



by Dr. Manor Haas

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Is Endodontics Dying?

ABSOLUTELY NOT—HERE'S WHY

Course description

With the increased popularity of dental implants, there's been a growing perception that the future of endodontics is bleak. As Dr. Manor Haas explains, however, endo actually has a bright future, and dentists are fortunate to have it as a treatment option.



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Abstract

Some dentists have equated the recent uptick in dental implant use with the impending collapse of endodontic treatment, saying that implants “work better” than root canal treatments. But the evidence from recent studies reveal that the success rate for endodontically treated teeth is high even a decade after initial treatment, while the growing evidence related to the incidence of peri-implantitis in teeth treated with dental implants is troubling in its own way. With improved instruments and imaging technology, root canals will remain a well-proven treatment option to preserve structurally sound teeth.

Educational objectives

After reading this article, the participant should be able to:

1. Identify the successful outcome rate of endodontically treated teeth five and even 10 years after the original treatment in private practice.
2. Recognize the role of improved visualization, thanks to loupes and dental microscopes, in helping to identify potentially difficult and calcified canals.
3. Understand how improved nickel titanium (NiTi) files have made it easier to successfully perform endodontic treatment.
4. Consider the reported incidence of peri-implantitis symptoms in implant cases.
5. Understand how improvements in 3-D imaging technology can help determine whether a patient is a true candidate for successful endodontic treatment.

Introduction

With the increased popularity of dental implants, there has been a growing perception that the future of endodontics is bleak. You often hear colleagues saying things such as, “Root canals don’t work, so why bother?” “Endo is just a prelude for an implant” or, “Implants work better than

root canals.” Many might also think that teeth with complex anatomies, such as calcified or curved canals, simply can’t be treated endodontically. And many patients often say, “I got a root canal and then lost my tooth,” referring to a tooth that cracked after endodontic treatment.

With this in mind, let me explain why endo has a very bright future and is here to stay, and why we’re fortunate to have it as a treatment option.

Root canals do work

Numerous studies have shown that well-performed, well-restored root canal-treated teeth have excellent outcomes. A recent “real world” endodontic study looked at 487,000 initial root canal-treated teeth performed in private practice.¹ It found that five and 10 years after endo treatment, 92 percent and 86 percent of the cases, respectively, did not require extraction or endo re-treatment or surgery. Keep in mind that many of those cases were performed in less-than-ideal clinical standards, and not always ideally restored. Furthermore, these cases were performed with endodontic instruments that nowadays seem outdated, because treatments were from as far back as 2000. It’s difficult to argue such numbers. One wonders what the outcomes would have been if those cases were treated with current generation of endodontic armamentaria and protocols, and were routinely well restored after the treatments!

Of course, a poorly done endo—missed canals, underinstrumented or undermedicated, a likely contaminated canal system because of a lack of rubber dam isolation, etc.—will not have a good prognosis. But the same would hold true for a poorly executed implant procedure.

With the introduction of many advanced instruments such as enhanced magnification, improved mechanized nickel titanium (NiTi) instrumentation, and intracanal means to medicate canals, endo can now be performed more efficiently and predictably, meaning there’s less room for error. With improved visualization, such as loupes with LED

Disclosure:

The author declares that neither he nor any member of his family has a financial arrangement or affiliation with any corporate organization offering financial support or grant monies for this continuing dental education program.

headlights or microscopes, we're more likely to locate difficult and often calcified canals such as MB2. Such canals are a significant reason for endo failures in molars.^{2,3}

We can also identify hairline fractures better than ever. This raises the question of how often we may have missed hairline fractures and completed an endo procedure, only to have the tooth—not the endo—fail shortly thereafter. Such a failure is a common complaint of patients and dentists after endo treatments. They may wrongly perceive it to be an endo failure when in fact it's a mechanical failure. For one such case, see Example 4 (p. 100).

Improved armamentaria

With the many new NiTi file systems on the market, we now have files that can

manage canals so much more predictably and safely. New generation files are less likely to fracture, ledge or transport. A case in point is the recent introduction of reciprocating NiTi mechanized files, such as WaveOne Gold files from Dentsply Sirona.⁴ With new engineering and file designs, a system such as the WaveOne Gold is considered to be able to do what traditionally would have required several NiTi files. In turn, with fewer steps and instruments needed, there's less room for error and there's a quicker operator learning curve.⁵

For those who worried about files not being able to fully instrument a canal system, there are now files that can better instrument most of those nooks and crannies in canal systems, thanks to their intentionally curved designs. The XP-3D from Brasseler USA

Table 1:

NiTi file systems designed to instrument and negotiate calcified canals

WaveOne Gold Glider from Dentsply Sirona



XPLorer from Clinical Research Dental



ESX Scout from Brasseler USA



SPECIFICATIONS

Size 0.15, with a 0.02 taper apically increasing to 0.06 coronally.

Sizes 0.15 and 0.20, with tapers of 0.01 and 0.02.

Size 0.15, with 0.02 or 0.04 tapers.

FEATURES

Reciprocating motion; provides glide path along with coronal flare as it tapers to 6 percent coronally; can be pre-curved.

Rotary motion and offered in a taper as narrow as 0.01.

Rotary motion and offered in two tapers.

and TruShape from Dentsply Sirona are two such systems that have only recently come to market.⁶

Furthermore, there are NiTi files specifically designed to nicely manage calcified canals and create a “glide path”—initial canal instrumentation that extends from the orifice to the apex—with reduced canal transportation and ledging.⁷ (See Table 1.) So calcified or very curved cases that we once thought couldn’t be instrumented (or instrumented safely) can now be treated very nicely with the combination of enhanced magnification and new NiTi mechanized files.

Implants do not have better ‘success’ rates than root canals

We are fortunate to have dental implants available as a treatment option. However, with time come outcome studies and the humble reality of postsurgical outcomes. An increasing number of studies are evaluating the outcomes of dental implants. They have shown that, unfortunately, they do not work as well as we’d thought—or, shall I say, as well as we had perceived.⁸ It’s likely that you’ve been hearing more and more about “peri-implantitis,” an inflammatory disease that affects soft and hard tissues around dental implants.⁸ This, in turn, leads to compromise in long-term prognosis of dental implants.⁹

Root canals have been evaluated under stricter criteria than implants. The word “success” has often been misused in dental implantology; the perception has been that if the implant site is asymptomatic and the implant is functional, it’s successful, no matter the cervical bone loss or peri-implantitis present.⁹ Figs. 1 and 2 are certainly not successes, but instead should



Figs. 1 and 2: While #3 (left) and #19 (right) implants are functional and asymptomatic, they show cervical bone loss and are not “successes.”



Fig. 3

Figs. 3–5: Better diagnosis and treatment is possible thanks to improvements in dental loupes and lights, such as those from Designs for Vision (Fig. 3), and in dental microscopes such as the Carl Zeiss Extaro 300 (Fig. 4) and Global Surgical A-Series (Fig. 5).



Fig. 4

be considered “surviving” implants. When comparing apples to apples with respect to “success,” root canal treatments have been shown to easily be just as successful as implants.^{10,11}

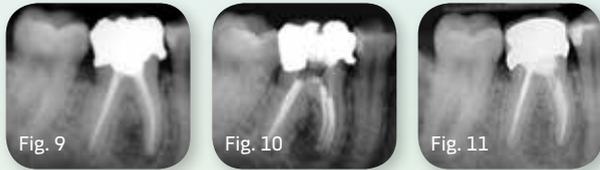
A recent study evaluated 588 randomly selected implant cases and followed them for nine years.⁹ It found that about 45 percent of cases presented with some form of peri-implantitis. That’s a very humbling, and potentially troublesome, outcome. If only a few years after insertion, so many implants show disease around them, then what will there be 10 or 20 years later? And if/when an implant is failing with peri-implantitis, what do we do? Unfortunately, we currently have no idea.

So, considering the success of root canal treatments and that of dental implants, it seems that root canal treatments will remain a well-proven and sound treatment option.



Fig. 5

How and Why Endo Plays a Significant Role in Dentistry



EXAMPLE 1

Nonsurgical endo retreatment of tooth #30 (Fig. 9) resulted in apical healing. A previously untreated midmesial canal was located (Fig. 10) with use of endo ultrasonic pulp floor grooving and under microscope magnification and treated successfully (Fig. 11).



EXAMPLE 2

Would anyone really consider extracting tooth #31 (Fig. 12), which is structurally sound and with irreversible pulpitis, instead of endodontically treating it (Fig. 13)?



EXAMPLE 3

Why not endodontically treat this symptomatic #29 with bifurcating calcified canals (Fig. 14)? Such cases can be predictably treated (Fig. 15) with the use of a dental microscope and current generation of narrow and flexible NiTi files.



EXAMPLE 4

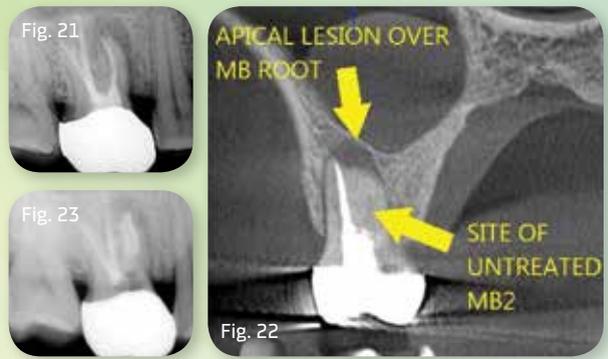
Note the visibility inside tooth #3 (Fig. 16) endo access, comparing the view without (Fig. 17) and with (Fig. 18) enhanced magnification and illumination. Thanks to a dental microscope, a very fine white-lined vertical fracture was noted reaching the pulp floor. By diagnosing such (exceptionally fine) fractures, we can weed out potential endo cases that would be doomed to fail due to mechanical (fracture) issues, not endodontic ones. Doing so may increase prognosis of carefully selected endo cases.



EXAMPLE 5

Thanks to 3-D/CBCT imaging, we can now better diagnose and treatment-plan cases that otherwise would have been difficult, or impossible, to perform with only 2-D radiographs as reference.

Mildly symptomatic #15 with no (clear) apical pathology noted in a PA (Fig. 19). Thanks to CBCT imaging (Fig. 20), a significant apical lesion is noted along with untreated MB2 and DB canals. The precise diagnosis provided by 3-D imaging of such (failing) endodontic cases enhances our ability to manage them endodontically.



EXAMPLE 6

Tooth #3 that presents with an inverted MB root "J-shaped" lesion that is consistent with a vertical root fracture (Fig. 21). But CBCT imaging (Fig. 22) doesn't reveal signs consistent with a vertical fracture, and instead simply has an apical (not vertical) lesion associated with an untreated MB2 canal. Without a CBCT scan, this tooth may have been extracted. Instead, with the use of 3-D imaging and magnification, the MB root can be, and is, re-treated (Fig. 23). This highlights the significant role that endodontics plays in dentistry.

Root canals are not preludes for implants

Knowing the prognosis of well-performed and restored endo-treated teeth, should we really give up on a tooth for an alternative that, within a short period of time, may have cervical disease that we still have no way of treating?⁹ (See Example 2.)

Better yet, let's look at the world of orthopedic surgery. You'd be hard pressed to find orthopedic surgeons recommend a total knee replacement on a relatively young patient; you're much more likely to hear them suggest managing the injured knee for as long as possible before replacing it. And unlike in dentistry, orthopedic surgeons almost always advise patients that their new knees will likely need to be replaced after, say, 10 or 15 years, so the longer the initial surgery is held off, the better. Why we don't state this to our patients with respect to dental implants—or why we don't state it more often—is a question I can't answer.

So, we should do what we can to hold on to a structurally sound tooth by means of endodontic treatment. In other words, root canal-treated teeth are certainly not a prelude for dental implants.

Improved diagnosis means better case selection

To a great extent, thanks to CBCT and dental microscopes, we can now better select cases that would benefit from endodontic treatment and weed out those that won't.

One may argue that weeding out poor candidates for endo treatment might further improve endodontic outcomes. Time will tell. Examples may include a vertical hairline fracture that's seen only under a microscope. (See Example 4.) Such a case would not benefit from endo treatment in the first place. Nowadays, there is less of a need for exploratory endo surgeries or exploratory endo accesses. This, in turn, saves patients the time, money and pain of such procedures. These diagnostic tools could greatly enhance the endo experience and outcomes, when poor candidates are not endodontically treated in the first place. A recent study demonstrated how the use of

CBCT in endodontics altered treatments in most cases reviewed. CBCT saved patients from unnecessary endodontic treatments that may have been unsuccessful if pursued.¹²

Summary

Not only do endo-treated teeth have exceptionally high success and survival rates, but we can now diagnose and manage endo-related problems better than ever.^{1,12} To a great extent, this is thanks to the impressive advances in endodontic techniques and armamentaria. For instance, we can now more predictably and more safely manage very calcified and curved canals thanks to narrow, flexible mechanized NiTi files. (See Table 1.) We can more easily and more frequently locate difficult-to-find canals that are related to endodontic failures, such as MB2. And, unlike ever before, we can now diagnose and treat complex endo-treated cases thanks to CBCT imaging.

So, while we are fortunate to have dental implants available to our patients, with the aforementioned endodontic prognosis and the limitations of implants, there is certainly a very healthy future for endodontics. ■

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- 1. A recent study revealed that five years after endodontic treatment, what percentage of teeth needed no further endo retreatment, surgery or extraction?**
 - A. 72 percent.
 - B. 82 percent.
 - C. 92 percent.
 - D. 99 percent.
- 2. The same study examined patients after 10 years as well. What percentage of teeth needed no further endo retreatment, surgery or extraction after a decade?**
 - A. 66 percent.
 - B. 76 percent.
 - C. 86 percent.
 - D. 96 percent.
- 3. The study referred to in Questions 1 and 2 profiled cases from as far back as 2000. Given the improvements in endodontic armamentaria and protocols, if the study profiled cases begun in the past few years, how would the number of successful endo cases likely have been affected?**
 - A. It likely would be higher.
 - B. It likely would be lower.
 - C. It likely would not have changed.
- 4. Which of the following is not given by the author as a reason that modern endodontic procedures can be performed more efficiently and predictably?**
 - A. Enhanced magnification.
 - B. Improved mechanized nickel titanium (NiTi) instrumentation.
 - C. Intracanal means to medicate canals.
 - D. Rubber dam isolation.
- 5. New NiTi endo files on the market help dentists manage canals more predictably and safely. Which of the below is not an example of a recent improvement?**
 - A. New generation files are less likely to fracture, ledge or transport.
 - B. Reciprocating mechanized files often can do what traditionally would have required several files.
 - C. New files automatically signal the presence of a missed hairline fracture.
 - D. With fewer steps and instruments needed, there's less room for error and a quicker operator learning curve.
- 6. New NiTi files specifically designed to manage calcified canals create a route that extends from the orifice to the apex with reduced canal transportation and ledging. This route is known as a:**
 - A. Slide path.
 - B. Glide path.
 - C. Slip path.
 - D. Smooth path.
- 7. True or false: Root canals and implants are evaluated for success by identical criteria.**
 - A. True.
 - B. False.
- 8. In a recent study of randomly selected implant cases, what percentage presented with some form of peri-implantitis within nine years?**
 - A. 5 percent.
 - B. 55 percent.
 - C. 45 percent.
 - D. 65 percent.
- 9. Improvements in which dental instruments have led to better diagnosis and treatment for endodontic patients?**
 - A. Loupes.
 - B. Headlights.
 - C. Microscopes.
 - D. All of the above.
- 10. True or false: CBCT/3-D imaging helps dentists diagnose and treatment-plan cases that would have been difficult, if not impossible, to do with only 2-D radiographs as reference.**
 - A. True.
 - B. False.

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