

DOMINION

ENDODONTICS



ENDODONTIC SHOWCASE 2021

Greetings!

Thank you for considering Dominion Endodontics for your patients' endodontic treatment. Drs. David Palmieri, Nathan Schoenly, Frank Portell, and Nicholas Leon-Guerrero pride themselves in providing their patients with state of the art endodontic treatment in an atmosphere focused on gentle, professional care. We have been serving the nation's capital area since 2001 with three office conveniently located in Arlington, Alexandria, and Falls Church, Virginia. Your patients have entrusted their care to you and those relationships have formed the foundation of your practice. As your trusted endodontic partner, we will strengthen the trust you've built by providing your patients exceptional endodontic care with precision, integrity, and compassion.

Our Philosophy

Our practice philosophy has been and always will be to treat everyone with respect, empathy, and honesty. This applies to both our patients and our colleagues in the dental field. Like all endodontists our goal is to save teeth, however we understand that a root canal is not always in the patient's best interest. We strive for patient-centered outcomes where people can find value in their oral health. Our practice utilizes up to date technology and evidence-based decision-making to maximize successful outcomes for our patients and referring doctors.

About our Endodontic Showcase

The annual endodontic showcase is a selection of interesting endodontic cases treated in our office from the past year. The purpose of this booklet is to educate our colleagues on the possibilities endodontics has as a treatment modality, in addition to highlighting the skill and ability of our professionals at Dominion Endodontics. Please enjoy the following case presentation, and as always feel free to reach out to any of our doctors with questions you may have. You will find our office locations and contact information on the back of this booklet.

Why Dominion Endodontics?

- **We offer a full range of sedation options**

At Dominion Endodontics, we understand that some patients may have anxiety at even the thought of a root canal. To better serve our patients, we offer a full range of options including Nitrous Oxide anxiolysis, oral conscious sedation, and IV sedation. Our goal is always to provide the most comfortable experience for our patients.

- **We routinely utilize 3D CBCT imaging, microscopes and ultrasonic instruments**

Scientific evidence shows that CBCT imaging, microscopes, and ultrasonic instruments all improve the outcome of endodontic treatment. Not only do these technologies allow for a more accurate diagnosis, but also they provide more minimally invasive treatment options than ever before. We provide consistent results, and stand by our work.

- **We communicate well with your office**

Our doctors believe patient care is a team effort and are available to help with your treatment planning. Reports are quickly sent to your office after treatment so that you can proceed with the restorative work as soon as possible.

- **We accept insurance**

For those patients in need of a flexible payment option, we also accept CareCredit and offer an in-house payment plan.

- **We can accommodate emergency patients**

With 3 offices, we have an available chair to accommodate your emergency patient. It is not uncommon for us to start early, work through lunch, or stay late to help our patients because we know how terrible a toothache can be!



David Palmieri, DMD, MS

Education:

- Doctor of Medicine in Dentistry, University of Pittsburgh
- Certificate of Endodontics, University of Pittsburgh
- Master of Science, University of Pittsburgh

“For me, patient experience is the most important part of what we do as endodontic professionals. While predictable endodontic treatment should be our primary goal, we must always remember that there is a patient attached to the tooth. Root canals can be an expensive, time-consuming and painful procedure— but they don't have to be! We start by listening to the patient, addressing their concerns to produce a comfortable experience where they feel value in preserving their natural tooth.”

Treatment of Dens Invaginatus

Proper treatment planning is key to addressing pathology on any tooth with abnormal morphology. Here I have presented 2 cases, each with dens invaginatus anatomy. Teeth with dens invaginatus undergo a malformation during development, where the dental papilla folds inward prior to calcification of the tissues. Clinically, this enamel layer extends apically into dentin, frequently appearing as an enlarged pit. This projection may extend mildly into the crown (Type I), moderately below the CEJ and stay confined within the root (Type II), or significantly into the root and communicate with the PDL either apically or laterally (Type III). This invagination can accumulate bacteria and eventually cause endodontic pathology. Luckily for us dentists, these cases are rare with a prevalence between .3% and 10%¹. Even though this anatomical presentation can be very complex, endodontic treatment for these cases can still be completed predictably.

The endodontic treatment plan for any dens invaginatus case begins with the classification of the malformation. CBCT is an excellent tool to conservatively evaluate the anatomy and determine the type of the dens prior to treatment. Type I cases rarely require the need for endodontics, and are best treated preventatively with a sealant as soon as the dens is identified. Type II, which I have pictured here, typically requires nonsurgical root canal treatment, as the depth of the invagination commonly communicates with the pulp, resulting in pulp necrosis. Type III is the most challenging to treat because the invagination essentially creates a second or third canal within the tooth. As I have pictured here, Type III anatomy generally requires both root canal treatment and apical surgery to correct the problem. It is important to remember, while modern endodontic treatment can be successful for these kinds of cases, prophylactic treatment and prevention of apical pathology are always preferable when possible.

Dens Invaginatus Type II **Dens Invaginatus Type III**



#23 Pre-op PA



#10 Pre-op PA



#23 Post-op PA



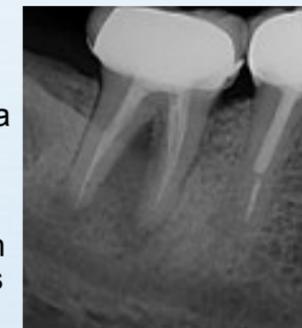
#10 Post-op PA



1 Year Recall

Is It Fractured?

This next case is perfect example of the endodontic diagnostic process, and how different etiological factors play a role in determining prognosis. This patient presented to me with pain to pressure on #31, which had a previous root canal treatment 10 years ago. The most troubling aspects of this case were the complete intraradicular bone loss and an 8mm probing depth on the lingual. Unfortunately for the patient, a deep probing depth and lateral radicular bone loss are the quintessential signs of a vertical root fracture, which generally has a poor outcome. However, it is important to remember that other endodontic conditions can present similarly, and that due diligence is required to fully assess the prognosis. In the differential diagnosis here, three etiologies could adequately explain this presentation: a vertical root fracture (VRF), a strip perforation, or a perio-endo condition.



#31 Pre-op PA



#31 Post-op PA



1 Year Recall PA

CBCT

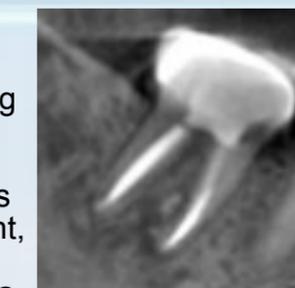
Using the CBCT scan, we examined the pattern of bone loss on #31 and discussed the findings with the patient. CBCT imaging revealed no mesial or distal angular bone loss, which could have indicated a marginal ridge fracture extending below the CEJ. Additionally, the buccal and lingual cortical plates were intact, except for a small area on the lingual where the periodontal pocket presented. These findings are inconsistent with a crack, as the structure of mandibular molars predisposes them to cracking along their central groove. While abnormal presentation of VRF can occur along the buccal or lingual, a crack was less likely to be the underlying etiology with this pattern of bone loss. A strip perforation was also able to be eliminated from the differential, as no communication from the canal was seen in the axial view of the CBCT scan.

With these other two causes removed, the most likely etiology was determined to be a periodontal defect secondary to endodontic pathology. As an endodontic infection expands, bone loss will generally follow the path of least resistance. Typically, this expansion will produce drainage through a sinus tract. Sometimes however, especially when the cortical bone is thick, the endodontic infection will drain through the PDL, creating a periodontal pocket. For these perio-endo cases, the overall prognosis is dependent on the healing of that periodontal pocket.

Treatment of this case was completed in 2 visits using calcium hydroxide as an interim medication. This was done to assess the healing of the periodontal defect prior to obturation. At the second treatment appointment, which was scheduled 6 weeks after the first, the periodontal pocket probed a healthy 3mm. At the 1 year follow up, #31 was asymptomatic with complete regeneration of the furcal bone. As illustrated by this case, a proper diagnosis, often made with 3-dimensional imaging, is a critical first step to evaluating a tooth and achieving a patient-centered outcome.



Pre-op CBCT Sagittal View



1 Year Recall CBCT Sagittal View

1. Gallacher A, Ali R, Bhakta S. Dens invaginatus: diagnosis and management strategies. Br Dent J. 2016 Oct 7;221(7):383-387



Nathan Schoenly DDS

Education:

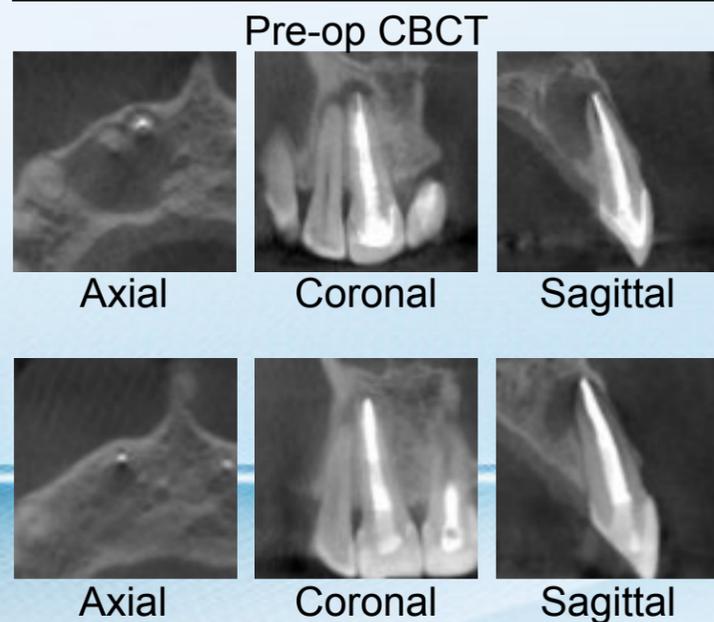
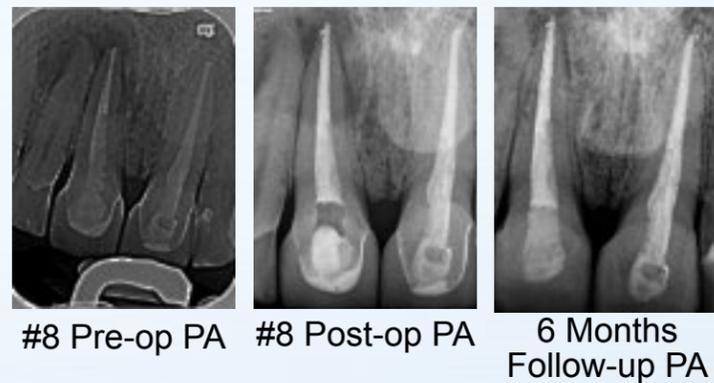
- Doctor of Dental Surgery, University of Buffalo School of Dental Medicine
- Certificate of Endodontics, University of Buffalo School of Dental Medicine
- Diplomate, American Board of Endodontics

“When incorporating endodontics into the treatment plan, we must always focus on predictability. Root canal treatment has a high success rate, but ultimately some teeth are unsalvageable and require extraction. A full determination of the prognosis is critical to favorable endodontic outcomes. Implants are an excellent option for replacing nonrestorable teeth, but when the prognosis is favorable, a root canal and crown can be a very predictable long-term option for the patient.”

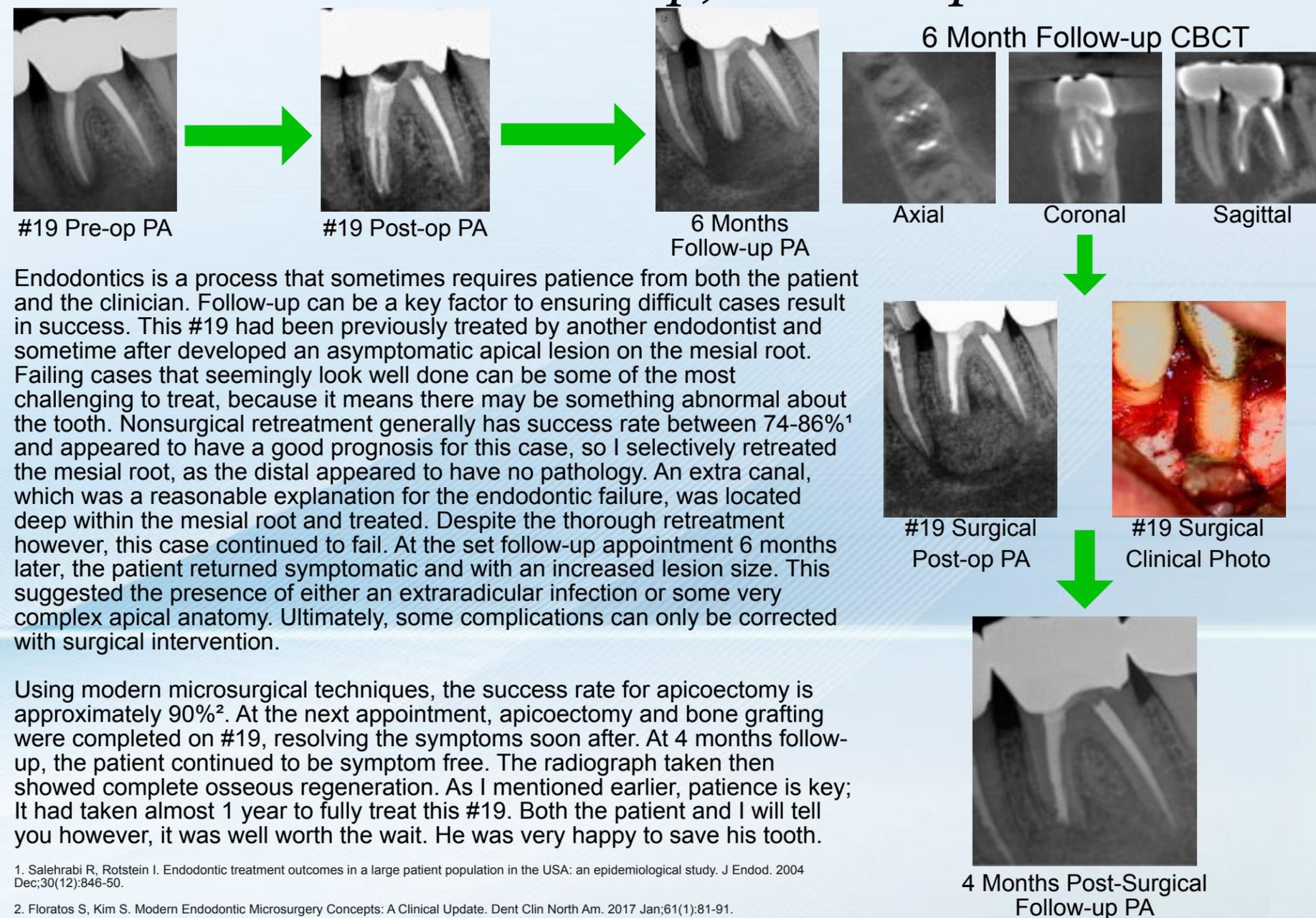
Large Apical Lesion Treated Nonsurgically

This case is an example of the decision-making process when considering surgical and nonsurgical retreatment. This patient presented with a history of palatal swelling in the maxillary anterior. CBCT revealed a large lesion that appeared to be originating from #8. Normally apicoectomy would be the preferred treatment here as healing is generally more predictable with these large lesions. However, several factors lead the patient and I to attempt nonsurgical retreatment of #8 instead. First, the apex of a vital #7 was engrossed by the apical lesion and would surely be devitalized during surgical curettage, rendering endodontic treatment necessary on it as well. Second, the apical lesion here was palatally positioned, meaning excess root resection would be required during surgery for proper access from the buccal. Lastly, the prognosis for surgery is improved if a tooth has undergone retreatment first, meaning that if surgery was ultimately necessary, our chances for success would be improved.

Nonsurgical retreatment was completed and the patient’s symptoms resolved soon after. 6 months later, a PA taken at the follow-up appointment showed significant healing of the lesion. At 10 months, a CBCT was taken to assess the 3-dimensional healing. Comparison of the before and after images show considerable osseous regeneration. With this amount of improvement already, we can be confident this tooth will completely heal over time. While not every case can be treated nonsurgically, it’s exciting to see cases like this where significant healing is possible.



Don't Give Up, Follow Up



Endodontics is a process that sometimes requires patience from both the patient and the clinician. Follow-up can be a key factor to ensuring difficult cases result in success. This #19 had been previously treated by another endodontist and sometime after developed an asymptomatic apical lesion on the mesial root. Failing cases that seemingly look well done can be some of the most challenging to treat, because it means there may be something abnormal about the tooth. Nonsurgical retreatment generally has success rate between 74-86%¹ and appeared to have a good prognosis for this case, so I selectively retreated the mesial root, as the distal appeared to have no pathology. An extra canal, which was a reasonable explanation for the endodontic failure, was located deep within the mesial root and treated. Despite the thorough retreatment however, this case continued to fail. At the set follow-up appointment 6 months later, the patient returned symptomatic and with an increased lesion size. This suggested the presence of either an extraradicular infection or some very complex apical anatomy. Ultimately, some complications can only be corrected with surgical intervention.

Using modern microsurgical techniques, the success rate for apicoectomy is approximately 90%². At the next appointment, apicoectomy and bone grafting were completed on #19, resolving the symptoms soon after. At 4 months follow-up, the patient continued to be symptom free. The radiograph taken then showed complete osseous regeneration. As I mentioned earlier, patience is key; It had taken almost 1 year to fully treat this #19. Both the patient and I will tell you however, it was well worth the wait. He was very happy to save his tooth.

1. Salehrabi R, Rotstein I. Endodontic treatment outcomes in a large patient population in the USA: an epidemiological study. J Endod. 2004 Dec;30(12):846-50.

2. Floratos S, Kim S. Modern Endodontic Microsurgery Concepts: A Clinical Update. Dent Clin North Am. 2017 Jan;61(1):81-91.



Frank Portell, DMD, MS

Education:

- Doctor of Medicine in Dentistry, University of Puerto Rico
- Certificate of Endodontics, Walter Reed Army Medical Center
- Diplomate, American Board of Endodontics

“While many things have changed throughout my career, the pillars of successful endodontics still remain the same. The process starts with a proper diagnosis, requires efficient correction of the pathological etiology, and ends with the appropriate long-term restoration. Technology helps us achieve these steps, but the goals of endodontics remain the same, dedicated to eliminating bacterial infection and restoring function to a tooth.”

Lateral Periodontal Cyst or Lateral Canal?

Incorporating CBCT into our practice has significantly influenced our treatment planning process. This patient presented with discomfort localized to an old root canal on #21. While the technical quality of the original root canal appeared adequate, a lateral radiolucency was present along the root. Included in the differential diagnosis was the possibility of a lateral periodontal cyst, which is a noninflammatory developmental cyst that is unrelated to root canal pathology. Lateral periodontal cysts occur most commonly around mandibular canines and premolars are typically treated with surgical removal and biopsy.

Using the CBCT scan we visualized the area and located what appeared to be a lateral canal exiting into the lesion. Because of this finding, the patient and I opted to retreat #21 rather than approach this surgically. Subsequent root canal retreatment shows sealer exiting from the new obturation and full resolution of the patient’s symptoms. Based on the final PA, we can be confident that this radiolucency is not likely to be a lateral periodontal cyst and rather a lesion of endodontic origin. CBCT was the X-factor here that helped this patient avoid an unnecessary surgery.

According to the literature, CBCT changes the endodontic treatment plan around 53% percent of the time¹.

1. Mota de Almeida FJ, Knutsson K, Flygare L. The effect of cone beam CT (CBCT) on therapeutic decision-making in endodontics. Dentomaxillofac Radiol. 2014;43(4):20130137.

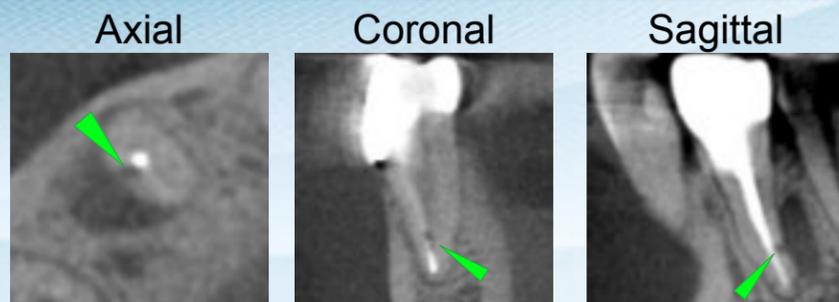


#21 Pre-op PA

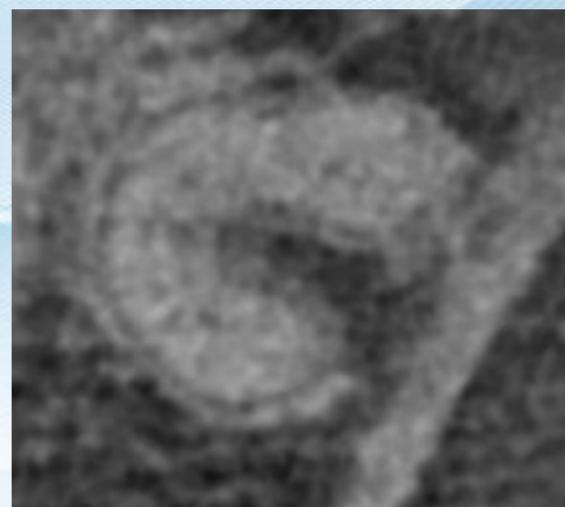


#21 Post-op PA

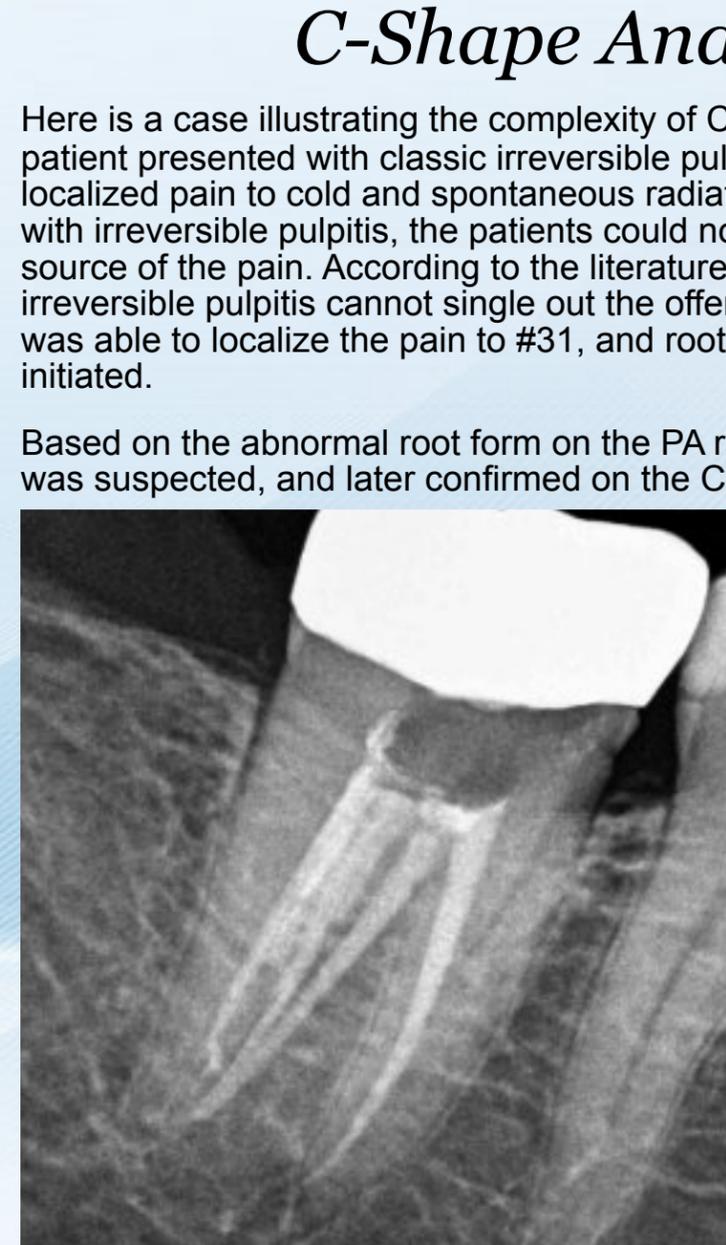
CBCT



#31 Pre-op PA



#31 CBCT axial slice showing C-shape anatomy



#31 Post-op PA

C-Shape Anatomy

Here is a case illustrating the complexity of C-shape molar anatomy. The patient presented with classic irreversible pulpitis symptoms– a poorly localized pain to cold and spontaneous radiating pain. As with many patients with irreversible pulpitis, the patients could not identify which tooth was the source of the pain. According to the literature, over half of patients with irreversible pulpitis cannot single out the offending tooth². A simple cold test was able to localize the pain to #31, and root canal therapy was soon initiated.

Based on the abnormal root form on the PA radiograph, C-shape anatomy was suspected, and later confirmed on the CBCT. Studies show the

prevalence of C-shape anatomy is approximately 8% in mandibular second molars, but varies between different ethnic populations³. This case was completed in 2 visits with calcium hydroxide. The difficulty with these cases is that the isthmuses and fins must be properly cleaned. You can visualize the multiple canals and isthmuses filled with gutta percha in the final PA to the left. The use of warm vertical condensation is key to the successful obturation of C-shape molars.

2. Friend LA, Glenwright HD. An experimental investigation into the localization of pain from the dental pulp. Oral Surg Oral Med Oral Pathol. 1968 May;25(5):765-74.

3. Wadhvani S, Singh MP, Agarwal M, Somasundaram P, Rawtiya M, Wadhvani PK. Prevalence of C-shaped canals in mandibular second and third molars in a central India population: A cone beam computed tomography analysis. J Conserv Dent. 2017 Sep-Oct;20(5):351-354.



Nicholas Leon-Guerrero DDS

Education:

- Doctor of Dental Surgery, University of the Pacific Arthur A. Dugoni School of Dentistry
- General Practice Residency, Kings County Hospital Center
- Certificate of Endodontics, Columbia University
- Diplomate, American Board of Endodontics

"I love the power endodontics has to save teeth. Our specialty is taking great strides in patient care by embracing fundamental ideas of the past and incorporating new innovative methods to provide the best care possible. I enjoy practicing at the cutting edge with regenerative, minimally invasive, and surgical techniques to reach patient-centered outcomes. My priority is always to provide successful treatment and gently alleviate pain for my patients."

"Hide and seek"

This case is a classic example of how game-changing CBCT technology can be. This patient presented with percussion and palpation symptoms localized to #2 which was previously treated by another endodontist six years ago. On a 2-dimensional periapical radiograph, the treatment appears adequate. However the 3-dimensional images tell a different story. First in the sagittal view, an apical lesion is noted expanding into the sinus. The source of the pathology is clear when looking at the coronal and axial views- there is a uninstrumented mesio-palatal root. Moreover the CBCT suggests that there is also an uncleaned MB2 canal.



#15 Pre-op PA

CBCT

Axial Coronal Sagittal



The retreatment for this tooth was completed in 1 visit. As suspected, 2 missed canals were located. All together 5 canals were cleaned, shaped, and obturated. The final PA radiograph can be seen here to the left. Soon after retreatment, the patients symptoms resolved and the crown was repaired by the referring dentist.



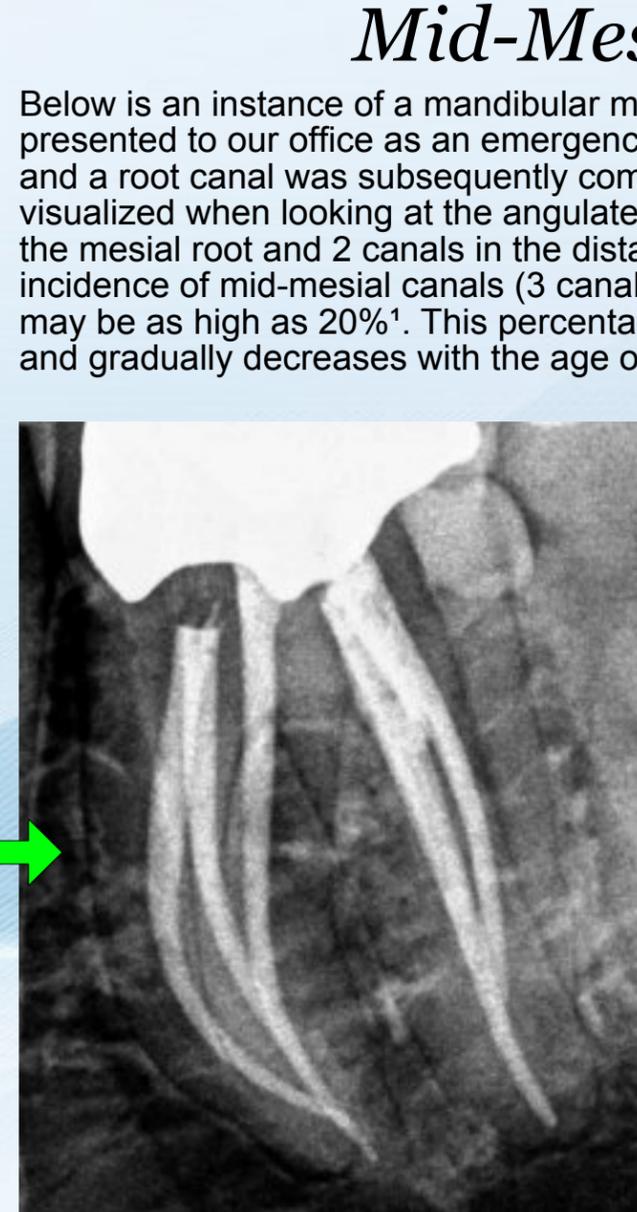
#15 Post-op PA



#19 Pre-op PA



#19 Post-op PA (Straight Angulation)



#19 Post-op PA (Mesial Angulation)

Mid-Mesial Anatomy

Below is an instance of a mandibular molar with a "mid-mesial" canal. This patient presented to our office as an emergency with irreversible pulpitis symptoms on #19 and a root canal was subsequently completed. The anatomy here can be fully visualized when looking at the angulated PA radiograph, where there are 3 canals in the mesial root and 2 canals in the distal root. According to Nosrat et al., the incidence of mid-mesial canals (3 canals in the mesial root) in mandibular molars may be as high as 20%¹. This percentage is generally higher in younger patients and gradually decreases with the age of the patient.

This was a difficult case in which I found the use of the surgical operating microscope indispensable. Missed canals are often the difference between success and failure of endodontic treatment, making identification of canals with the microscope key for any tooth known to have variable anatomy. The intense magnification and illumination with the microscope allow for proper visualization and instrumentation of these teeth with additional canals. The position of the American Association of Endodontists is that the microscope is essential when performing modern endodontic techniques. Higher magnification with loupes, and even more so with the use of the operating microscope, improves endodontic outcomes, and elevates the standard to which all dentists should strive for when performing root canal treatment.

1. Nosrat A, Deschenes RJ, Tordik PA, Hicks ML, Fouad AF. Middle mesial canals in mandibular molars: incidence and related factors. J Endod. 2015 Jan;41(1):28-32.

Our Office Locations



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www.DominionEndodontics.com