Feature Interview

Profs. Sema Belli, and Gurcan Eskitascioglu, widely published authorities on fiber posts, discuss the use of fibers to reinforce endodontically-treated teeth

Welcome to the 4th Edition of our Electronic Newsletter

This is the second time that we have combined the dentist newsletter with the dealer newsletter, and the first time we have used this new page template.

We are constantly trying to improve our newsletter; it's readability, and "passed along" readership by making it less bulky and easy to understand. We feel, based on feedback on our previous issues, that this new format is moving in that direction.

In the current age of electronic media, the world gets smaller, and it becomes much easier to share high quality information with professional colleagues with the "click" of a button; to forward the document, find more information on social media websites such as Facebook, or just connect and browse the sponsor's website for additional information and commercial incentives.

Pierre-luc Reynaud, President of RTD

In this issue, the editorial theme is FIBER REINFORCEMENT IN DENTISTRY, and we feature the usual main components:

- **Feature Article: RADIOPACITY. Part three of four parts discussing the differences between the characteristics and qualities of fiber posts**
- **Interview with Profs. Sema Belli, and Gurcan Eskitascioglu, widely published authorities on fiber posts, address the use of fibers to reinforce endodontically-treated teeth**
- **Clinical case; Unidirectional Quartz fibers in the direct/indirect application of the Fiber Augmented Post and Core technique.**
- **Product news**
- **Product testimonials**
- **Article reviews of several recent and relevant scientific and review publications.**
- **Other news**

FEATURE ARTICLE

RADIOPACITY OF FIBER POSTS: the right way and the cheap way

As the inventor and developer of fiber reinforced posts, and a world leader in premium brands of fiber posts, it is important that RTD explain to its distribution and clinical customers and the research community the ways that RTD posts are statistically distinguished from copycat and counterfeit products that are emerging worldwide.

In parts one and two of this series, we addressed the relationship between raw materials, manufacturing processes, and other expertise that had significant and observable impact or influence on the quality of the finished product in terms of 1. Flexural Strength and 2. Fatigue Resistance. Both of these very important and related properties require unique and sophisticated testing devices and a certain level of expertise to perform and interpret meaningful testing according to the international (ISO) standard (#4049).

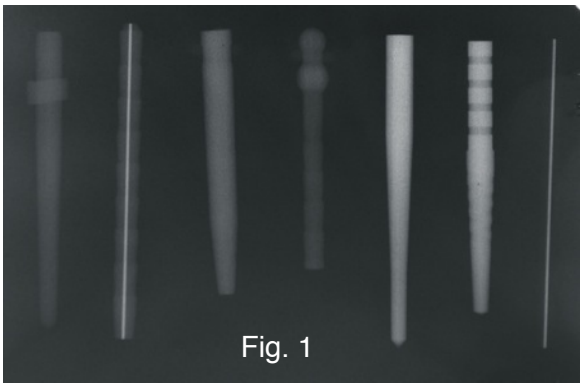


Fig. 1


Fig. 2

In this issue we will address the radiopacity of fiber posts; a characteristic that is apparent and important to every clinician, even if not numerically quantifiable by them. You will see that among the brands of fiber posts that are available in the world market today, there is a wide range in the level of radiopacity. (Fig. 1) We will illustrate this with radiographs, but more importantly, will explain the different ways manufacturers can use to make a fiber reinforced composite (post) radiopaque,

Every dentist knows that cast posts and prefabricated stainless steel or titanium posts will have a profound contrast surrounded by tooth structure. The first and second generation of fiber posts (Composipost® / C-Post®- 1989, and Aestheti-Plus® / Light-Post-1997), both introduced by RTD, had the disadvantage of being radiolucent. This means that they could only be seen in an x-ray when cemented by a highly radiopaque cement (Fig. 2).


Fig. 3

Knowing that radiopacity is of high importance to the dentist and patient, especially if the patient changes dentists, or if post removal ever becomes necessary, RTD was determined to find a way to make their posts radiopaque, without compromising mechanical properties or light transmission. And in 2000, RTD introduced the DT Light-Post® a “designer post” with a unique shape and a new fiber that rendered it radiopaque.

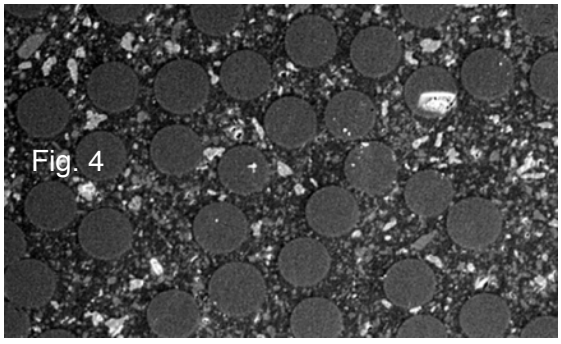


Fig. 4

The significant breakthrough was that RTD was able to make a post that was more radiopaque, (Fig. 3) while maintaining nearly 60% greater flexural strength than its competitors, and superlative fatigue resistance.

Engineers in the field of fiber reinforced composites will tell you that the key is to make a stronger, low-modulus, **radiopaque fiber**; rather than simply including powders of radiopacifier powders into the resin.

This second methodology (Fig.4) is cheaper and will achieve some level of radiopacity (the more powder- the more radiopaque).

However, by design, these powders replace the fibers, which then reduces their strength and fatigue resistance. (Fig.5, 6)

Fig. 5

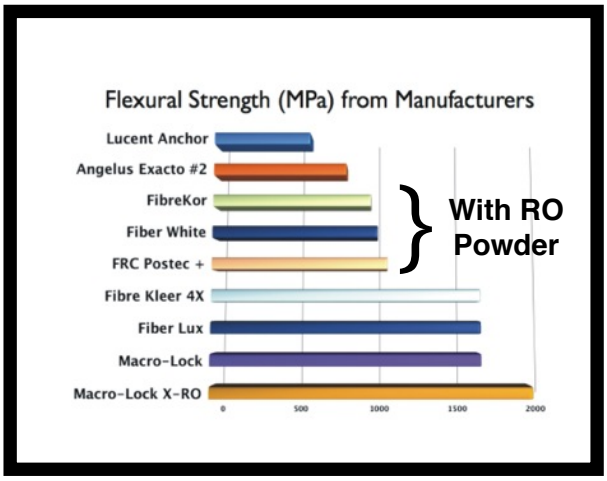
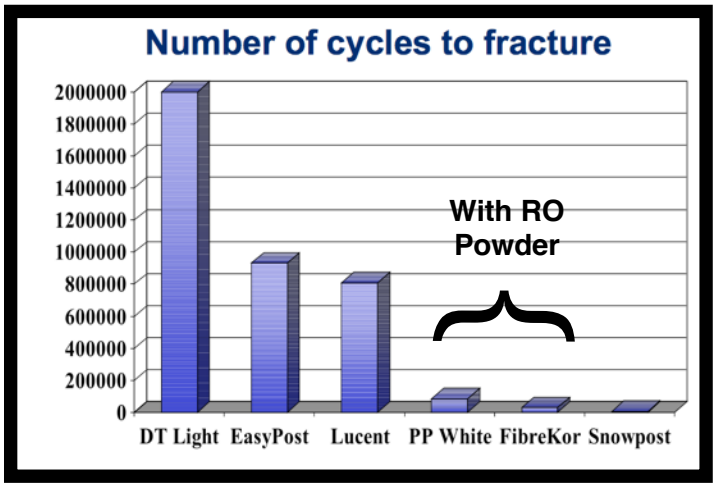
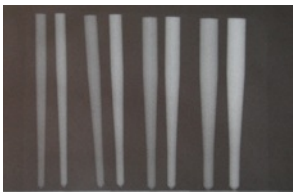


Fig.6

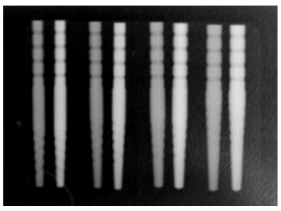


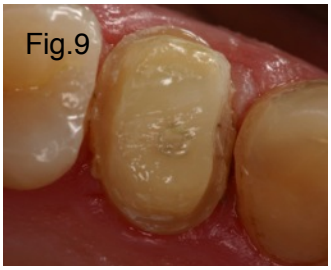
RTD was able to find a proprietary exclusive fiber which optimized light transmission, radiopacity and mechanical properties.

As competitive companies developed products with better radiopacity, RTD was compelled to find even better fibers for its posts and other products. An expensive four-year developmental research project with a European glass manufacturer, yielded a unique and exotic fiber; code-named X-RO® (eXtra RadiOpaque). The X-RO fiber/post is patented (EP 2,181,074/ US 8 298 973.) and is exclusive to and owned by RTD.



The use of this pre-silanized fiber improved the radiopacity level of the DT Light-Post and Macro-Lock Post® by 50%, (Figs. 7, 8) while at the same time increasing the strength of the post material by 20%. This was introduced in 2010.

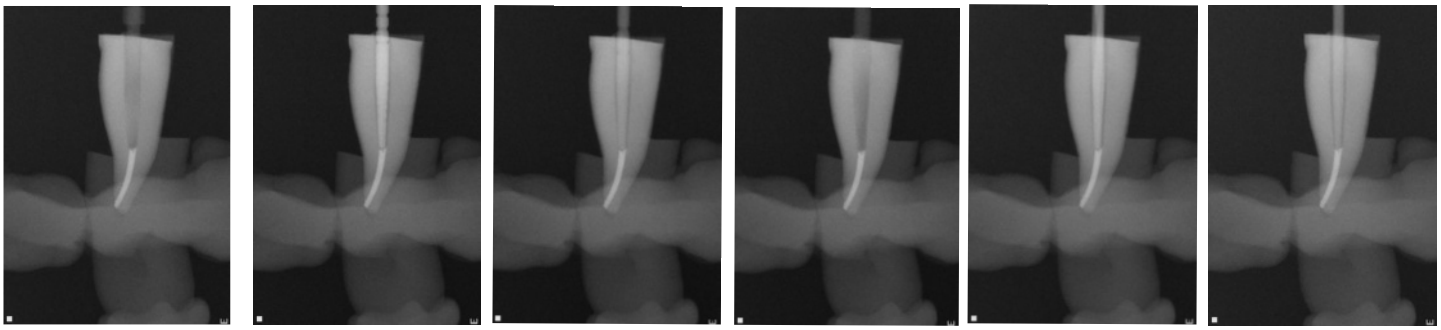




At about the same time, RTD introduced another “first” in the arena of dental posts; a patented (EP#1,776,933 US 7,726,971) technology called Illusion®, which allows the intrinsic post coloration to disappear at body temperature, but be returned in the event that the post must be removed.(Figs. 9, 10)

In today’s marketplace, there is no other product line that offers the combination of advantages offered by RTD's flagship brands; high radiopacity, mechanical properties, light conductivity and Illusion color change technology.

In our next edition, we will describe and explain the advantages of **translucency**, the impact of light transmission and the important role it plays in the cementation of the fiber post.



Which post in this series is the RTD/ X-RO fiber post?

INTERVIEW

Drs. Belli and Eskitascioglu have collaborated on and published many studies and articles on fiber reinforcement of bridges, endodontically- treated teeth, Class 2 restorations and fixed partials.

Question #1. Fiber reinforcement has been used in dentistry for nearly 3 decades. In today's world of consumers' aesthetic demands, what do you consider the most important clinical indications for fibers, and why?

"We believe that fiber materials are very useful when used as post core restoration or to create build ups in molar teeth. Their esthetic properties and, of course, their elastic modulus, which is similar to the natural tooth dentin, have made these materials preferable. They help the restoration act together with the tooth by creating a monoblock unit."

Q2. Based on your experience and research, do you feel that the fiber reinforcement products on the market today represent a universally viable alternative to metal frameworks, metal bridgework, Maryland bridges, etc.?

"To be honest, it is still hard to say that in the long term, especially when created in the mouth; an effective ***finishing*** *is very important, and sometimes this is very difficult. Actually, the fibers work very well for the construction of crowns and temporary anterior bridges, but success of the restoration depends mostly on the clinician's experience. Recent improvements are significant and very soon we believe that we will be able to use them more effectively in clinics. Currently we are working on some laboratory projects, and if we can effectively integrate fiber materials with ceramics, I guess we will answer this question once again, and the answer will be more universally "yes" the next time."*

Q3. In the Fiber Augmented Post technique, do you feel that stiffer, unidirectional fibers offer any advantages to braided, rope, or other types available?

"There are many factors affecting the success of the fiber reinforced restorations. In a previous study we have tested the effect of fiber reinforcement materials structure on stress distribution. Our results indicated that the structure of the fiber material really effects the stress distribution. Unidirectional fibers are more successful under vertical loads and braided or woven type fibers are more successful under lateral forces. Therefore, the indications are important, and the occlusion of the patient is important. Having knowledge about the material is important and, finally, using the material according to the manufacturer's recommendations is very important. "

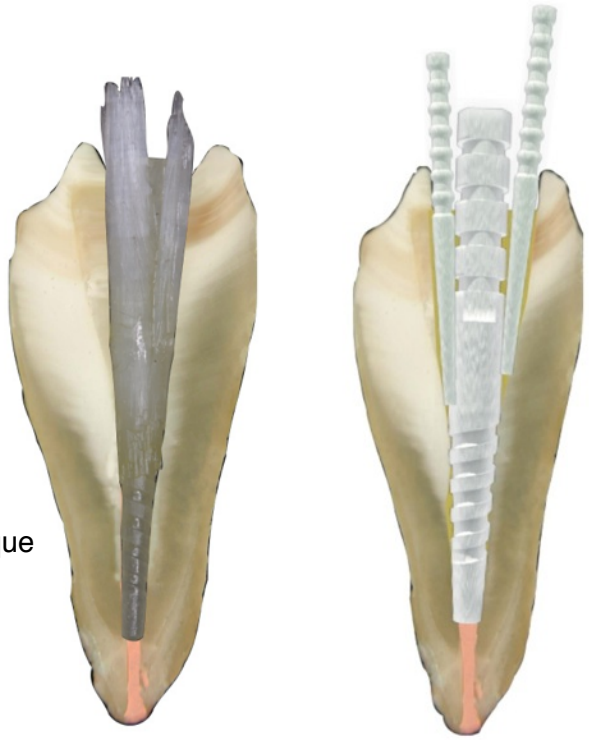
Q4. In your view, which is more important; flexural strength or flexibility in handling/placement? Or does it depend on the clinical indication?

"All of them are very important. Flexural strength is important for the strength of the restoration and flexibility is important to create effective restorations easily. Clinical indication is also important."

More about the authors

Prof. Dr. Gurcan Eskitascioglu was graduated from Ankara University Faculty of Dentistry in 1987, and is the Founder Dean of Yüzüncü Yıl University; Faculty of Dentistry. In 2009, he was chosen as a member of Inter-University Board of Turkey.He has more than 80 scientific essays about dental implants,dental fibers, adhesive restorations, ceramics and biomechanics, and his works have been referenced by many scientists. Prof. Dr. Eskitascioglu has many national and international scientific works; especially in the conferences, and has been a member of Turkish Prosthodontics and Implantology Association, International Association of Dental Research (IADR) ,Turkish Dental Association and Chamber of Dentists of Ankara.

Prof. Dr. Sema Belli was graduated from Marmara University, Istanbul, Turkey with DDS, and received her PhD degree in Department of Operative Dentistry from Selçuk University, Konya, Turkey. Dr. Belli is a full- time Professor; Department of Endodontics. She was a visiting researcher at Tokyo Medical and Dental University and Medical College of Georgia. She has published and lectured extensively on dental materials including dental composites, adhesives, glass or polyethylene fibre reinforcement materials, conservative restoration of extensive cavities, restoration of endodontically treated teeth, post and cores, finite elemental analysis, composite polymerization, cuspal deflection, bond strength tests and leakage. Dr Belli's current interest is biocompatibility of dental materials.



Fiber Augmented Post/Core Technique

Accessory Post/ Core Technique

CLINICAL CASE

Each newsletter issue will feature at least one case study showing clinical steps using RTD products. The complete cases, with as many as 24 step photos, can be reviewed at www.rtddental.com website.

The clinical cases have been donated by recognized clinicians and teachers from all over the world. The cases are selected by a committee and the editor does not bear responsibility for the accuracy or appropriateness of the treatment plans or step sequence.

Quartz Splint fibers in the direct-indirect Post and Core technique.

In the last Newsletter edition, January 2014, we showed you Dr Daniel Torassa's "Direct" technique for restoring flared canals with an RTD fiber post and Quartz Splint Unidirectional.

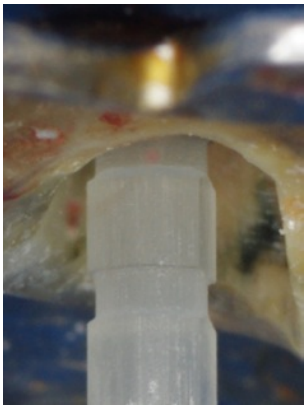
In this issue we will feature a case treating the same sort of problem, but in a "Direct / indirect" technique wherein the post and fibers are used to generate a analog of the over flared canal, this complex is like your extra orally and cemented back into the tooth. The primary advantage of this technique over the "direct-only" technique is that with extremely flared canal cases the clinician can be assured that **all polymerization shrinkage** of this "core build-down" takes place extra-orally and can be cemented with a very low film thickness of resin cement. That, in turn, counters the infamous "C-Factor" , which is at its highest with three or four surfaces to be bonded, and helps prevent micro-leakage.

This case was submitted by **Dr. Prof. Alejandro Bertoldi Hepburn,** currently teaching at Universidad de Desarrollo, Concepcion, Chile. The entire case can be viewed is at www.rtddental.com/…. or in Dr Bertoldi's book (only in Spanish), or watch a video in English https://www.youtube.com/watch?v=Ah7o-xSCyvo

When the opening of the post space is 25% - 50% wider than the largest fiber post available, there are two more low-modulus techniques available.

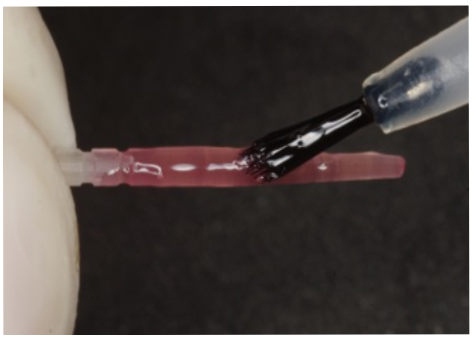
Direct-indirect chair-side techniques allow good adaptation while using polymerization shrinkage and factor to our advantage. It utilizes light-cured composite to fill the flared space and then complete the curing of the composite extra-orally, thus leaving the shrinkage "outside".

A fiber -augmented "build-down" offers the advantage of reinforcing the composite by up to 300%.



1. Due to an infection, a cast metal post has been removed from the root of an upper canine. The root canal will be retreated. A properly –sized Macro-Lock Post was tried-in. The post fit correctly in the apical third, but in the middle and coronal third of the preparation there are important spaces between the post and the walls which represent the lack of adaptation of the post.

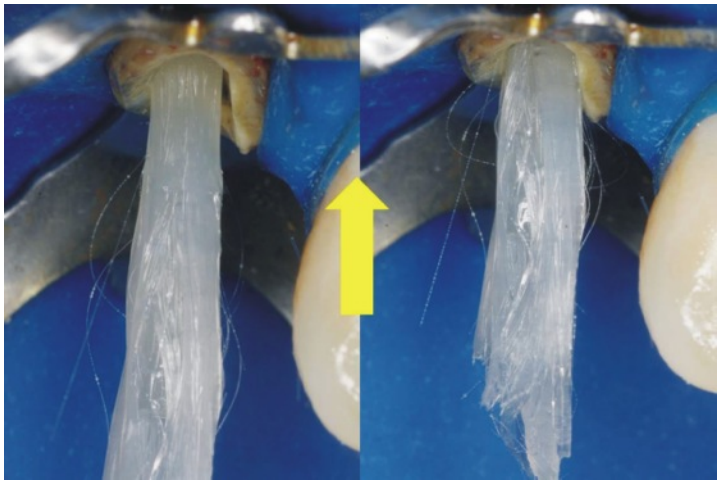
2. The post space is isolated with glycerin. The post is cleaned and a resin primer is applied and light-cured.



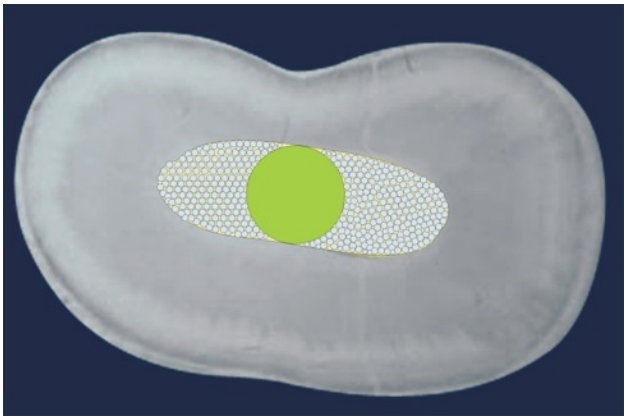
3. The post, covered by the Quartz Splint Uni-Directional fiber strands, is placed into the post space. With care and light pressure the structure is positioned until the post fits correctly in the apical end. The coronal excesses of the fiber strand is kept for creating the core. Once positioned and correctly adapted the fibers should be light-cured, and removed.

It can be further light-cured extra-orally

4. After cleaning, etching and rinsing the post space a primer is applied. The dual cure resin cement / core material is injected with a long point applicator in order to reach the bottom of the post preparation.



5. Placed back in position, the coronal portion of the post and the fibers are covered with same resin composite material, and light-cured



6. The core is trimmed as usual.

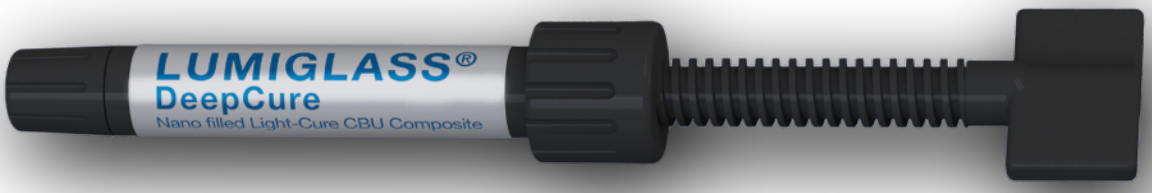
PRODUCT NEWS

QUARTZ SPLINT UNI-DIRECTIONAL OFFERED IN NEW 1.0MM WIDTH.

RTD Quartz Splint, originally launched in 2010, continues to grow as the company receives feedback from clinicians and dental laboratories. One result of that has been the improvement in the packaging, another, more recently, has been the addition of a 1mm size of uni-directional, in addition to the current 1.5mm. The new size is also pre-wetted and 80 mm in length and is packaged in the same light-proof primary package, but the more slender size offers more flexibility in custom shaping it to an arch for periodontal splinting, and allows easier insertion alongside the Master post in the **Fiber Augmented post** technique described in this newsletter.

As with the original there is a refill package of five strips available (Reference # 5010048), which is slightly less expensive than the 1.5 mm version, and two introductory kits (#5011106 & #50111080, which are the same price as the other introductory kits.

In addition, there is an updated "printer-friendly" version of the Quartz Splint brochure on the RTD website http://www.rtddental.com/images/pdfs/DOC5010GB00.pdf



LUMI-GLASS™ DeepCure™ OFFERS SUPERIOR DEPTH OF CURE

The long-range effort to optimize the performance of the fiber posts, RTD has developed the technology internally to compound a range of its own resin cements and core buildup materials. CoreCem and CoreCem Illusion were introduced several years ago, and now RTD announces the availability of LumiGlass DeepCure. It is a high viscosity, light-cured core buildup material with superior translucency, which allows an unsurpassed **11 mm** depth of cure.

The product is presented in a package (0960000) of 2- 5g twist-syringes, and has a shelf life of two years at room temperature.

The full product literature sheet can be viewed

at http://www.rtddental.com/images/pdfs/DOC0960GB00.pdf

OTHER NEWS

RTD EXPANDS GRENOBLE FACILITIES, OPEN USA SUBSIDIARY

To meet increasing demand for its fiber posts and expand the product line to include resins and reinforcement fire products, RTD has built and occupied an additional building in St Egreve, France, just outside Grenoble, in the Pre-Alpine district. The new building was designed and built primarily to accommodate the operations and inventory required to make the raw material for its broad line of fiber posts. It houses multiple six-stage “pultrusion” lines, which makes the translucent, radiopaque rods from which the fiber posts are ground, and the other inspections quality control tests; Flexural, Interlaminate Shear and the DSC test that confirms 99.9% polymerization. The grinding and packaging operations remain at the main facility.

RTD has opened a US subsidiary company and small distribution center in the centrally-located state of Kentucky. Under the management of Norman Hicks, a 39-year veteran of the dental industry, RTD USA will offer a limited line of fiber-based products. These include Fibercone™ Accessory Posts and Quartz Splint®; the family of pre-impregnated Quartz reinforcement fibers. RTD USA offers this limited product line directly to dentists, clinics and dental schools. For more information, go to www.rtddental.com/rtdusa , or call 844-783-3368 or 502-477-2787

TECHNIQUE VIDEOS ON-LINE AT YOUTUBE

RTD has posted 3 technique videos for your easy access. These were recorded at a CE course given in Cordoda, Argentina by Dr Alejandro Bertoldi and Dr Lucas Echandia. Some captions are in Spanish, but the clinical Steps are easy for a dentist to follow.

- Anatomic Post and Core Technique: https://www.youtube.com/watch?v=pibh1BkIm58
- Accessory Post Technique: https://www.youtube.com/watch?v=KHM4WZkk8BA
- Fiber Augmented Post and Core Technique: https://www.youtube.com/watch?v=rh8uZPlAnT4

RTD’s YouTube Channel contains many other useful videos:
https://www.youtube.com/channel/UCEpNhULD2ZRrr6m3Kp6V4kg

AGD Creates International Membership Category

The Academy of General Dentistry is pleased to announce the creation of a new international membership category beginning October 2014. The new category is in response to the many requests the AGD receives from dentists around the world who share in AGD’s values, goals and mission. These forward thinking dentists, who are committed to continuing education, can now pursue that AGD’s prestigious Fellowship (FAGD) and Mastership (MAGD) awards by attending approved CE courses and AGD’s annual meeting. Additionally, international members will have full electronic access to AGD’s award winning publications General Dentistry and AGD Impact. This is wonderful global opportunity for all dentists who value continuing education to share their knowledge and achieve recognition for their pursuit of excellence. For more information contact the membership department at 1-888-AGD-DENT or visit the website: www.agd.org

INDEPENDENT PUBLISHED RESEARCH

RTD keeps an eye on the in vitro and clinical research that is being published on nearly every continent. There is plenty, and we use this newsletter to share some of what we consider to be the most significant studies, many of which distinguish RTD products and technology from the plain and ordinary.

Daniel Torassa, DDS , PhD, Editor

Read and download and an impressive scientific bibliography of over 500 studies about Fiber Posts;

at www.rtddental.com/images/pdfs/publications/Fiber-Post-Bibliography.pdf

Restoration of endodontically treated teeth: Criteria and technique considerations. Richard D. Trushkowsky, DDS, (Quintessence Int 2014;45:557–567; doi: 10.3290/j.qi.a31964)

The restoration of endodontically treated teeth is often required and may represent a challenge as there is no consensus on ideal treatment. The failure of endodontically treated teeth is usually not a consequence of endodontic treatment, but inadequate restorative therapy or periodontal reasons. Prior to the initiation of endodontic treatment the restorability, occlusal function, periodontal health, biologic width, and crown-to-root ratio need to be assessed. If acceptable, the appropriate technique, material, and type of restoration to restore function need to be considered. Posts are used to provide retention for the core material and to replace missing tooth structure. The residual amount of tooth structure will deter- mine its stability for restoration. The creation of adequate ferrule (approaching 2 mm circumferentially is ideal) minimizes the damaging effects of lateral and rotational forces on the restoration and post.

Editor's Comments:

Dr Trushkowsky shows very clearly that knowledge of conventional prosthesis has to be combined with the new advancements in materials and techniques for the proper approach to restoring endodontically treated teeth.

There is no consensus yet on the ideal treatment over endodontically treated teeth. This statement, which might confuse many clinicians, shows us we have to be more prepared and updated on the options we are able to give our patients.

The indications for a Post are proposed based on a previous article from Preoz et al, which might be a reference for many clinicians. The cast posts usually fail with catastrophically fractures, fiber posts are instead more prone to de-bonding, thus protecting the tooth structure and the surrounding tissues -bone- for a *next step* in treatment.

The importance of the low modulus is also addressed, with better stress distribution over dentin.

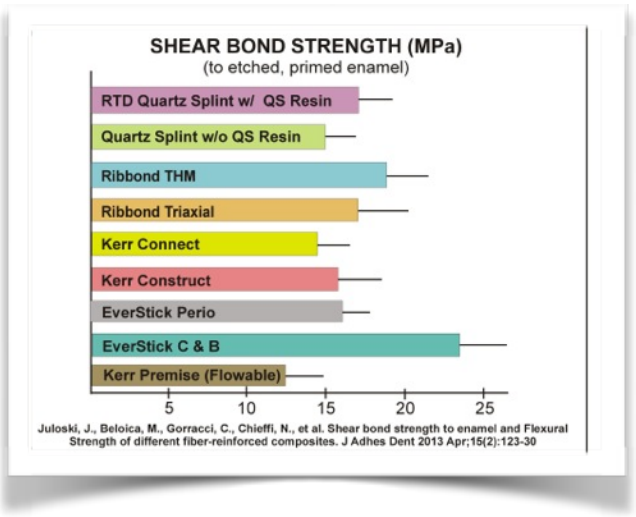
Regarding cementation, both techniques with dual cured cements and self adhesive cements are used and have their clinical considerations. The difficulties to adhere posts to dentin and the importance of post adaptation are highlighted for an optimal survival.

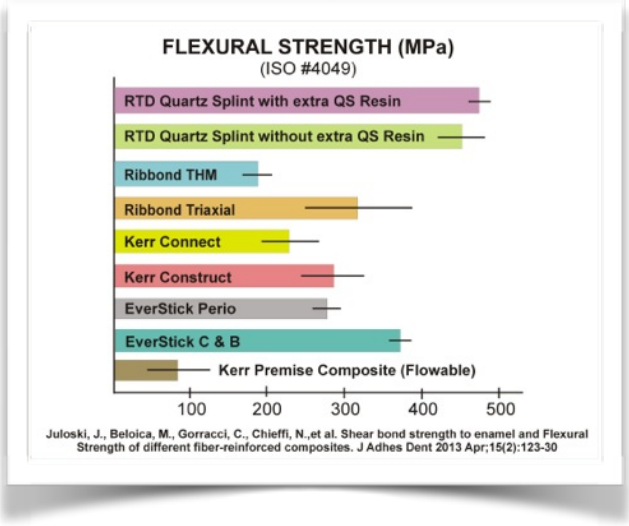
The presence in the market of other materials to get a reduced cement thickness as accessory posts are shown, even though there is no consensus in the literature on the ideal cement thickness and their clinical consequences. The importance of a Ferrule effect which we and other clinicians interviewed pointed out many times before are emphasized again, and a 2mm past the tooth core connection is advisable.The conservative approach -keep as many tooth structure remaining as possible- when preparing an abutment for a post and core is very important.

Finally, the clinician has to take into consideration biomechanics requirements the tooth to be restored will have, anterior or posterior, occlusion and periodontal issues to indicate the most appropriate technique for restoration.

Shear Bond Strength to Enamel and Flexural Strength of Different Fiber-reinforced Composites
Jelena Juloski / Milos Beloica / Cecilia Goracci / Nicoletta Chieffi / Agostino Giovannetti / Alessandro Vichi / Zoran R. Vulicevic / Marco Ferrari

Purpose: To assess the shear bond strength to unground human enamel (ESBS) and flexural strength (FS) of different reinforcing fibers used in combination with a flowable composite resin.MATERIALS AND METHODS: For ESBS testing, 90 human molars were selected and randomly divided into 9 groups (n = 10) according to the reinforcing fiber to be tested: 1. RTD Quartz Splint additionally impregnated at chairside with Quartz Splint Resin (RTD); 2. RTD Quartz Splint without additional impregnation; 3. Ribbond-THM (Ribbond) impregnated with OptiBond FL Adhesive; 4: Ribbond Triaxial (Ribbond) impregnated with OptiBond FL Adhesive; 5. Connect (Kerr) impregnated with OptiBond FL Adhesive; 6. Construct (Kerr) impregnated with Opti- Bond FL Adhesive; 7. everStick PERIO (Stick Tech); 8. everStick C&B (Stick Tech); 9. nonreinforced composite Premise flowable (Kerr). Cylinders of flowable composite reinforced with the fibers were bonded to the intact buccal surface of the teeth. After 24 h of storage, shear loading was performed until failure occurred. FS was assessed performing three-point bending test according to ISO Standard 4049/2000. ESBS and FS data were analyzed using one-way ANOVA, followed by Tukey's HSD test for post-hoc comparisons ($p < 0.05$). RESULTS:For each group, the ESBS and FS, respectively, in MPa were: 1. 17.07 ± 4.52 and 472.69 ± 30.49; 2. 14.98 ± 3.92 and 441.77 ± 61.43; 3. 18.59 ± 5.67 and 186.89 ± 43.89; 4. 16.74 ± 6.27 and 314.41 ± 148.52; 5. 14.38 ± 4.14 and 223.80 ± 77.35; 6. 16.00 ± 5.55 and 287.62 ± 85.91; 7. 16.42 ± 3.67 and 285.35 ± 39.68; 8. 23.24 ± 5.81 and 370.46 ± 29.26; 9. 12.58 ± 4.76 and 87.75 ± 22.87. For most fibers, no significant difference in ESBS was found compared to the control group, except for everStick C&B, which yielded higher ESBS. Nonreinforced composite exhibited the lowest FS, while all fibers positively affected the FS.





CONCLUSIONS:Fiber reinforcement of flowable composite does not affect its ESBS. The flexural strength of FRCs is significantly influenced by fiber composition and pattern

Editor's Comments:

The evaluation of shear bond to enamel of Fiber reinforced composites FRCs from different commercial brands and their flexural strength is provided under the specific conditions of this In vitro Test.

The influence of fiber type, pattern and resin impregnation on the adhesive and physical properties are addressed.

There were no statistically significative differences on shear bond strength of the different materials to enamel, however when the RTD fibers where additionally impregnated with resin there were no cohesive failures within composite, so could be beneficial to consider in the clinical use to add resin when bonding the quartz splint to enamel.

This results means that fiber reinforcement of flowable composites are not affected on its shear bond strength to enamel.

Regarding Flexural Strength, RTD quartz splint impregnated with resin had the highest Flexural Strength, showing quartz fibers provided the most effective reinforcement of the composite specimens. These results are influenced by the fiber composition and pattern of the FRCs.

Evaluation of clinical effect of Quartz Splint high strength Quartz fiber splint in fixing mobile anterior teeth. Shen, Y., Bian, LX, Jiang, H. Yu, H., Lin, C. Journal of Jilin University (Medicine Edition) Vol. 37, No 8, Sept. 2011 1671-587(2011)05-0898-04

Objective: to evaluate the clinical effect of Quartz Splint high-strength Quartz fiber splint in fixing mobile anterior teeth and to provide the clinical evidence for the treatment of teeth moving in periodontitis patients. Methods: the Second degree and Third degree mobile anterior teeth of 32 cases of chronic periodontitis patients were fixed by Quartz Splint high-strength quartz fiber splint. The clinic status such as probing depth (PD), attachment level (AL) and radiograph were measured before fixation and three and six months after fixation. Results: the value of PD reduced from 4.39 (+/-1.26 mm) to 3.16 (+/- 0.37 mm) ($p<0.01$). The AL value reduced from 3.56 (+/- 1.17 mm) to 3.34 (+/- 1.03) mm and there was a statistically different difference ($p<0.05$). Six months after fixation, the PD value reduced to 3.21 (+/-0.25) and there was a significant difference compared with the before fixation ($p<0.01$). The AL value reduced to 3.36 (+/- 1.31mm), and there was a significant difference compared with before fixation ($p<0.05$). Meanwhile, advanced bone loss was not found. Conclusion: the Quartz Splint can get a satisfactory clinical effect in fixing mobile anterior teeth.

Editor's Comments: In this research the evaluation of using Quartz splint for teeth with increased mobility is showed. As is clearly stated the Quartz splint is useful to keep them fixed when properly indicated. As an alternative to the usage of other materials conventionally used for splinting, this technique- with the direct application of the quartz fibers- is done in one clinical session with the benefits of a better bonding due to its pre-wetted condition.

Moreover, the periodontal levels as PD and AL were improved which shows the efficacy of the splinting with a Quartz fiber which is easily and predictable bonded to tooth structure.

The influence of cement filler load on the radiopacity of various fibre posts ex vivo. Goracci C, Juloski J, Schiavetti R, Mainieri P, Giovannetti A, Vichi A, Ferrari M. The influence of cement filler load on the radiopacity of various fibre posts ex vivo. International Endodontic Journal. doi:10.1111/iej.12275

Aim To verify whether the filler load of luting agents influences the radiopacity of intra-radicularly placed posts. Methodology Digital radiographs of the following posts were taken: RelyX Fiber Post (3M ESPE), GC Fiber Post (GC Corporation), DT Light Post Illusion X-RO (RTD), DT Light SL Post (RTD), Endo-Composipost (RTD), FibreKleer Parallel Post (Jeneric Pentron Incorporated), FRC Postec (Ivoclar Vivadent), Parapost TaperLux (Coltene/Whaledent AG), Radix Fiber Post (Dentsply Maillefer), EverStick Post (Stick Tech Ltd), Dentin Post X (Komet), Tech 21 X-op (Isasan), ENA Post (Micerium). Post radiopacity was measured in millimeters of aluminum (mmAl) with reference to an aluminum step wedge. Two extracted contralateral premolars were root filled. After post space preparation, taking the midpoint of the post hole as a reference, each tooth was cut longitudinally into two halves in a mesio-distal direction. On each half, the exposed root dentine was ground flat to the deepest point of the post space, and an even layer of cement was placed and light-cured. To obtain a clinically relevant layer of cement, the material thickness was reduced to 75 lm by grinding with wet abrasive paper. A cement formulation with 30 wt% of filler was tested in one premolar, whilst a formulation with 70 wt% of filler was utilized in the contralateral tooth. Posts were then placed between the two facing root halves of each premolar, and radiopacity was measured in mmAl. Data were analyzed using t-test for paired samples ($P < 0.05$). Results: Radiopacity of posts ranged between 1.44 (ENA Post) and 5.78 mmAl (FibreKleer). In the presence of the more heavily filled cement, significantly higher values of post radiopacity were measured ($P < 0.001$). Conclusion The radiopacity of the luting agent contributed to the overall post radio-visibility within the root. Even when the cement with lower filler content was used in combination with the least radio-dense dowels, the post was detectable within the root.

Editor's Comments: In this article, radiopacity has been measured; not only for the posts, which showed different results depending on their composition (DT Light-Post had one of the best performances), but also the incidence of the filler on the cement used.

Both cements, with 30% weight and 70% weight improved radiopacity, even though the 70%wt showed significantly higher values. This improved the overall radiopacity of different posts with better results for those that are inherently more radiopaque based on their composition.

However the 30% weight also was enough to fulfill the ISO Standard requirements for dental root canal sealers. It is interesting to note that the cements with a low filler percentage provided greater post retention and reduced nano-leakage in recent research.

Even though this ISO is not meant for Post and there should be an ISO defined in the future; in this research the posts were clearly visible on the X-ray measurements and the cement filler content clearly benefit the post radiopacity performance which should be taken into consideration when selecting the post and cement to be used.

TESTIMONIALS

WHY DENTISTS AND LABORATORIES LOVE QUARTZ SPLINT*

Dr. Alejandro Bertoldi Hepburn

Universidad Del Desarrollo Dental School Concepción, Chile.

"In flared and oddly-formed root canal treatments, I have had good success so far using Uni-directional Quartz Splint to augment the main fiber post. It works with Macro-Lock, DT Light-Post or any other fiber post. It saves time and money compared to a cast post and it provides a stronger mass than composite resin or cement alone."

Olaf Fuchs

Dentallabor an der Abt. für Prothetik, Universitätsmedizin Mainz, Mainz, Germany

"With the QS Rope, I can reinforce provisional implant abutments quickly and easily. Subsequently, a resin bridge frame can quickly be molded on the QS Rope. Due to the close-fitting of the QS fibre to the abutment, the typical "flaking" of the resin during the fitting is impossible."

Dr. Enrique Kogan Frenck,

Universidad Tecnológica de Mexico, Mexico City, Nova Southeastern University College of Dental Medicine, Fort Lauderdale, FL, private practice; Mexico City.

"I first evaluated Quartz Splint several years ago; splinting extracted tooth crowns back into place temporarily in trauma cases. The Woven QS worked very well for that, but I could also use the Uni-directional in heavy function. Overall, I like the esthetics and handling properties of the Quartz Splint. I also like that it is pre-impregnated, and that I can re-wet the fibers (with the QS Resin) when I want to."

Peter Köck

Köck Zahntechnik, Veitsbronn, Germany

"We use QS Rope and Woven in the lab and in the operatory, for provisional bridges. This way the larger spans are stable and do not fracture. I place the QS Mesh in the denture base instead of a stainless steel or Titanium frame. It is very easy to do, and the denture stays in one piece even if there is a fracture in the acrylic resin. The patient is grateful."

Armin Gebhart

Dentallabor
Die Zahnwerkstatt, Wartenberg, Germany

"Due to the pink colour of the QS Mesh, it is invisible in the maxillary denture. With the QS Mesh, the denture can be made thinner and more delicate in the palatal part. Using the Uni-Directional or Rope strips, a maximum level of stability can be achieved with a minimum of space required."

André Hellmuth

UNIKAT Dental, Bad Neustadt, Germany

"To us the pink QS Mesh and resin is the ideal combination of simplicity in the handling, stability and aesthetics."

* Read many MORE testimonials at www.rtddental.com