



# IF YOU KNOW, YOU KNOW!

## Reducing Pulpal Irritation in Restorative Procedures Katie Divine, DDS, MS

One of the most important factors a dentist has in reducing pulpal irritation and post-op sensitivity is ensuring a tight marginal seal for restorations. Many techniques can be employed for preventing bacterial contamination of a prepared tooth and minimizing the micro-gap that can occur from the contraction stress of composite resins. The composite resin material undergoes volumetric shrinkage during polymerization which can lead to a gap formation if these stresses are not properly managed (1). Simply stated, if the stress of polymerization exceeds the strength of the developing bond, a micro-gap formation will result (2). The presence of a micro-gap will have consequences for the tooth and patient including post-operative sensitivity, marginal leakage, and higher risk of recurrent decay (3). In vital teeth, the gaps will fill with pulpal fluid via transudation which alters the hydrodynamic fluid flow in the tubules eliciting sensitivity and pulpal irritation (4). Rubber dam isolation is advised when preparing and restoring teeth to eliminate contamination in the adhesive bond that is necessary for composite restorations. Nair evaluated various adhesive systems and found that 64.6% were prone to have a deleterious impact due to salivary contamination. Saliva moisture can be trapped in the adhesive resin and compromise the overall bonding and strength of the adhesive (5). Another technique to improve bond strength is to utilize air abrasion. Air abrasion will condition the dentin substrate and compact the smear layer enabling an improved adhesive bond (6,7). Another step to take to eliminate exposure of dentinal tubules and reduce pulpal irritation and thereby patient post-operative sensitivity is to implement immediate dentinal sealing (8,9). Cox describes post-operative hypersensitivity as a result of the breakdown of the smear layer, therefore sealing the dentin interface will reduce this discomfort (10). This technique can be especially helpful following crown preparation before the temporization phase. This will offer some protection to the prepared tooth structure from any thermal effects it could incur during the fabrication of the temporary crown (11) as well as in the interim phase while in the temporary crown. Immediate dentinal sealing (IDS) is completed by the immediate application of dental adhesives to all freshly cut dentin before making impressions. Completing this step early on allows for pre-polymerization of the dentin bonding agent which will increase the bond strength, the development of the adhesive bond without stress which will reduce the formation of a micro-gap, and will seal the dentinal tubules to protect the dentino-pulpal complex from the ingress of bacteria (8,9). Any leakage around the temporary crown is of less concern when the dentinal tubules have been sealed. The concern of salivary contamination is also reduced when removing the temporary crown and seating the permanent crown. It is an easy step to incorporate into the restorative protocol with multiple advantages for the patient and the dental pulp. Any steps an operator can take to reduce pulpal irritation are helpful but pulp necrosis may still occur. Felton found that full-coverage restorations led to a higher incidence of pulp necrosis at 13.3% (12). Typically, a tooth that is requiring a crown has already had extensive restorative treatment previously and has large caries or crack(s) necessitating full-coverage restoration. Kontakiotis's prospective study of the incidence of asymptomatic pulp necrosis following crown preparation found that in a time frame of 6-10 weeks, 9% of teeth were diagnosed with asymptomatic pulp necrosis. Teeth that were intact pre-operatively had a 5% incidence of necrosis while those with pre-operative restorations and cracks had a 13% incidence. There was an 8x incidence of pulp necrosis in teeth with pre-operative caries, fillings, or crowns (13). The process of crown preparation is also pretty extensive to the tooth. In summation, the pulp in these teeth has already been repeatedly stressed and is at higher risk of pulpal deterioration (14)

### References:

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## LEADERSHIP ROLES



Dr. Majerus continues as an Adjunct Faculty teaching endodontics at the UofM School of Dentistry.  
Dr. Regan Anderson will serve as Immediate Past President of the Minnesota Association of Endodontists.  
Dr. Divine is a Trustee of the AAE Foundation for Endodontics. She will begin her term as Vice President of the ZVDS this year.

We continue to have success in adjunctively treating patients with bruxism using Botox injections on prevention and symptom relief for these patients. This can help with limiting damage to teeth and restorations as well as to relieve tension headaches and chronic pain.

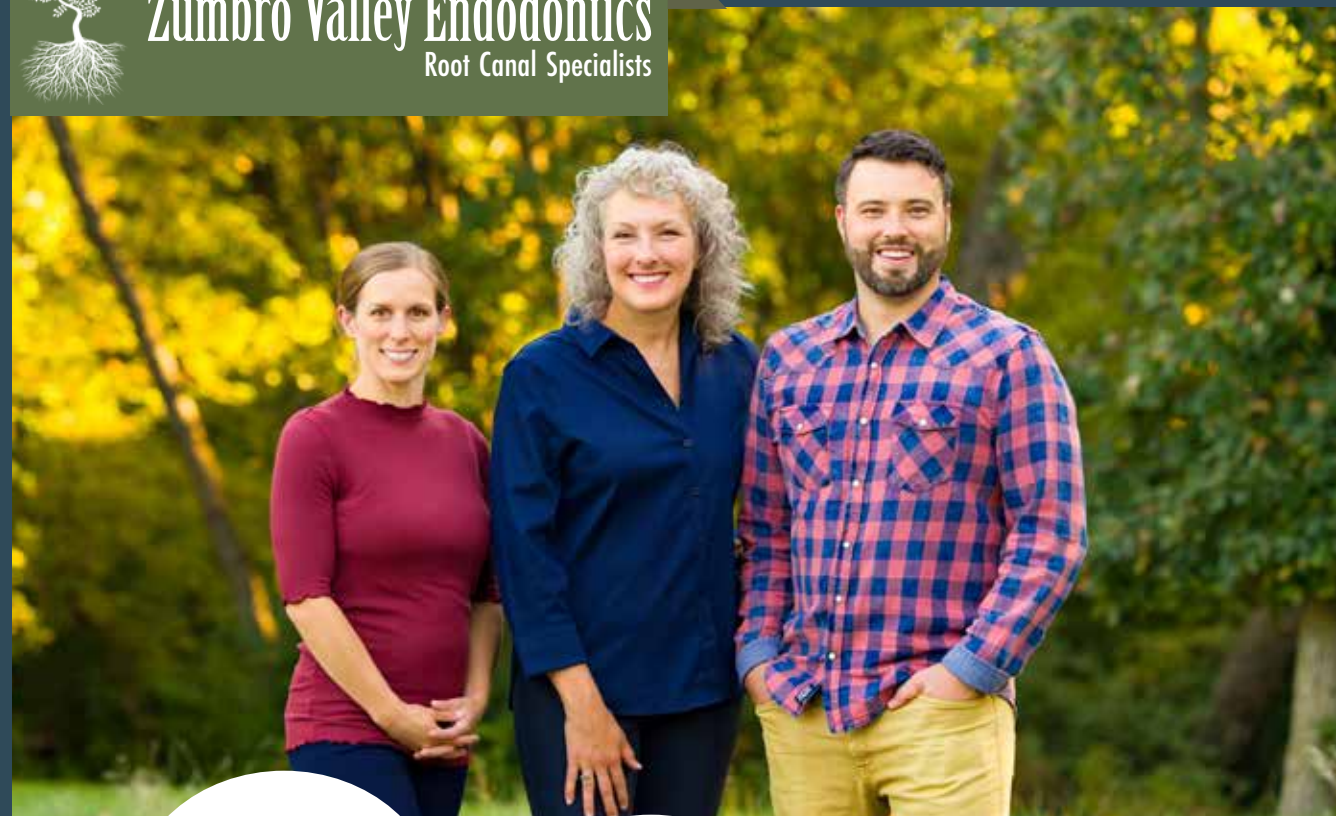


General dentists and endodontists have been coming to ZVE to see how we practice. We welcome our referring doctors to come and spend some time. Within the last year, we had dentists from Chicago, St. Cloud, Minneapolis, and Florida to observe and share ideas. If interested, please feel free to contact Dr. Regan Anderson at email below:

drmichael@zumbrovalleyendo.com



## Zumbro Valley Endodontics Root Canal Specialists



"We are so very privileged and fortunate to be able to refer our patients to this team of highly qualified, endorsed, and licensed professionals of such high moral, ethical, and professional integrity!"

John Rainville, DDS-Downtown Dental Care

"I had a great experience with Zumbro Valley Endodontics. From the exceedingly patient Wendy at the front desk to my dental assistant Dr. Majerus and Dr. Regan-Anderson, I received wonderful care and compassion. I had a not-so-great diagnosis and Dr. Majerus was extremely kind as if she was talking to her own mother or sister. The facilities are A+, especially the 3D scanner, which allowed them to nail down the correct diagnosis. The education I received, both from a video and from Dr. Majerus herself, was top notch. I plan to always ask for Zumbro Valley Endodontics should I ever again need an expert opinion about a possible root canal."

-Chris T

"Dr. Divine is the best, she makes sure you are comfortable and pain free. She does an excellent job. I fully trust her to care for me!"

-Karen C

"Camille and Dr. Regan Anderson were very thorough and friendly. Procedure was flawless and Dr. Regan Anderson even communicated updates and follow up with my general dentist. Would defiantly recommend Dr. Regan Anderson and his team to friends and family."

-Lauran C

# ROOT NEWS

Winter 2023



Visit [zumbrovalleyendo.com](http://zumbrovalleyendo.com) to read one of our 1,000 personal and Google reviews!

## EMERGENCY & FRIDAY HOURS



With our expanded schedule, we have been able to redesign our patient flow to benefit our community of referring doctors and patients. Whereas in the past the demand for our care made it difficult to see patients right away, we are now able to save several emergency slots every day! Please reach out with patients who need our care, and chances are good we will be able to get them in immediately, especially for emergencies. This serves patients and helps keep our referring doctors keep their schedules less chaotic! We have expanded our hours to better serve you and your patients. Now that we are open on Fridays, we can treat patients five days per week, and it should improve our ability to see emergency patients promptly.

# SINCE YOU LAST HEARD FROM US...



A product manager and an engineer flew in from California to spend some time with Dr. Regan Anderson testing prototypes aimed at improving usability of the GentleWave system, which is employed by endodontists across the country. We were happy to play a part in advancing technologies used in our specialty, all in the hopes of improving the quality of patient care!

In December, Dr. Divine served as an evaluator of the oral exam Division of Endodontics residents. This is a difficult and important process for the residents, preparing them at a high academic and clinical level at the



UM residency is known for. Dr. Majerus is also an examiner every year in that same process, and has been for years. In fact, she was an examiner when Dr. Regan Anderson and Dr. Divine were residents themselves! Dr. Majerus and Dr. Divine are both Adjunct Professors teaching at the University of Minnesota!



Our wonderful staff at Zumbro Valley Endo decorated a tree for the Festival of Trees Gala benefiting Hiawatha Homes. Our tree theme was "Sweet Tooth" Hiawatha Homes provides support services to individuals with disabilities at home and in the community. We are honored to support an organization providing such important resources to members of our community.



Dr. Divine traveled to Las Vegas to serve on the Foundation for vEndodontics Board of Trustees. This group helps devote funding to promote education and research in the field of endodontics. She was appointed as the New Practitioner Trustee.



Dr. Majerus traveled to sunny Tuscon, Arizona to participate in the Women in Endodontics conference for colleagues to share their pathways to success in endodontics. They shared excellent knowledge in how to practice endodontics at a level of excellence and be leaders in the specialty.



Dr. Regan Anderson, as President of the Minnesota Association of Endodontics, hosted a continuing Education meeting for the endodontists in the state. The MAE invited Dr. Ashraf Fouad, who is the Director of the Advanced Endodontics Program at the University of Alabama at Birmingham. Dr. Fouad has over 100 peer-reviewed manuscripts, 24 textbook chapters, and has co-authored the textbook *Endodontic Microbiology and Endodontics: Principals and Practice*. Dr. Fouad is a past President of the American Board of Endodontics. He gave a fascinating talk about vital pulp therapy, discussing ways to maintain healthy pulp tissues in restorative and endodontic therapy.



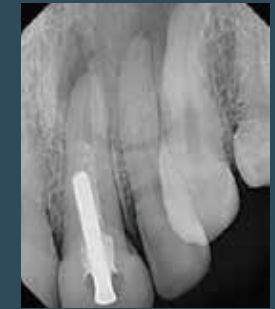
Our Zumbro Valley Endodontics family has grown again!! Our office manager Crystal welcomed their baby girl on November 2nd. Welcome to the family Lettie!



Dr. Divine also serves on a national committee for the American Association of Endodontics. She traveled to Chicago to meet at the headquarters to discuss newly formed Leadership Development Program to encourage young endodontists to get involved in specialty leadership.

# HIGHLIGHTED CASES

This is a great example of how endodontic microsurgery can help patients. This previously treated tooth had a large lesion that extended all the way to the floor of the nose. By disinfecting the tooth and treating it with root-end surgery, we were able to see complete healing on year following treatment. Endodontic surgery can be very successful with our modern techniques!



PRE-OP



ONE YEAR RECALL



In this re-treatment, we were able to determine the source of persistent endodontic disease to be coming from and uninstrumented



This #14 demonstrates some elegant curves, multiple portals of exit, and an MB3 canal disinfected through the use of GentleWave disinfection technology.



This #30 demonstrates both middle-mesial canal spaces and a lateral exit mid-root on the mesial root. These complications could be treated with careful instrumentation and use of the GentleWave disinfection technology to help clean out the lateral anatomy.



Not all root canal spaces are simple. Many teeth demonstrate complex shapes and anastomoses. This is a great example of the webbed mesial isthmus. Treatment of the canals alone would leave all of that space connecting the mesial canals possibly contaminated.



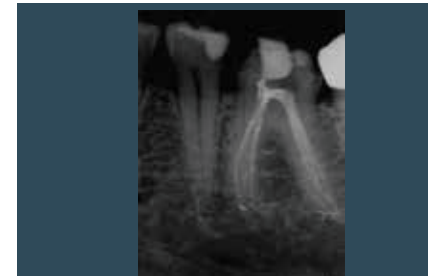
This #14 demonstrates four canals with some fascinating accessory anatomy, particularly the accessory canal in the palatal root.



Sometimes the two-dimensional radiograph understates the complexity of a tooth. The distal root of this #31 took an acute, 90 degree curvature that was evident on the CBCT. It is because the curvature is in the buccal direction that is not appreciated on the periapical radiograph. Postoperatively, a "bullseye" PDL space can be indicative of a severe curvature at the apex of the tooth obturation to the radiographic apex would have resulted in overextension.



We often say to fear the premolar. Mandibular premolars have two canals 24% of the time, and a substantial portion of those can demonstrate C-shaped canal anatomy in the apical third of the root.



The mesial root in this mandibular molars is not the only root to have middle anatomy. Here we can see the slender preparations and three distal canals.