

NONSURGICAL ENDODONTIC RETREATMENT: ISSUES INFLUENCING TREATMENT

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Mao Tse Tung wrote "The foundation of success is failure". Clinicians who strive for endodontic excellence appreciate the elements that comprise success and use these criteria to evaluate the causes of failure. Endodontic failure occurs for a variety of reasons, but what all failures share in common is leakage (*Figures 1-4*).¹ Endodontic failures may generate confusion, anxiety, and frustration for clinicians and patients alike. Focusing the attention of the patient on the stepping stones to endodontic health helps alleviate concerns and creates the clinical pathway to successful retreatment.

Many failures can be kindly attributable to endodontics done as it was taught in a particular era and geographical region. Regrettably, numerous additional failures can be identified as cases treated with techniques incongruent with biological principles. Regardless, the causes of failure are multifaceted and endure due to an abundance of misinformation, misconceptions, and perpetuated endodontic myths. Additionally,

spectacular change is occurring in clinical endodontics and is driven by an explosion of new technologies, instruments, materials, and the emergence of new practice-building techniques. This accelerating rate of change has left many dentists in an increasing gap between current training and possibility.

This article is an introduction to nonsurgical retreatment, and will spotlight the many issues that influence results. The purpose of this article and future nonsurgical retreatment publications will be to close the endodontic gap by illuminating a clear pathway to greater success and long-term predictability. The collection of these papers will reflect on over two decades of experiences I have gathered from being a clinician, teacher, clinical researcher, and my interactions with countless international colleagues. Properly performed, endodontics is the cornerstone of restorative and reconstructive dentistry (*Figure 5*).



Figure 1. A pre-op film of a maxillary right first molar demonstrates an apically failing gutta percha case.



Figure 2. A pre-op film of the maxillary anterior abutment reveals a gutta percha point tracing toward a laterally failing silver point case.

THE POSSIBILITIES

Statistics confirm about 2.5 million endodontic cases were treated in 1960 and exponentially surged to over 40 million annual cases in 1995.² This increase in endodontics is parabolic, staggering, and can be described as the good-news-bad-news dilemma. The good news is, hundreds of millions of teeth have been salvaged through combinations of endodontics, periodontics, and restorative dentistry. The bad news is, tens of millions of teeth are endodontically failing for a variety of reasons. To support this assertion, consider the great number of articles quoted in textbooks, such as *Endodontics*, reporting endodontic success rates ranging from 53% to 95%.³ This startling range in success can be attributable to a variety of factors such as number of treated cases, tooth type, operator ability, limited follow-up periods, and all the clinical treatment factors that will ultimately influence success or failure. Even if we assume 90% of all endodontics works over time, the reciprocal failure rate is 10%. 10% of the annually treated cases in any given year is

a significant number of teeth, and if you look over time horizons of the past 3 to 4 decades, the number of failures is massive and in the tens of millions of cases.

Clinical observation of endodontic failure reveals multiple etiologies.^{4,6} The causes of endodontic failure include coronal leakage, radicular fractures, post errors due to diameter, length and direction, missed canals, short fills, overextensions with internal underfilling, blocks, ledges, perforations, transportations, broken instruments, surgical failures, and hopelessly involved periodontal teeth. Examples of these frequently encountered clinical breakdowns can be observed in *Figures 6-16*. Regardless of etiology, the sum of all causes is leakage and endodontic failure.^{4,12} When confronted with the endodontic failure, clinicians must know how to select the best, most predictable treatment approach that will provide long-term success.^{7,8} The huge game of retreatment is virtually a vacant niche and provides phenomenal possibility for trained clinicians.



Figure 3. A pre-op film of a mandibular right second molar bridge abutment demonstrates a failing carrier/gutta percha case.



Figure 4. A pre-op film of a mandibular left second molar shows a failing paste-filled case.



Figure 5. A 10-year recall film of a maxillary right first molar demonstrates a successful palatal root resection, 3-D endo, and restorative procedures.



Figure 6. A pre-op film of the mandibular molars confirms coronal leakage. Additionally, the second molar is endodontically failing.

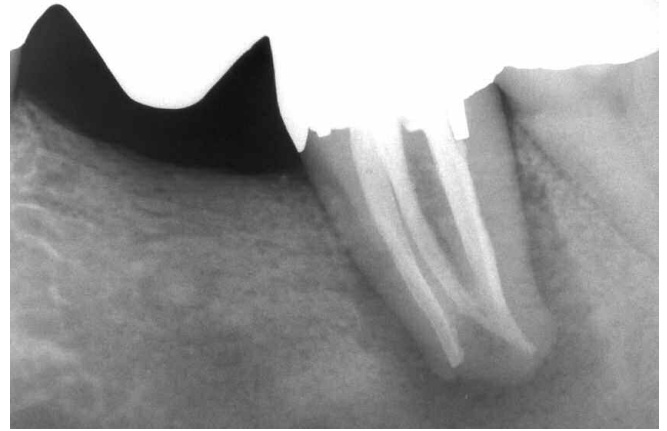


Figure 7. A film of a second molar bridge abutment reveals endodontics and an asymmetrically positioned lesion suggesting a possible root fracture.

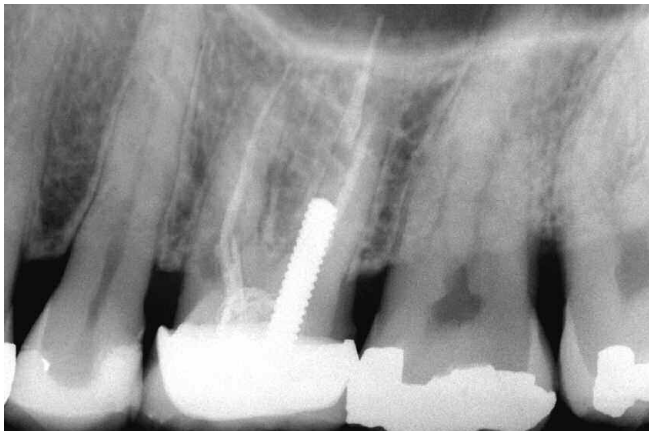


Figure 8. A pre-op film of a maxillary left first molar shows incomplete endodontics, a large post, resorption, and a poor fitting crown.



Figure 9. A pre-op film of an endodontically failing mandibular right second molar which suggests a missed, untreated, second distal canal.



Figure 10. A pre-op film of an endodontically failing posterior bridge abutment shows three posts, underfilling, and frank apical pathology.



Figure 11. A pre-op film of an endodontically failing maxillary molar. The canals are internally underfilled and apically overextended.

ISSUES INFLUENCING TREATMENT

Following quadrant vital pulp testing, clinical examination, and radiographic observation, teeth are frequently discovered that need endodontics or are endodontically failing.⁹ Clinicians should evaluate previously treated teeth and judge success by the standards of patient comfort, healthy periodontium, and absence of radiographic pathology. At times, certain teeth exhibit inadequate treatment based on present day criteria, but fulfill the definition of success, as has been previously stated. Clinicians may choose to watch these teeth periodically, but should consider retreatment if new dentistry is planned. If, however, the patient is symptomatic, has periodontal disease secondary to endodontic pathology, or exhibits a radiographic lesion of endodontic origin, then a decision should be made between retreatment versus extraction. Today, endodontic success can approach 100%.

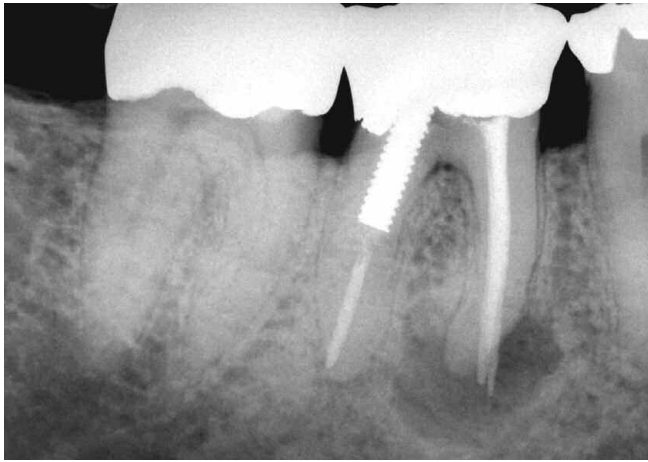


Figure 12. A pre-op film of an endodontically failing mandibular molar confirms the mesial systems were blocked, then ledged, and finally perforated.

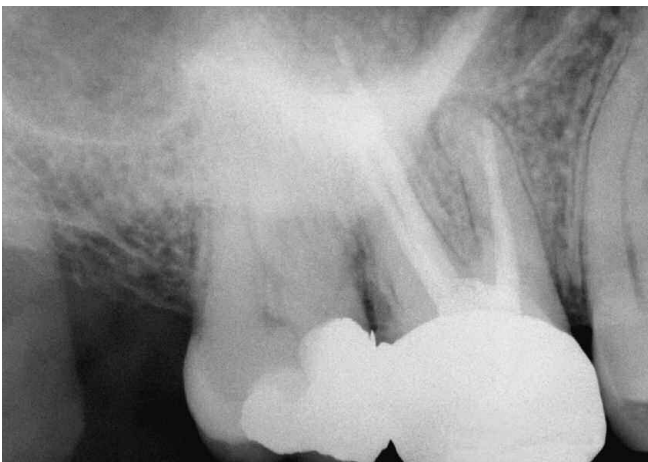


Figure 13a. A distally angulated pre-op film of a maxillary first molar reveals gross apical transportation of the MB canal.

This phenomenal improvement is related to several factors, such as better understanding of biological principles, greater knowledge, appreciation, and respect for root canal system anatomy and the role it plays in success and failure, improved training, expanded abilities, breakthrough techniques, relevant new technologies, and attention to restorative excellence. Following are the issues that should be considered when choosing between retreatment versus extraction.

IS IT A STRATEGIC TOOTH?

Clinicians need to look very carefully at any particular tooth that is failing endodontically and decide, is this a critically essential tooth to optimize oral health or are alternatives to endodontic retreatment more predictable? Sometimes an effort is made to retreat a tooth endodontically, but the outcome does not afford a prognosis as good as the alternatives. Certainly any endodontic retreatment and the necessary restorative efforts should be as predictable as alternative treatments, such as bridge work or a restoration-based implant.

WHAT DOES THE PATIENT WANT?

Dentistry, at its best, oftentimes may provide a pathway for innovative types of treatment, but if the patient isn't motivated to have this treatment, then anything that is performed is not appropriate. It is profoundly important to understand the patient's needs, wants, and how their overall expectations are related to their oral health.

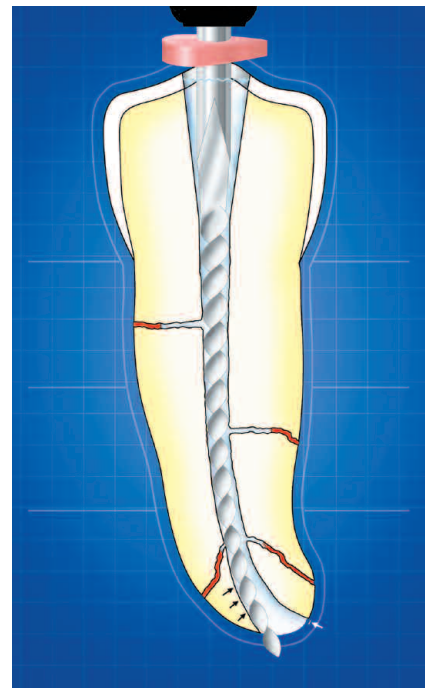


Figure 13b. A graphic clearly shows the aftermath following transportation of the foramen which results in reverse canal architecture.



Figure 14. A pre-op film of a maxillary canine reveals a relatively large broken instrument positioned deep toward the canal terminus.

NSRCT VS. SRCT

Endodontic failures must be carefully evaluated so a decision can be made between nonsurgical root canal treatment (NSRCT) versus surgical root canal treatment (SRCT), or extraction. Historically, regrettably, and still too often, endodontic surgery is selected in efforts towards resolving failures. Even with the vast improvements achieved in surgical endodontics in recent years, surgical techniques are restricted in eliminating pulp, bacteria, and related irritants from the root canal system (Figures 15a and 15b).¹⁰⁻¹² When considering NSRCT, it is wise, often necessary, and encouraged to consult with the appropriate specialist to better

appreciate the time, energy, effort, cost, and prognosis associated with the various treatment alternatives. Infrequently, but on occasion, surgery may still be necessary, but the clinician will have greater confidence in the surgical outcome if the tooth has been three-dimensionally re-cleaned, reshaped and repacked.

RESTORATIVE EVALUATION

Fundamental to endodontic treatment is the ability to produce an aesthetic, well-designed, clinically functional restoration.¹³ Oftentimes, broken down teeth should be evaluated for crown lengthening procedures so that the restorative dentist can achieve the ferrule effect and establish a healthy biological width. Indeed, certain teeth fracture following restoration of the endodontically treated tooth because clinicians rely too much on the post and core to retain the coronal restoration, rather than having restorative margins gripping a 2 to 3 mm collar of circumferential tooth structure. Crown lengthening improves all phases of ensuing interdisciplinary treatment. Endodontically, crown lengthening addresses isolation issues, creates pulp chambers that retain solvents, irrigants, and later, if required, inter-appointment temporaries. This periodontal procedure assists in placing well-defined margins, improves accuracy in impressions, enhances laboratory procedures, allows for accurately fitting restorations, and promotes the health of the attachment apparatus. Clinicians must recognize that crown lengthening procedures dramatically improve prognosis, and clinicians should integrate this service, when necessary, into restorative excellence procedures.

PERIODONTAL EVALUATION

In simple terms, practitioners need to know a great deal about the supporting tissues, their health, or potential for health. Endodontically failing teeth that are being evaluated for retreatment need to be examined for pocket depth, mobility, crown-to-root ratios, hard and soft tissue defects, and any other anomalies that could preclude a healthy attach-



Figure 15a. A pre-op film of a splinted mandibular canine. Attempting to cork the empty canal is ill-advised especially with a floating retrograde amalgam.



Figure 15b. A pre-op film of a failing maxillary bicuspid reveals access extended subcrestally, history of surgery, and a frank lateral root lesion.

ment apparatus. Periodontal treatment has phenomenally advanced over the years and can provide numerous treatment modalities that, in concert with other disciplines, can afford excellent longitudinal success.¹⁴

OTHER INTERDISCIPLINARY EVALUATIONS

Most endodontically failing teeth can be successfully retreated with the skill, experience and technologies that are present today. However, clinicians should not just be about the tooth, but should question whether the particular tooth fits into a treatment plan that promotes oral health. The strategic nature of any tooth must be evaluated from a variety of dental disciplines and the clinician must carefully analyze the periodontal condition, restorability, occlusion, potential for orthodontics, and their ability to perform successful endodontic retreatment either nonsurgically or surgically.¹⁵ The value of any tooth is only as good as the sum of its disciplinary parts and as such, each discipline must be viewed separately then collectively before instituting any treatment. Certainly it is valuable, and at times critical, to obtain additional opinions from other members of the dental team to better appreciate the complex issues that must be understood before commencing with any treatment. From an endodontic perspective, the following sections review the general considerations that should be understood, managed, and communicated before initiating treatment.

TRAINING, EXPERIENCE AND TECHNOLOGY

When evaluating teeth for endodontic retreatment, it is essential to appreciate there's never just one problem to overcome, but a series of challenges that must be addressed to produce predictably successful outcomes. When clinicians look at a tooth that is failing endodontically, they should honestly ask themselves, "Do I have the training, the clinical experience, and technology to disassemble this tooth and prepare it for three-dimensional cleaning, shaping, and obturation?" It is important to speak to patients and begin to appreciate their concerns and openly discuss what is best for them. Certainly, when looking at various treatment



Figure 16. A pre-op film of a failing mandibular molar compromised by a root perforation, massive periodontal bone loss, and loss of attachment.

modalities, one has to weigh their abilities and realistic expectations for creating an outcome and compare that with other alternatives that may be more predictable.

CHAIRTIME AND COST

The chairtime and cost associated with any procedure needs to be carefully analyzed and understood by the clinician and completely communicated to the patient. Certainly, if one does not have the experience in endodontic retreatment, they may not be willing to invest the chairtime required to perform some of the tedious tasks necessary to achieve success. Obviously, the length of chairtime is going to impact the cost. In my opinion, a fair fee is that fee that a patient pays with gratitude and a doctor receives with pleasure. Certainly, many retreatment cases cannot be pigeon-holed or categorized according to insurance codes.

Typically, endodontic insurance codes primarily address pulpal extirpation and obturation along with other selective procedures. There are no insurance codes to take a crown off, to remove a core, to eliminate a post, to remove gutta percha, silver points, paste, and carriers. Additionally, there are no insurance codes that address blocks, ledges, perforations, and broken instruments. Consequently, if a clinician is going to seriously address these clinical challenges and become proficient performing them, they must dedicate the proper chairtime and set a fee commiserate with the time spent.

In my practice, I've always quoted two fees for endodontic retreatment. One fee would be my usual, customary, and reasonable (UCR) fee I charge for conventional endodontic procedures. A second fee is quoted, for what I call "endodontic disassembly". With experience, clinicians will begin to appreciate the time required to predictably and safely disassemble a given endodontic failure and the fee necessary to cover this time. It is critically important that the patient understands that the total fee minus the UCR fee equals the "disassembly fee" and that it is their responsibility, as it is generally not covered by their insurance carrier. Philosophically, I have always felt that a well-performed endodontic retreatment fee plus the restoration fee should equal the alternative fee.¹⁶ If possible, the alternative procedure is a bridge, or a restored implant. If you begin to look at the endodontic retreatment and restorative procedures in terms of both time and money, it is a sobering revelation to see how poorly it compares to the time and cost of alternative treatment plans. It is no wonder so many teeth are extracted due to the existing insurance compensation tables, which favor and promote alternative treatments.

REFERRAL

Clinicians should look at all the above issues and remember the Hippocratic Oath, which states, "Do no harm while doing good." Certainly, one should create a context for patient care that would be to treat their patients as they would like to be treated themselves. Ethical questions arise as to who is best qualified to produce the desired result? Would it be best to refer the patient to a colleague who has more experience, better training, and the technology aboard to achieve success? As a practicing clinician and educator for more than 20 years,

I've always encouraged colleagues to conscientiously improve and expand their endodontic procedures within their comfort zone. Taking on new tasks is good, offers personal growth and satisfaction, and begins to position your practice in the marketplace. Balance desire and monetary issues with what is best for your patients and remember, at times, a referral is prudent.

Future publications will address the nonsurgical retreatment of the frequently encountered clinical breakdowns seen throughout this article. All the failure cases shown here, along with others, will be successfully retreated and shown in subsequent articles. Until then, think endodontics and remember, "Retreatment – You *Can* Do It!" ▲

REFERENCES

1. West JD: Endodontic failures marked by lack of three-dimensional seal, *The Endodontic Report*, Fall/Winter, pp. 9-12, 1987.
2. Endodontic Trends Reflect Changes in Care Provided, *Dental Products Report* 30:12, pp. 94-98, 1996.
3. Ingle JI, Bevrige EE, Glick DH, Wichman JA, Abou-Rass M: Ch. 1, Modern endodontic therapy. In: *Endodontics*, pp. 1-53, 3rd ed., Lea & Febiger, Philadelphia, 1985.
4. Stabholz A, Friedman S, Tamse A: Ch. 25, Endodontic failures and retreatment. In Cohen S, Burns RC, editors: *Pathways of the Pulp*, pp. 690-727, 6th ed., Mosby Yearbook Co., St. Louis, 1994.
5. Lin LM, Skribner JE, Gaengler P: Factors associated with endodontic treatment failures, *J Endod* 18:625-627, 1992.
6. Torabinejad M, Ung B, Kettering JD: In vitro bacterial penetration of coronally unsealed endodontically treated teeth, *J Endod* 16:566-569, 1990.
7. Scianamblo MJ: Endodontic failures: the retreatment of previously endodontically treated teeth, *Revue D'Odonto Stomatologie* 17:5, pp. 409-423, 1988.
8. Ruddle CJ: Microendodontic nonsurgical retreatment, in *Microscopes in Endodontics*, *Dent Clin North Am* 41:3, pp. 429-454, W.B. Saunders, Philadelphia, July 1997.
9. Ruddle CJ: Endodontic considerations in periodontal/prostheses, *J Calif Dent Assoc* 17:9, pp. 41-49, 1989.
10. Carr GB: Ch. 19, Surgical endodontics. In Cohen S, Burns RC, editors: *Pathways of the Pulp*, pp. 531-566, 6th ed., Mosby Yearbook Co., St. Louis, 1994.
11. Ruddle CJ: Endodontic failures: the rationale and application of surgical retreatment, *Revue D'Odonto Stomatologie* 17:6, pp. 511-569, 1988.
12. Ruddle CJ: Surgical endodontic retreatment, *J Calif Dent Assoc* 19:5, pp. 61-67, 1991.
13. Wright WE: Prosthetic management of the periodontally compromised dentition, *J Calif Dent Assoc* 17:9, pp. 55-60, 1989.
14. Shanelec DA, Tibbetts LS: A perspective on the future of periodontal microsurgery, *Periodontology 2000*, Vol. 11, pp. 58-64, 1996.
15. Amsterdam M: The diagnosis and prognosis of advanced periodontally involved dentition, *J Calif Dent Assoc* 17:9, pp. 13-24, 1989.
16. Ruddle CJ: Financial policy is the key to the bottom line, *Dentistry Today* 15:10, pp. 104-105, and 109, 1996.