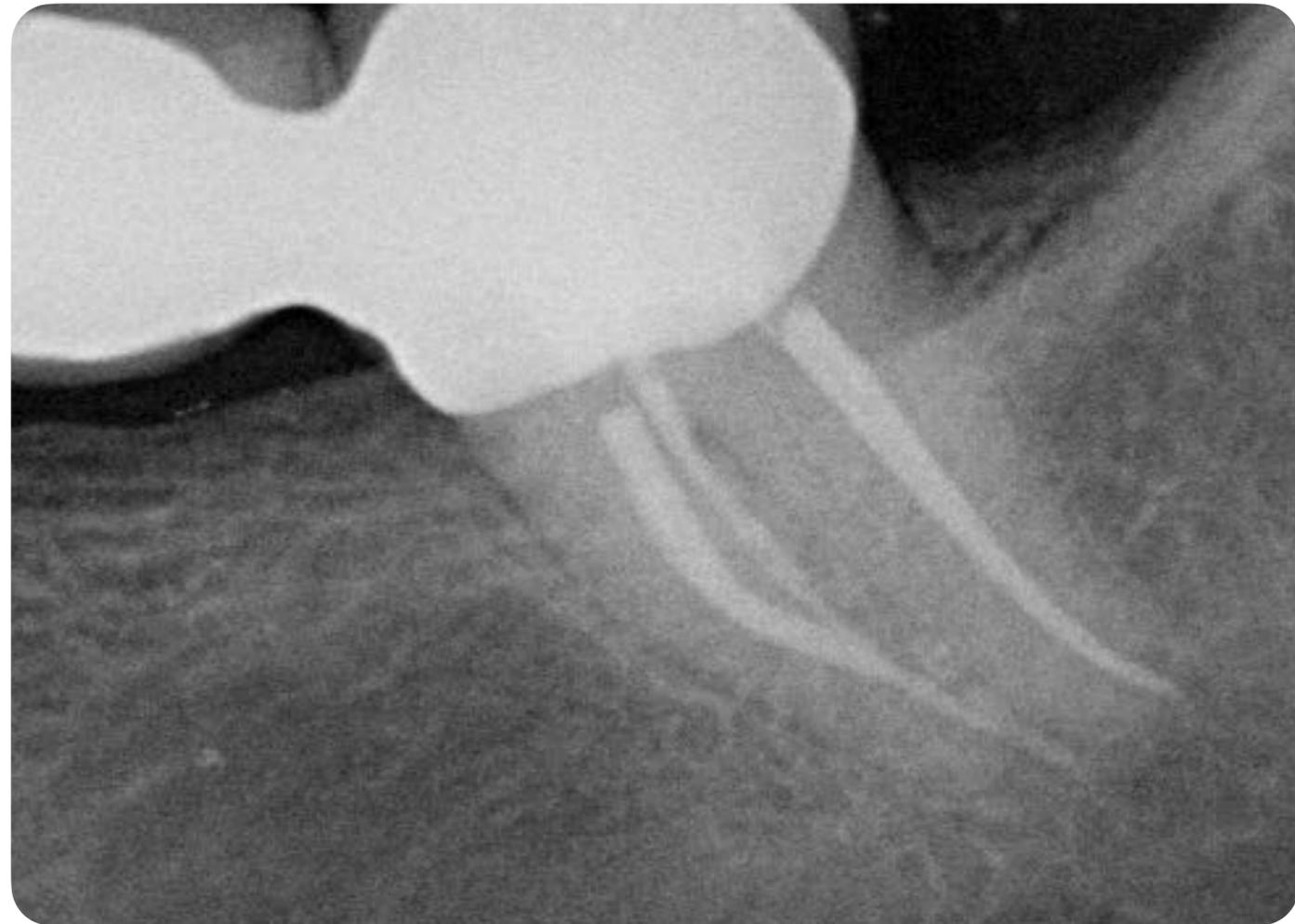
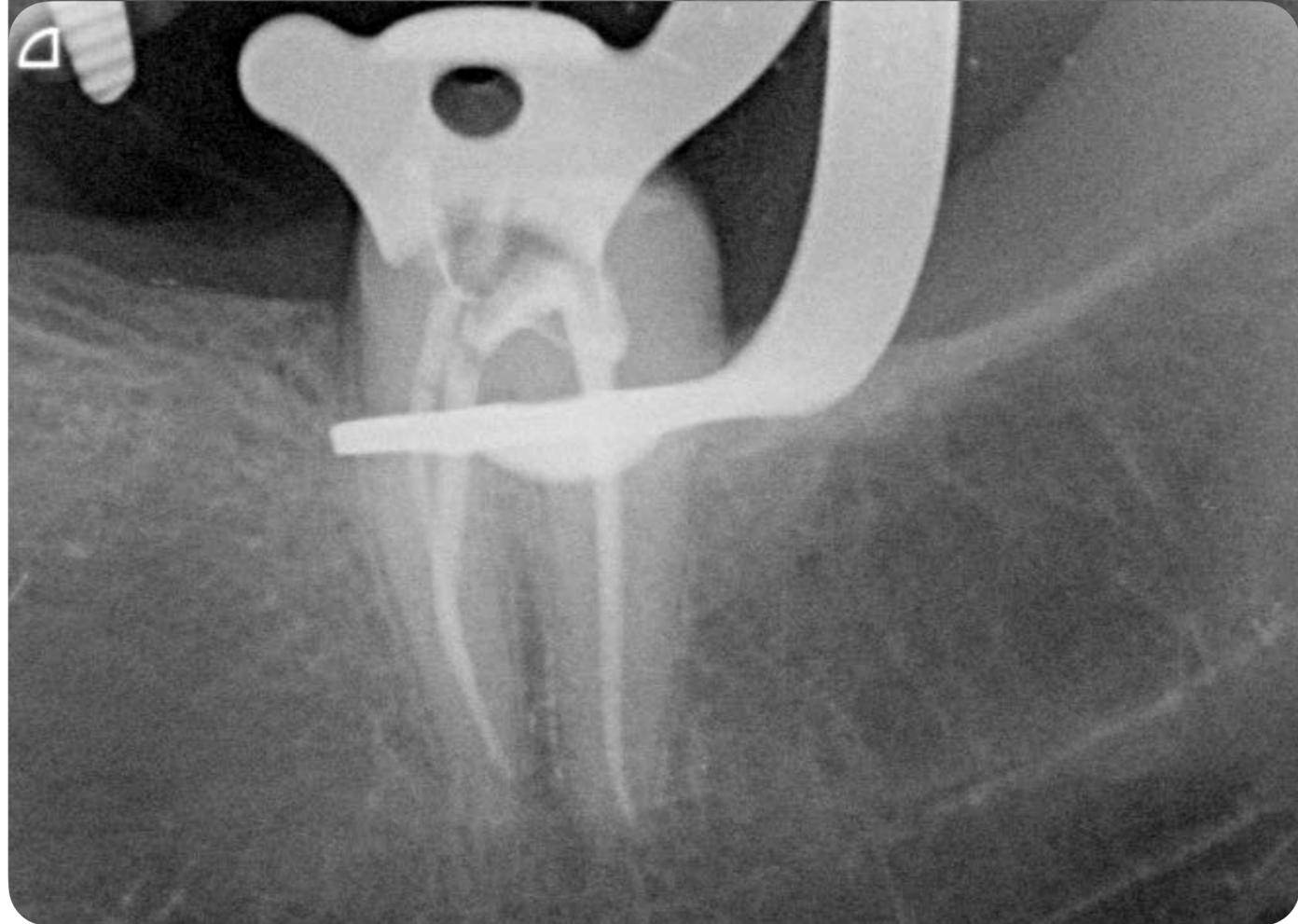
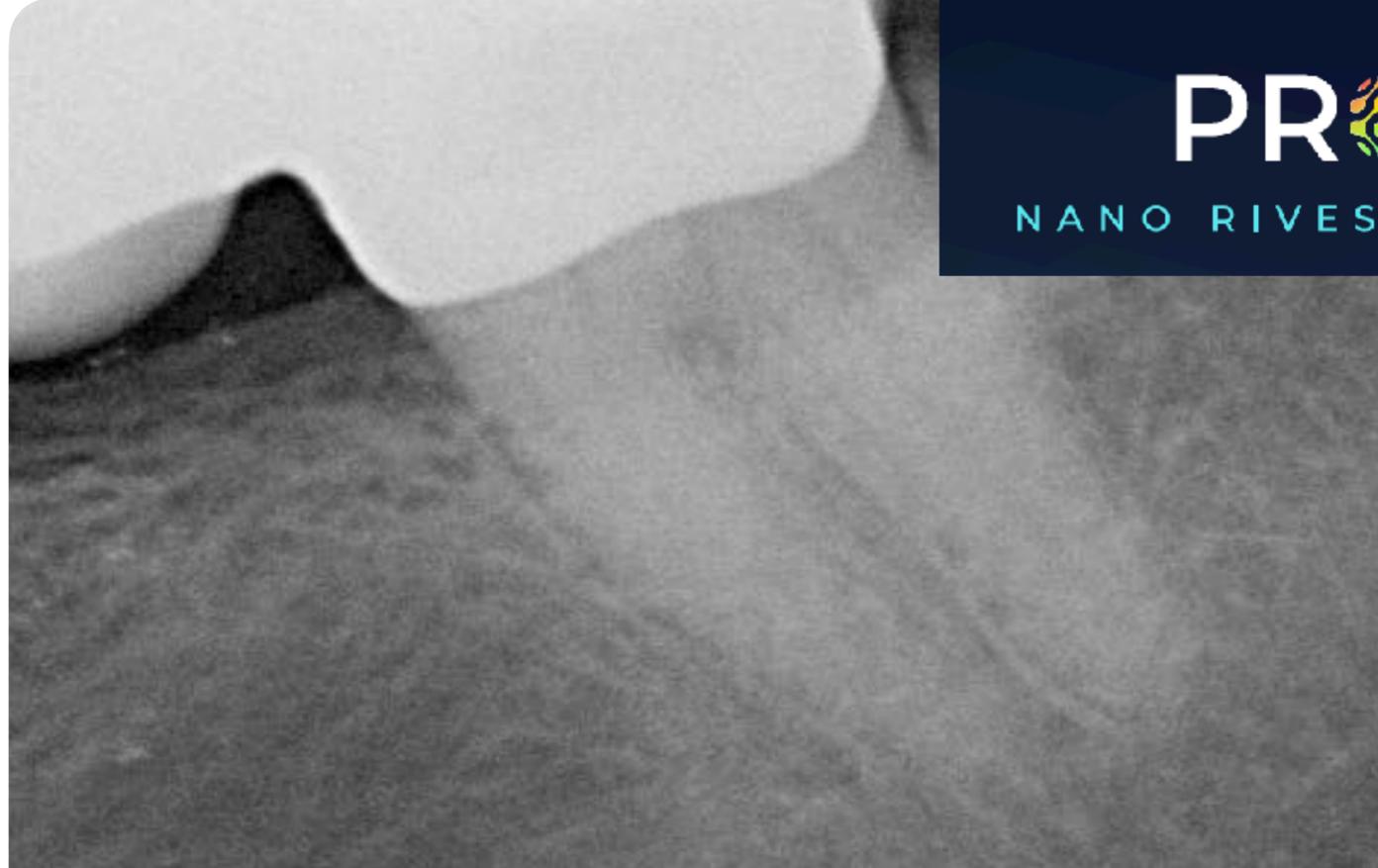
Correspondence: Amir Aminoshariae, Diplomate of American Board of Endodontics, 2123 Abington Road A 280, Cleveland, Ohio 44106, USA (Tel: 1 216 368 1188, e-mail: awa53@case.edu).

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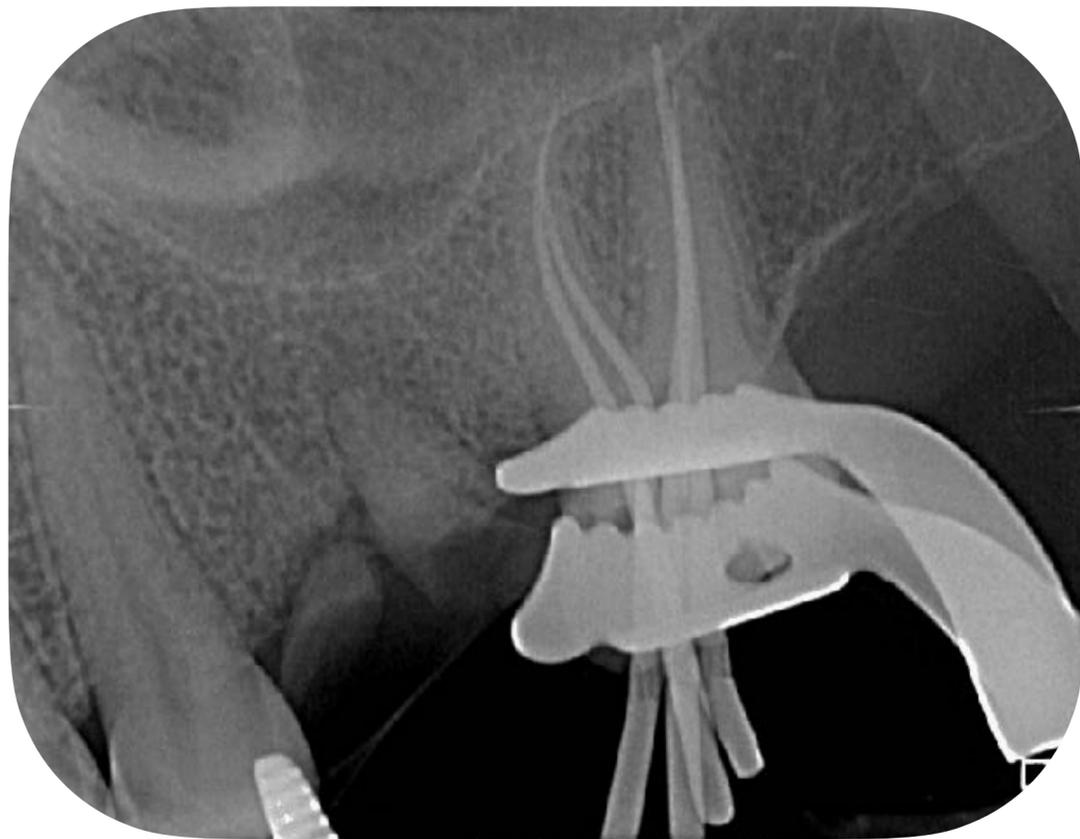
BAUGH 2005

PRO FLEX NHA
NANO RIVESTITO ATTIVAZIONE TERMICA





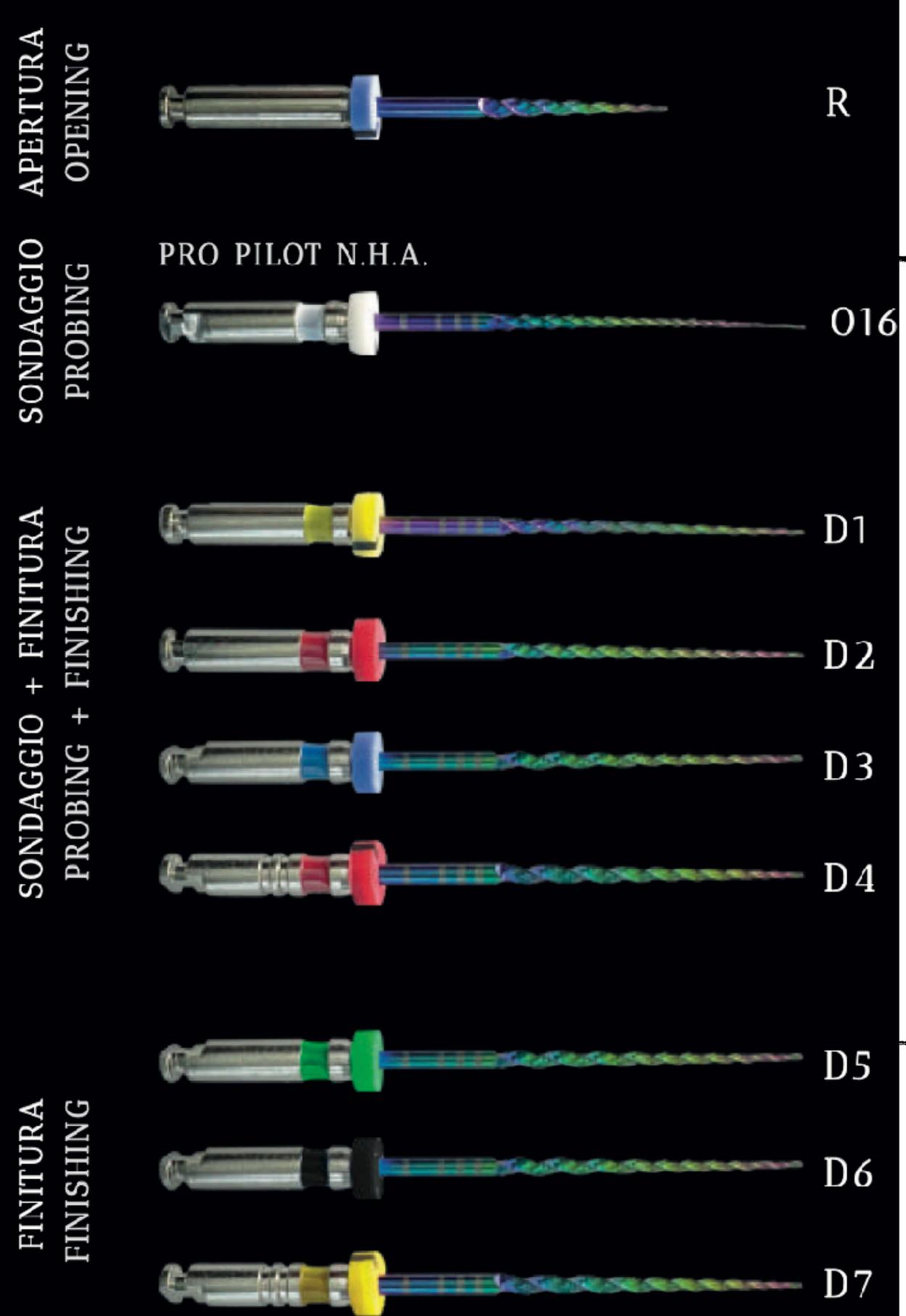
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VANTAGGI DEL NANO-COATING

- FLESSIBILITÀ (CURVATURE)
- APPROCCIO CONSERVATIVO (SAGOMATURA 0,4)
- RESISTENTE
- EFFICIENZA DI TAGLIO
- SAGOMATURA PROFONDA (30,4...)

DENTAL WORLD

BIOCERAMIC SEALER

CONDENSAZIONE IDRAULICA 0.4 TAPER



Elevata biocompatibilità

Non tossico

Idrofilo

Radiopacità

Adesione alla dentina

Dimensionalmente stabile

Bioattivo e osteoinduttivo

Bassa risposta infiammatoria

Formazione di idrossiapatite

Antibatterico (pH basico)

Facile da usare e maneggiare

VANTAGGI



AIE
 ACCADEMIA ITALIANA DI ENDODONZIA
 COLLANA DI MONOGRAFIE

**OTTURAZIONE DEL
 SISTEMA CANALARE**

MAURO VENTURI, FEDERICA FONZAR
 GIANLUCA FUMEI, CARLO PIANA
 Coordinamento scientifico
 MAURO VENTURI



PICCIN





Remake Root HT

Pre-mixed bioceramic sealant.

FLOW hydraulic cement based on calcium aluminosilicate.

- Tempo di lavorazione: **Nessuno**
- Tempo di presa (indurimento): **2.5 ore**
- Fluidità: **22mm**
- Spessore: **17mm**
- Resistenza alla compressione: **60MPa(7giorni)**

- Generation of calcium hydroxide
- Three-dimensional adherent sealing
- Generation of hydroxyapatite
- Chemical bonding to gutta-percha and dentin
- Setting time: work (25 min.)
- Setting time: total (2.5 hours)
- No contraction
- Wet field activation
- Resistance 100 MPa

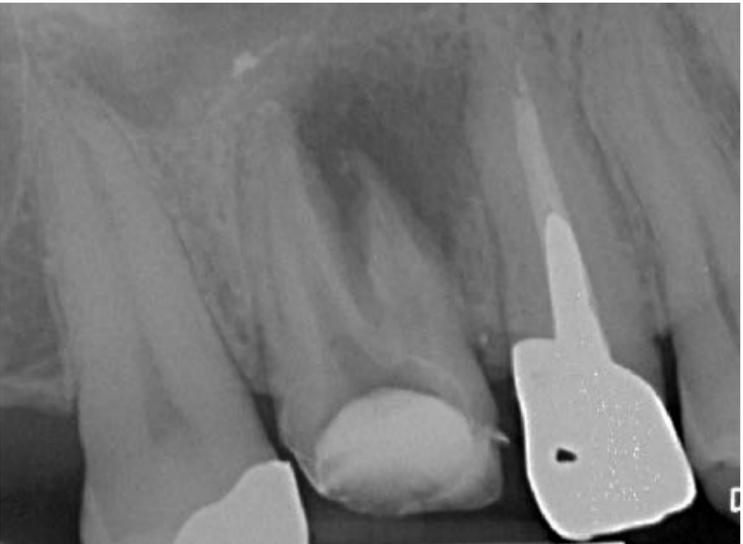
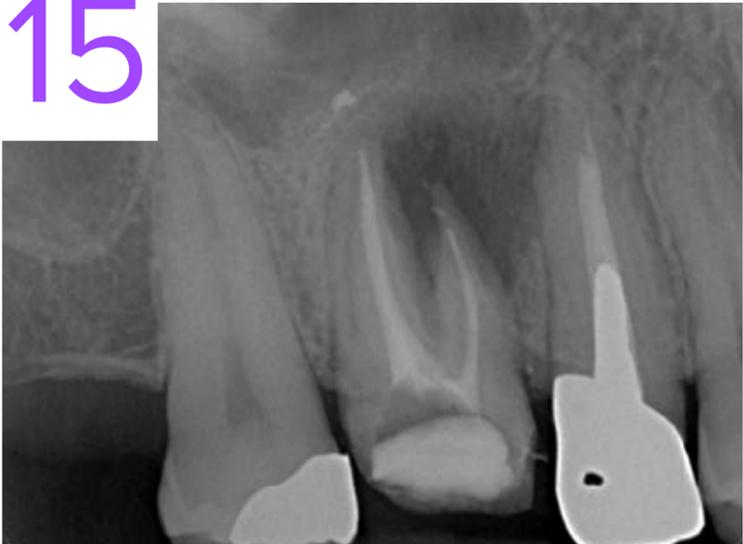
- Calcium aluminosilicate with high degree of purity
- Resin-free
- Eugenol-free
- Ready to use
- Pre-mixed injectable one-component paste
- Compatible with Thermafil



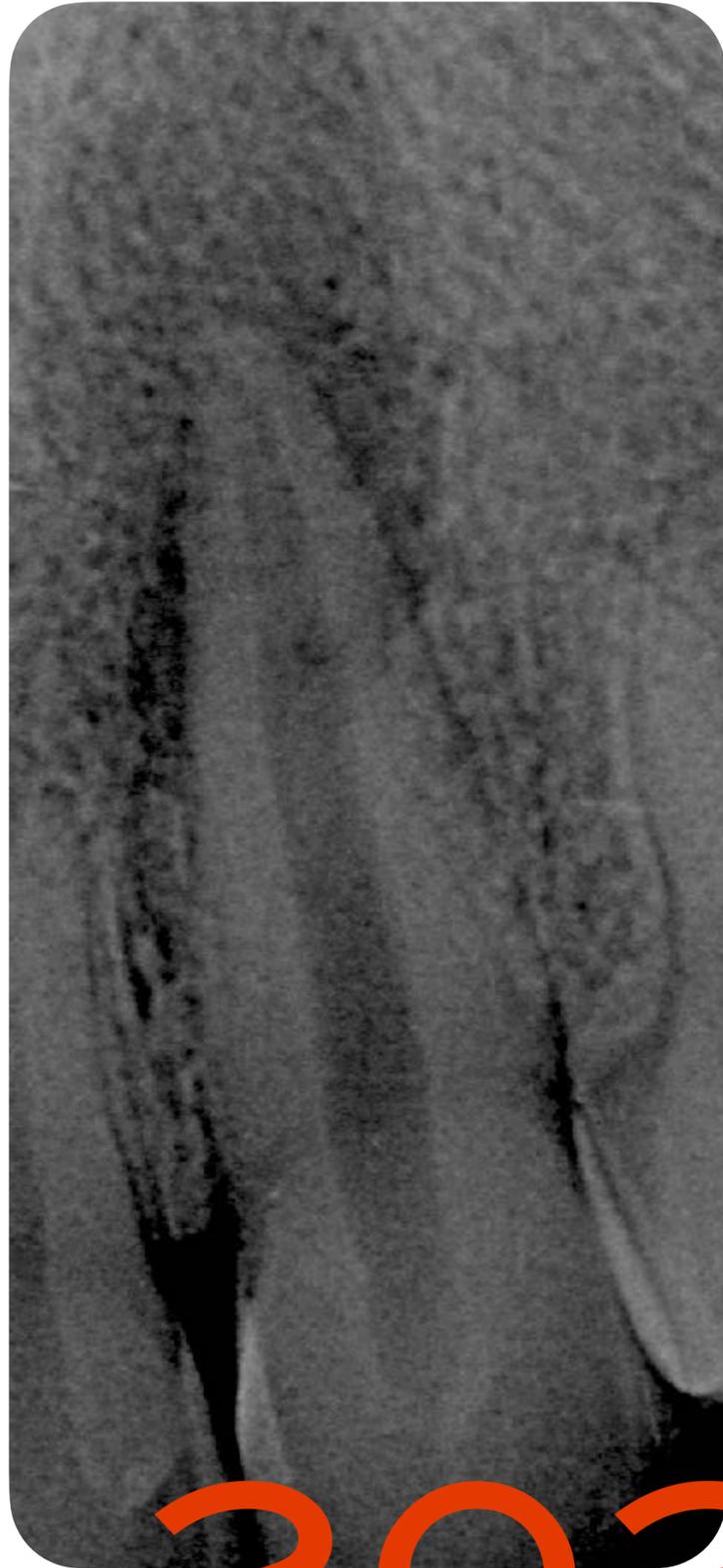
0,4 TAPER

HYDRAULIC CONDENSATION

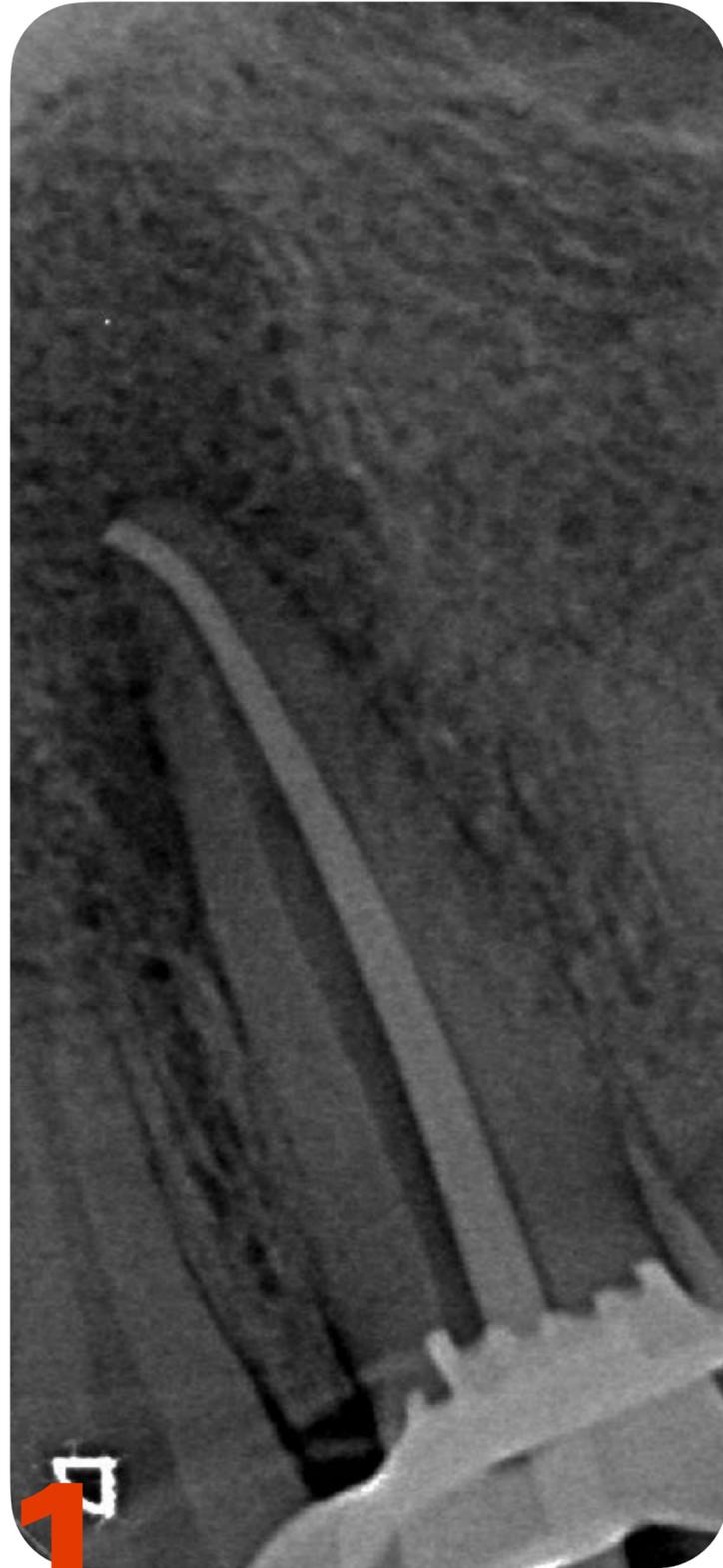
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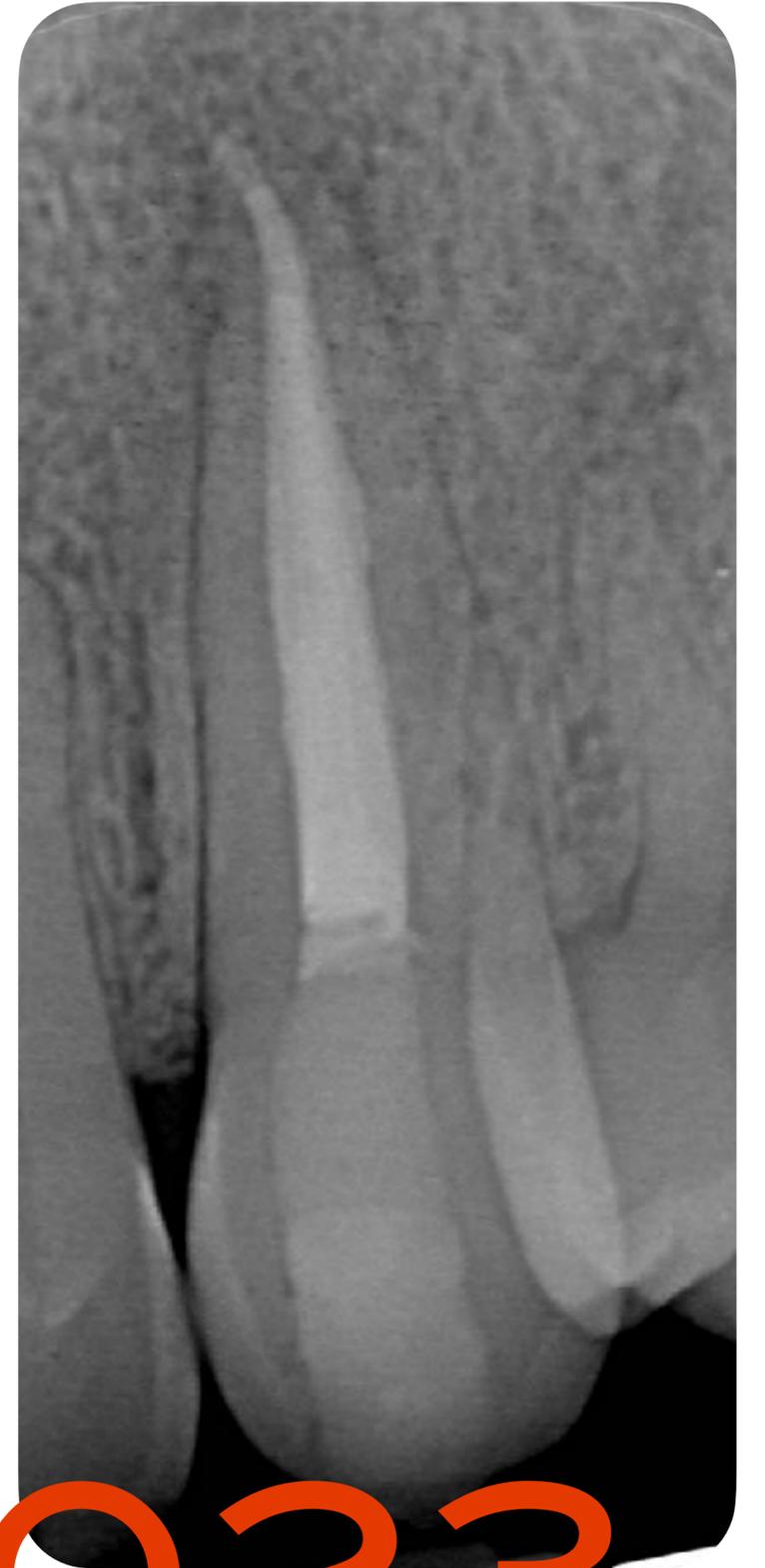
2021



D



D



2023



2023





2023



2024



KEY POINT



TRATTAMENTO ENDODONTICO MINI-INVASIVO

STRUMENTI NI-TI NANO-COATED

CEMENTI BIO CERAMICI



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Grazie

Gianluca



1 STEP

Working length



II STEP

Opener Preflaring
20-10



400 rpm
T 2,5 Ncm

III STEP

GLYDER Glide path
15/2-6



300 rpm
T 1,8 Ncm

IV STEP



Shaping

20.4

25.4

30.4

25.6

400 rpm

T 2,5 Ncm