higher than #25.06 files made with the same thermal treatment. Independently from taper, each file tested in 3mm-radius canal showed lower cyclic fatigue resistance than instruments tested in 5mm-radius canal.

## 3D micro-CT analysis of the interface voids associated with BioRoot RCS and Guttaflow Bioseal

**Karalambos Lazaridis[1], Gianluca Conte[1], Pietro La Paglia[1], Giusy RM La Rosa[1], Prasanna Neelakantan[2], Ernesto Rapisarda[1], Sebastiano Ferlito[1]**

[1]Department of General Surgery and Surgical-Medical Specialties, University of Catania, Catania, Italy;
[2]Discipline of Endodontology, Faculty of Dentistry, University of Hong Kong, Hong Kong, Korea.

**Aim:** The material used for root canal obturation is one of the critical determinants for the success or failure of endodontic treatment. Lately, a number of new endodontic materials have been introduced. The Aim of this study was to investigate the percentage of 3D voids within root fillings produced by BioRoot RCS (Septodont, Saint Maur des Fossés, France) and Guttaflow Bioseal (Coltene Whaledent, Langenau, Germany) using micro-computed tomography.
**Methods:** Forty-eight single-rooted mandibular premolars were collected and decoronated. The root canals were instrumented using Hyflex EDM nickel-titanium rotary instruments (Coltene, Coltene/Whaledent AG, Altstatten, Switzerland) up to size 40/0.04. The roots were randomly allocated into 2 groups (n=24), and each group was obturated by using single cone technique with a different material: BioRoot RCS (Group 1) and Guttaflow Bioseal (Group 2). Specimens were numbered and scanned with a micro-CT (Skyscan1172, Brunker microCT, Antwerp. Belgium) at 80 kV and 100 µA with an isotropic resolution of 11 µm. Volume rendering and multiplanar volume reconstruction were performed to calculate the volume of root filling material using the software Amira 5.3 (Mercury Computer System Chelmsford, MA, USA) which permitted the subdivision of the root canal into thirds (coronal, middle, apical and last 1mm). The volume of voids was calculated by subtracting the filling material volume from the post-obturation root canal volume. All data sets were tested for normality of the data by the Shapiro–Wilk test and the data showed a normal distribution. Data obtained were statistically elaborated using a t test ($P < 0.05$) (Prism 8.0; GraphPad Software, Inc, La Jolla, CA).
**Results:** Root canals obturated with GuttaFlow Bioseal showed a significantly lower percentage of volume of voids than the ones obturated with BioRoot RCS ($P<0.05$), while no statistically difference was observed between them in the last 1 mm ($P>0.05$). Within each group, the percentage volume of voids in the coronal third was significantly higher than in the other anatomical parts examined for BioRoot RCS ($P<0.05$), with no significant difference among the last 1mm, apical and middle thirds ($P>0.05$). No statistically significant difference was observed among all examined parts for Guttaflow Bioseal ($P>0.05$).
**Conclusion:** Within the limits of the present in vitro study, the results of micro-CT study showed that Guttaflow Bioseal, used as endodontic root canal sealer, had significant less percentage of voids in comparison with BioRoot RCS in all anatomical part examined except for sections at 1 mm.

## Root-end resection after filling with single cone technique and bioceramic sealer: an effective way to simplify endodontic surgery?

**D. Angerame[1], M. De Biasi[1], M. Lenhardt[1], D. Porrelli[1], E. Pedullà[2]**

[1]Clinical Department of Medical Science, Surgery and Health, University of Trieste, Trieste, Italy
[2]Department of General Surgery and Surgical-Medical Specialties, University of Catania, Italy

**Aim:** State of the art endodontic surgery with controlled retrograde procedures may not be feasible in all teeth due to poor access and other technical difficulties. In selected cases, the possibility to perform the sole apical resection without further retrograde manoeuvres might constitute a substantial clinical advantage. The present study compared the filling quality obtained with standard retrograde procedures with that of an alternative technique without retrograde preparation and filling.
**Methods:** Previously published data served for sample size calculation ($\alpha=0.05$; $\beta=0.20$; $\delta=3.0$; $\sigma=1.5$). Twelve single-rooted teeth were selected from a pool of freshly extracted teeth, discarding those with aberrant anatomy. Selected teeth of comparable size were decoronated to obtain 12 mm long roots. The canals were scouted with manual files and the working length acquired. After mechanical glide path establishment, canal shaping was performed with HyFlex rotary files up to size 40, .04 taper (500 rpm; 2.5 Ncm). The roots were analysed with a computed microtomography scanner to identify the possible presence of dentine microcracks. Afterwards, all the canals were filled with the single cone technique with dedicated cones and BioRoot RCS bioceramic sealer. After 24 h, the roots were apically resected with a carbide bur 3 mm from the apex. At this point, the roots were randomly assigned to two groups: no retrograde procedures (n=6); standard retrograde ultrasonic preparation and Biodentine filling (n=6). Lastly, the formation of internal and external voids was quantified by means of a second computed microtomographic analysis. The normality

of the distribution and the equality of variance of the microtomographic datasets were tested with a Shapiro-Wilk and a Levene test, respectively; then, the volumes measured in the two groups were statistically compared with an independent sample t-test (p=0.05).
**Results:** Minimal voids volumes were observed in both considered groups. In the group entailing standard retrograde procedures, the mean voids volumes were 1.878±1.492 % of the entire canal space, in the group with sole root-end resection 0.823±0.576 %. The difference was not significant (p=0.137). Irrespective of the considered group, the small amounts of detected voids were mainly located inside the sealer.
**Conclusion:** When executable, filling the canal with the single cone technique and bioceramic sealer associated with simple root-end resection appears to provide an effective seal of the endodontic space. In selected cases, such technique could make the need to perform retrograde preparation and filling less imperative.

## Clinical evaluation of a new technique: low torque, high speed instrumentation with thermally treated nickel titanium rotary files

**A. Mazzoni, A. Zanza, S. Petracchiola, A. Del Giudice, M. Seracchiani, L. Testarelli**

Sapienza University of Rome, Department of Oral and Maxillo Facial Sciences, School of Endodontics, Professors G. Gambarini and L. Testarelli, Rome, Italy

**Aim:** To present and evaluate clinically a new operative technique for thermally treated Nickel Titanium Rotary instruments. Since the introduction of Nickel-Titanium (Ni-Ti) rotary instruments have been used to shape the root canals, the efficiency and fastness of root canal treatment (RCT) has increased. Anyway, files separation increased as well. To avoid this event, many ideas have been proposed. The low torque instrumentation is one of the suggested technique to increase safety of RCT. However in most of cases low torque limit did not allow instrument to progress easily and reach working length. In the last ten years, improvments in design, cutting efficiency and manufacturing like heat treatment with softer alloys, could in part eliminate those previous limitations and permit instrumentation with torque values lower than 1 Ncm. On the other hand, to ensure the adequate progression of the files, the operative speed should be up to 800 rpm.
**Methods**: S-One 25.06 (Fanta Dental Materials Co., Ltd, Shangai, China) NiTi instruments were used in 10 molar cases with an endodontic motor (Eighteeth, Changzhou City, Jiangsu Province, China) using the following setting: 800 Rpm and 1 Ncm. The operative technique used for all the canals was:
1. Scouting and patency check with a K-file 10;
2. Shaping with S-One 25.06 until the torque allowed inward motion of the instrument inside the root canal;
When the maximum torque value setting is reached use an outward motion;
Repeating steps 2 and 3 until the working length was successfully reached.
**Result:** The root canal treatment of the 10 molar in examination were completed successfully. All the tested instruments reached the working lenght without any fracture or deformation. The AF-R Wire, an innovative alloy produced by Fanta Dental, significantly increased the resistant to flexural stress. The proposed speed and torque setting helped reducing torsional stress. The combination of manufacturing design and operative technique permitted a safer and efficient instrumentation in complex root canals.
**Conclusion:** Low torque values could reduce the risk of intracanal separations due to torsional stress. The increase of speed may increase the risk of separation due to fatigue but the new alloy are much more resistant than traditional Ni-Ti and could easily compensate this risk. According to the crown down principles, using inward and outward motion with the same instrument, when progression is not easy, could reduce coronal blade engagement and facilitate the file progression. In relation to the results of the tested instruments, the proposed technique seems very promising, and other similar instruments could perform similar results. More tests are necessary to prove the efficacy and safety of this technique.

## Antibacterial effects of two synthetic peptides against enterococcus faecalis: an *in vitro* study

**Giovanni Mergoni[1], Chiara Mirabile[1], Francesca Poggia[1], Pio Bertani[1], Maddalena Manfredi[1], Tecla Ciociola[2], Stefania Conti[2], Laura Giovati[2]**

[1]Centro Universitario di Odontoiatria, Dipartimento di Medicina e Chirurgia, Università di Parma, Italy
[2]Laboratorio di Microbiologia e Virologia, Dipartimento di Medicina e Chirurgia, Università di Parma, Italy

**Aim:** The persistence of microorganisms within the root canal system is the main recognized cause of endodontic treatment failure. Unfortunately, current antimicrobial techniques have shown several limitations in microbial eradication. Thus, new agents that effectively eliminate endodontic pathogens are needed. The aim of this study was to assess the antibacterial properties of two synthetic peptides, namely KP and L18R, against planktonic cells and biofilms of the endodontic pathogen Enterococcus faecalis and to assess their cytotoxicity against human cells.
**Methods:** The KP and L18R bactericidal activity against E. faecalis (ATCC 29212) was evaluated by the colony