BioEmulation

Introduced by Magne in 2011, BioEmulation in dentistry takes into consideration that "Esthetics, strength, and biology have to be carefully balanced to create an optimal restorative material for implant supported restorations."

In practice, the aim is to emulate the natural tooth and its capability to distribute occlusal forces by replacing dentin with a shock-absorbing resilient material, and restoring enamel with a more translucent and brittle material. This is especially true for titanium implants which lack a PDL and have even less absorptive ability than teeth. While research is ongoing, the use of resin ceramics for implant restorations is promising, particularly in the age of CAD/CAM design which can greatly increase the speed and accuracy of using resins while minimizing costs.

Composite resin blocks such as Paradigm MZ100, introduced as a substitute for machinable ceramics, are manufactured from the original Filtek Z100 containing spheroidal zirconia-silica fillers providing the restoration with extraordinary strength under dynamic loading similar to ceramics, yet maintain a relatively low elastic modulus for shock absorption. This was true when Filtek composite was used in the cases I've treated in the prior newsletter.

Disadvantages to the use of resins include possible increased wear, color instability, difficulty in achieving ideal esthetics compared to porcelain, and chipping.

Composite and Periodontics?

Why is a periodontist writing about composite?

Composite has a role in basic things a periodontist might do, like bonding a chain or eyelet to a submerged canine that needs to be moved orthodontically. Composite is used to splint teeth together such as mobile lower anterior teeth. Composite hybrids such as resin modified glass ionomer are used for repairing root resorption subgingivally. Prior newsletters have touched on tooth uncovering and managing root resorption and can be found on our website.

Composite has played a role in my practice in caring for friends and family, as well as my own mouth. I've split the topic of composites into two newsletters:

The prior newsletter highlighted a few cases of more traditional dentistry that I performed for my family or staff, as well as managing anterior tooth transplantation cases. In those cases presented, the composite used was Filtek universal packable, in layers of dentin or enamel shades, with follow up time up to 7 years.

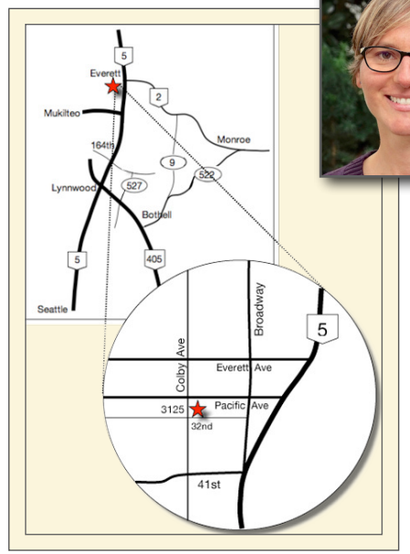
This **ProbeTips** newsletter will delve into the role of **composites in restoring dental implants and in managing endodontically treated teeth** with little remaining restorable tooth structure. These cases are based on work by Dr. Pascale Magne and highlight the durability of current composites, as well as favorable failure characteristics that protect the tooth or implant beneath.

Pamela A Nicoara DDS MSD PLLC

PERIODONTOLOGY IMPLANTOLOGY ORAL MEDICINE

Pamela Nicoara is a Board Certified Periodontist practicing in Everett since 2007. She is a UW Perio graduate, and a transplant from Dallas, Texas.

She is driven to achieve esthetic and predictable outcomes, particularly for anterior implant cases, and is always looking to improve processes and results. You can email her directly below with questions, comments, or suggestions for future newsletters.



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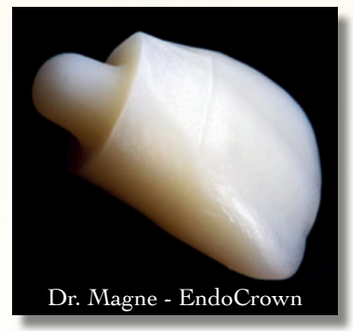
Probe Tips

A Quarterly Periodontal Newsletter

By Pamela Nicoara DDS MSD

I Love Composite
Part 2


Dr. Magne - EndoCrown

Volume 18, No. 3

November 2025

Implant and Endodontic Restorations

Implants and Composite

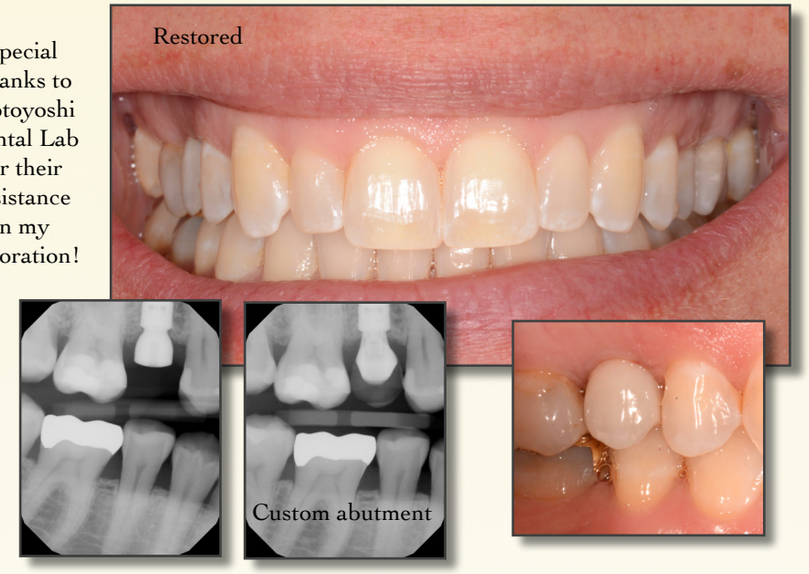
I am a dental implant recipient. Tooth #4 failed last year from root resorption. The sinus was pneumatized enough and the root bifurcated enough to require removal with socket grafting, and after 6 months of healing, implant replacement. Astra is my implant brand of choice because of the platform switch and excellent long term bone maintenance outcomes in the literature and in my practice. I have a class I occlusion, I do not brux, and all remaining teeth through 2nd molars are natural teeth.

A screw retained crown and custom abutment were requisite to avoid a cement retained restoration, as well as to bring any laboratory abutment-crown margin as near to the gingival margin as esthetically possible. **Because the implant has no PDL and does not compress in the socket as a natural tooth does, and because this is the only implant in my mouth, a choice was made to place a composite restoration on the implant abutment as opposed to a ceramic restoration**.

The nanoceramic composite restoration should: 1. **have more 'give'** than ceramic, but 2. **have similar longevity** to ceramic, 3. **wear more similarly to enamel** on surrounding teeth, and 4. **potentially fail in a way that is protective** to my implant compared to ceramic. In other words, should excessive loads be applied to my implant and restoration, the composite should fail before the abutment or screw, and should also be protective to the bone surrounding the implant in terms of absorbing some loads and preventing bone loss.

Time will tell how this strategy will work in my own mouth, but single tooth implant composite restorations may be an option for your patients or yourselves. (Ref: Magne et al, IJED 2017; Magne et al. COIR 2010). *Complete references available on request*

Special Thanks to Motoyoshi Dental Lab for their assistance in my restoration!



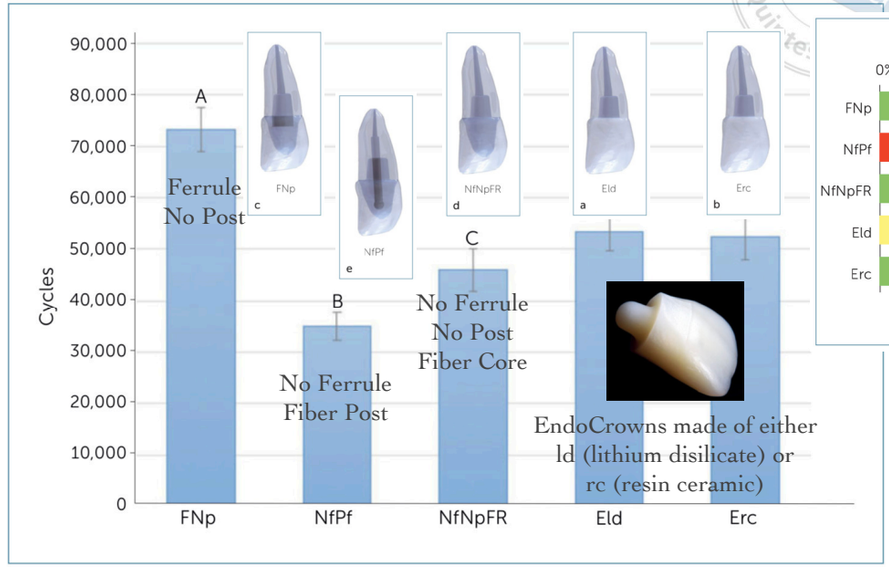
Endodontics and Composite

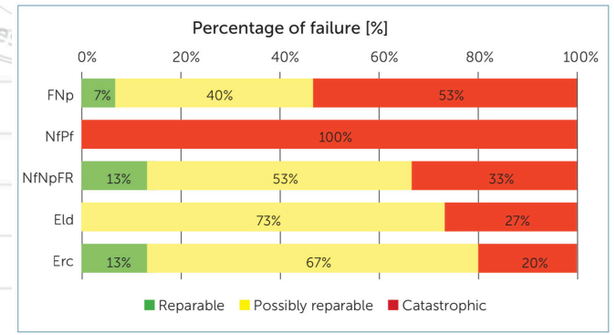
It is well documented that post/core restorations on anterior endodontically teeth generally fail in a catastrophic manner meaning the tooth requires extraction if the restoration fails. This includes bonded post/core restorations.

Dental implants are an option if a tooth catastrophically fails, but no restoration is ever as good as a natural tooth if possible.

Additionally, as adhesive dentistry continues to improve, bonded restorations are showing remarkable advantages over ceramics in terms of ease of fabrication (particularly as CAD/CAM restorations), and in terms of longevity similar to traditional post/core restorations, but with straightforward and less complicated implementation, and failure modes that still may allow maintenance of the root for as long as possible.

The images adjacent are taken from Dr. Magne's research presented in 2021* on the use of Endocrowns. This 'no-post' alternative uses the pulp chamber or coronal part of the endodontic canal as an adhesive surface for bonding. Although bonded restorations without a post and with some ferrule lasted the longest, Endocrowns without ferrule come in second with an advantage of failing in a favorable way as the restorations with ferrule more often failed catastrophically compared to Endocrowns.





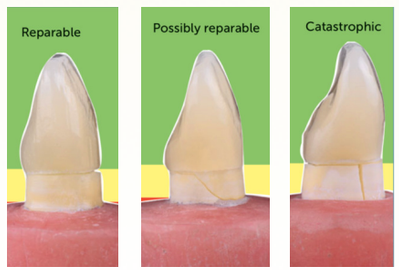


Fig 7 Mean survived cycles and standard errors: Kaplan Meier and log rank post hoc tests ($P < 0.05$) with different letters indicating significant differences. FNp: ferrule without post; NfPf: no ferrule with fiber post; NfNpFR: no ferrule, no post, and short-fiber-reinforced composite core buildup.