

# ENDODONTIC TREATMENT: MYTH BUSTER

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## Abstract:

There are many misconceptions surrounding root canal (endodontic) treatment and the excruciating response during the procedure. The thought of a root-canal may make anybody, who is not familiar with the procedure fearful or uneasy. The pain, inconvenience and cost of endodontic treatment are some of the reasons to opt for tooth extraction. The wait-and-see approach can be avoided as the longer the treatment gets postponed the more risk is associated in saving the tooth.

**Keywords:** Antibiotics, Conservative access, disinfection of root canal, discolouration, endodontic lesion, Ni-Ti file system, single visit vs multi visit endodontics, strength of endodontically treated tooth.

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## INTRODUCTION

The effectiveness of root canal treatment is well-established since decades. Globally twenty-five million endodontic treatments are performed every year, safely and effectively. Evolution in medical science, techniques and technologies have made endodontic treatment more predictable and successful than ever before. Today, digital imaging, rubber dams, rotary instruments, powerful disinfectant techniques and medicated filling materials aid in successful root canal treatment. However, there are many misapprehensions surrounding root canal treatment and its painful episodes. This article enlightens on some common myths about the root canal treatment and credible facts to offset those myths.

### ENDODONTIC MYTH NO. 1

“Large Endodontic Lesions Extending the Length of Several Teeth Have a Diminished Capacity to Heal”

**FACT:** Predictable healing can be achieved by eliminating the focus of infection. The elimination of

bacteria is done by a combination of measures such as mechanical cleansing, irrigation with various medicaments and the deposition of antibacterial dressings in the canals.

Nonsurgical management of a wide periapical lesions have shown a higher success rate and should always be adopted before resorting to surgery. The various non-surgical approaches can be: the conservative root canal treatment, decompression technique, active nonsurgical decompression technique, aspiration-irrigation technique, method using intracranial medicament, Lesion Sterilization and Repair Therapy, and the Apexum procedure. The decompression and aspiration-irrigation techniques can be used for drainage of cystic fluid from the canals as it decreases the hydrostatic pressure within the periapical lesion. In contrary for non-draining canals, calcium hydroxide or the triple antibiotic paste can prove beneficial. Periodic follow-up are essential to monitor the healing of periapical lesions according to Fernandes M et al, 2010.

Among the intracanal medicaments, like Calcium hydroxide and triple antibiotic paste with its antimicrobial property create an environment more favorable for healing and encourage osseous repair by the release of hydroxyl ions, which are oxidant-free radicles resulting in damage to bacterial cytoplasmic membrane, protein denaturation, and damage to bacteria.

Triple antibiotic paste, Ledermix paste has been successfully used in the open apex cases with large periapical lesion to disinfect the canals and MTA, biodentin, bioceramic used to form a three-dimensional hermetic seal at apex and also promote healing of perapical lesion.

If the lesion is separate from the apex and with an intact epithelial lining (apical true cyst) it may develop into a resistant lesion which may not heal with non-surgical treatment. Lesions of non odontogenic origin and for cases refractory to nonsurgical treatment, in obstructed or nonnegotiable canals, the surgical approach can be adopted.

Del Fabbro M et al. 2007 Reported that there is no apparent advantage of using a surgical or non-surgical approach for the re-treatment of periapical lesions in terms of long-term outcome.

In conclusion, the choice between a surgical and a non-surgical procedure should rely upon factors other than the mere treatment outcome or the size of lesion: these factors should include patient's initial clinical situation, patient's preference, operator's experience and skill, complication risk, technical feasibility, and overall cost and time.

## ENDODONTIC MYTH NO. 2

“The Root Canal System is difficult To Disinfect”

FACT: Although the Root canal system has complicated apical anatomy with fins and isthmuses. It can be effectively and sufficiently cleaned if proper technique are practiced. Intracanal irrigants and medications are used to reach the natural complexities and remove the smear layer. Intracanal irrigants exert their effects mechanically and chemically. Mechanical effects of irrigants are generated by the back and forth flow of the irrigation solution during cleaning and shaping of the infected

root canals, significantly reducing the bacterial load and its byproducts.

The irrigants can be divided into antibacterial and decalcifying agents or their combinations. They include sodium hypochlorite (NaOCl), chlorhexidine, ethylenediaminetetraacetic acid (EDTA), and a mixture of tetracycline, an acid and a detergent (MTAD), Tetraclean, electrochemically activated solutions (ECA), Ozonated water, photon-activated disinfection, herbals.

Various techniques effective in removing debris and bacteria can be classified into two broad categories: manual and rotary agitation. The manual irrigation techniques include irrigation with needles, agitation with brushes, and manual dynamic agitation with files or gutta-percha points. The rotary irrigation techniques include rotary brushes, continuous irrigation during instrumentation, sonic and ultrasonic vibrations, and application of negative pressure and lasers. The use of these methods results in better canal cleanliness when compared with that of conventional syringe needle irrigation. New activation systems like Endovac system, are improving the effectiveness of the treatment.

Chatterjee et al, 2015 Manual dynamic agitation with well-fitting gutta-percha cone to the working length with gentle push-pull motion; 100 strokes/30 seconds Sonic agitation with EndoActivator at 10,000 cycles per minute. EndoActivator produces powerful hydrodynamic intracanal waves, which serve to detach the biofilm from root canal surfaces. Passive sonic agitation with EndoActivator has proven to be the best irrigating system followed by manual dynamic agitation and conventional needle irrigation.

Dioguardi M et al , 2018 For an ideal irrigation protocol, it is essential to use of 2.5ml of 5.25% concentrated NaOCl solution for a suitable time during both the shaping the final irrigation phases, alternating the use of NaOCl with EDTA.

According to IOSR Journal of dental and medical science, 2019 for vital teeth- 2ml of NaOCl (5.25%)

**ENDODONTIC MYTH NO. 3**

“Conservative access cavity preparation is the New Endodontic Benchmark.

In the last decade, several access cavity designs involving minimal removal of tooth tissue have been described for gaining entry to pulp chambers during root canal treatment. The premise behind this concept assumes that maximum preservation of as much of the pulp chamber roof as possible during access preparation would maintain the fracture resistance of teeth following root canal treatment. However, the smaller the access cavity, the more difficult it may be to visualize and debride the pulp chamber as well as locate, shape, clean and fill the canals. At the same time, a small access cavity may increase the risk of iatrogenic complications as a result of poor visibility, which may have an impact on treatment outcome, generate a potentially dangerous limited view of the pulp chamber, reduced lighting, and magnification

Although the purpose of MIA cavities is to reflect clinicians' interest in retaining a greater amount of the dental substance, traditional cavities are the safer method for effective instrument operation and the prevention of iatrogenic complications.

Recently, Clark and Khademi modified the endodontic cavity design to minimize tooth structure removal. It preserves some of the chamber roof and pericervical dentin. Its confined outlines restrict cleaning, shaping, and filling of the root canals, increase the risks of inefficient canal instrumentation and the occurrence of procedural errors like ‘mouse whole effect’.

Kapetanaki I et al, 2021 the effectiveness of MIA cavities has not yet been well established by research data and that MIA cavities cannot replace the traditional straight-line access design. There is no scientific evidence that supports the use of MIA cavities over TECs. Although in vitro studies offer initial significant information about new types of access cavities, they have limitations in clinical practice.

**ENDODONTIC MYTH NO. 4**

“Short Endodontic Fillings Have a Better Prognosis than Long Endodontic Fillings”

FACT :

The outcome of endodontic treatments does not rely on a proper disinfection process only, but also on tight-sealed fillings of the canals as barriers to prevent re-infection. Therefore, root filling material is necessary to obturate the root canal in fluid tight seal 3-dimensionally on the main canal as well as the accessory canals

The only way to achieve the 3- D endodontic seal is to create the 3-D endodontic seal , i.e filling up to the apical constriction. Kuttler, 1955 recommended that all obturation should be terminated 0.5 mm from the apical foramen, because it is considered as nearest to the apical constriction and where the deposition of calcified tissues is most desirable. Seltzer et al, 1973 suggested that reaction to tissues were milder when instrumenting short of the apex as compared to instrumentation beyond the apex. Ingle,1957 suggested that obturation should terminate at 0.5mm short from radiographic apex. Obturation when extended upto the radiographic terminus of root results in overfilling.

Obturation extent seems to influence the RCT outcome. Overextended and underextended obturation showed a higher chance of association with less favorable outcome than adequate obturation. However, this influence could not be categorically supported due to other factors which are crucial and may affect proper shaping and cleaning of the root canal system

Ronaldo et al 2018, apical limit of obturation seems to have no influence in the repair of periapical lesions. Our results point towards the notion that root canal preparation appears to be the determinant factor for periapical lesion repair

According to ADA, 2016 In order to obtain the highest endodontic success rate and least amount of postoperative complications, the obturation material should be placed anywhere between the constriction and the anatomic apex

**ENDODONTIC MYTH NO. 5**

“Multivisit Endodontic Treatment Is More Successful Than Single-Visit Endodontic Treatment”

FACT: Multivisit and Single visit treatments should be viewed as part of a total endodontic treatment spectrum, with the choice of one over the other being determined by the circumstances surrounding each individual case.

Briefly, in cases of vital pulp, a single-visit treatment should be used, based on the fact that the pulp is only superficially infected and the root canal is free of bacteria, which provide the aseptic chain to be maintained during the intracanal procedure. Cases with fracture anterior teeth, non-vital teeth with sinus tract, nonsurgical retreatment cases, medically compromised patient who require prophylaxis, patient requiring sedation every time are indicated for single visit endodontics.

Conversely, if the pulp is necrotic and/or associated with a periradicular disease, there is ample evidence that the root canal system is infected. In these cases, the root canal system should ideally be cleaned and shaped, an intracanal medication placed, and the canal filled at a second appointment. Also in case of calcified and curved canal, asymptomatic non vital teeth with periapical pathology and no sinus tract, acute alveolar abscess, acute apical periodontitis, patient with allergy or previous flare up, patient who are unable to open mouth for long duration such as TMJ disorders.

Case selection for multivisit and single visit endodontics should be done carefully and the best time to obturate the canal is when the cone fits asymptotomatically.

J Conserv Endod, 2020 with the initiation of technological developments and advent of new gadgets, evidence-based dentistry and more scientific discussions, has directed single visit endodontic treatment to become more predictable. Single visit endodontics has presented to be an effective treatment aspect for both dentist and patient when compared with multiple visit treatment by decreasing the number of appointments and patient discomfort.

M Manfredi 2016 There is no evidence to suggest that one treatment regimen is better than the other.

Neither can prevent 100% of short- and long-term complications. It is likely that the benefit of a single-visit treatment, in terms of time and convenience, for both patient and dentist, has the cost of a higher frequency of late postoperative pain and swelling.

**ENDODONTIC MYTH NO. 6**

“Previous Endodontics Has One or Two Strikes against It and, Therefore, the Tooth Should Be Removed and Typically Replaced With an Implant”

FACT: Endodontic failures can be attributable to inadequacies in cleaning and shaping, obturation, iatrogenic errors like separated instruments, canal blockage and ledge formation, perforations, missed canal, or re-infection of the root canal system when the coronal seal is lost after completion of root canal treatment.

Straight root canals combined with apical root resorption might prevent satisfactory technical outcomes. Large periapical lesions and poor root filling quality in primary endodontic treatment appeared to predispose to treatment failure.

The new generation of endodontic instruments, magnification, materials and technology with the basic principles of endodontic retreatment have helped in retention of the patients natural tooth structure to form and function decreasing the need for extensively expensive prosthetic replacement in the area of implant dentistry. Surgical approach can be adopted in obstructed, calcified or non-negotiable canals.

Nonsurgical endodontic retreatment procedures have enormous potential for success if the guidelines for case selection are respected and the most relevant technologies are used.

Meandros Med Dent J 2020 providing the proper working length may help to eliminate residual bacteria in the untouched regions and improve the quality of the new treatment for tooth survival in regard to better disinfection.

Retreatment required in cases of missed canal include various methods for identifying missed canal canals which include: radiographic analysis, magnification and lighting (microscopes), complete

access, firm explorer pressure, ultrasonics, Micro-Openers ,dyes, sodium hypochlorite test. . The removal techniques for gutta percha, silver points include rotary retreatment files like Protaper retreatment files, M2 retreatment files, ultrasonic instruments, hand files with heat or chemicals, and paper points with chemicals.

The Post Removal System (PRS) is a reliable method to remove a post when ultrasonic efforts using the “10-Minute Rule” prove unsuccessful. In combination, microscopes and ultrasonics have driven “microsonic” techniques that have improved the potential, predictability and safety for removal of broken instruments. When ultrasonic techniques fail, the fall-back option is to use the Instrument Removal System (iRS)

Hence, with the advent of this new rotary systems and retrieval instruments; endodontic treatment including re-treatment has success levels comparable to implants.

The capacity for successful endodontic retreatment is the same as the capacity for endodontic nonsurgical treatment: 100% capacity. The only difference is the technical skill.

#### **ENDODONTIC MYTH NO. 7**

“I AM GOING TO PRESCRIBE ANTIBIOTICS, JUST IN CASE “

FACT: The routine use of antibiotics during the course of endodontic treatment is not supported by the principles of evidence-based dentistry in accordance with publications supported by the American Association of Endodontists and the American Dental Association.

Odontogenic infections, including endodontic infections, are polymicrobial, and in most cases, the prescription of antibiotics is empirical. This has led to the increasing use of broad-spectrum antibiotics even in cases where antibiotics are not indicated, such as symptomatic irreversible pulpitis, necrotic pulps and localized acute apical abscesses. In case of discrete and localized swelling, the primary aim is to achieve drainage without additional antibiotics. Adjunctive antibiotic treatment may be necessary in the prevention of the spread of infection, in acute apical

abscesses with systemic involvement and in progressive and persistent infections.

When using adjunctive antibiotics in addition to adequate debridement and surgical drainage, such as in cases with spreading infections, the practitioner should use the shortest effective course of antibiotics, minimize the use of broad spectrum antibiotics and monitor the patient closely

Ng YL, Mann V et al, 2011 A more recent endodontic prospective cohort study showed no association between the use of long-term antibiotics and nonsurgical treatment or retreatment outcome .

It has been proven that antibiotics do not relieve painful pulpitis and do not resolve localized periapical inflammation. Furthermore, prescribing antibiotics prophylactically, does not prevent flare-ups or reduce pain.

Antibiotics are indicated when there are systemic signs of an infection, such as fever and malaise, an infection that is spreading, or cellulitis is present. Unsupported use of antibiotics also contributes to the development of antibiotic-resistant bacteria, which is a serious global health threat.

#### **ENDODODONTIC MYTH NO. 8**

“Endodontically Treated Teeth Discolor in the Aesthetic Zone”

FACT: Discoloration of a single tooth is a demanding clinical issue especially if present in the aesthetic zone. It can be due to either calcification of the pulp chamber, pulp necrosis and/or iatrogenic mishaps during various stages of the endodontic treatment or final restoration.

The main causes of tooth discoloration in both vital and

endodontically treated teeth are briefly described as extrinsic (e.g. dental plaque, smoking, foods that contain stains, chlorhexidine based rinses etc.) and intrinsic, acting either (a) on odontogenesis and (b) following tooth formation.

The discolouration of teeth following severe trauma causes subsequent intrapulpal hemorrhage, haemolysis of the red blood cells and release of the haem group to combine with the putrefying pulpal tissue to form black iron sulphide.

Discoloration is also due to insufficient coronal seal, failure to properly remove necrotic tissue, or the failure to clean sealer and/or obturation material from the pulp chamber and the use of triple antibiotic paste.

Grey MTA (GMTA) if used in coronal portion causes tooth discoloration as well as discoloration of the adjacent gingiva. Hence we can use white MTA (WMTA) through the exclusion of iron compounds to reduce discoloration. Also, Biodentine can replace MTA in esthetic sensitive areas.

Inadequate removal of coronal pulp tissue as a result of inappropriate access cavity design and/or preparation, especially when the cavity does not include the mesial and distal pulp horns. The erythrocytes, either in the remaining pulp tissue or in dentinal tubules regardless of the presence of a smear layer (Davis et al. 2002), will degrade into haemosiderin, haemin, haematin and haematoidin, which release iron during haemolysis (Attin et al. 2003). The iron can be converted to black ferric sulphide with hydrogen sulphide produced by bacteria, and this may cause grey discoloration of the tooth crown.

#### **ENDODONTIC MYTH NO. 9**

“Endodontically Treated Teeth Are Weaker”

FACT: The endodontic access definitely influence on the strength of the structure but; is almost insignificant when compared with the damage occurring during restorative procedures as a result of removal of carious tooth structures.

According to Larson et al occlusal cavities significantly weaken the tooth and wider isthmus preparations result in the largest decrease of tooth resistance to fracture. Weakness of teeth actually occurs before endodontic therapy due to caries, subsequent restorative cavity preparations followed by the restoration itself and not because of endodontic treatment. The microscope-designed endodontic access cavity and root canal radicular preparations do not cause a tooth to be weaker post endodontic treatment.

The similarity between the biomechanical properties of endodontically treated teeth and their contralateral

vital pairs indicates that teeth do not become more brittle following endodontic treatment. Other factors may be more critical to failure of endodontically treated teeth.

#### **ENDODONTIC MYTH NO. 10**

“The Ni-Ti System That I Use Makes the Biggest Difference”

FACT: There is plethora of different systems available, various proprietary methods and treatments have been introduced to enhance the cutting ability and file design. Files with the austenite phase have super elastic properties and are recommended for straight or mildly curved canals, whereas in the martensite phase possess high flexibility and increased resistance to cyclic fatigue so are recommended to be used in canals with complex curvatures. Heat-treated and controlled memory NiTi alloys are being used widely as they have increased flexibility and reduced shape memory property. These instruments can better penetrate the entrance of the canals as they can be pre-bent to maintain the flexed shape.

Yet an experienced endodontist is the foremost formula for success, the material being used is only a secondary factor. Prudent use of contemporary devices along with the basics of anatomy will lead to a predictable higher quality of root canal treatment on a broader basis.

#### **ENDODONTIC MYTH NO. 11**

“Every root canal treated tooth require crown”

FACT- A successful endodontic treatment does not depend only on a good root canal therapy, but good restorative treatment is crucial (Gillen et al., 2011). Failure is inevitable in an improperly restored tooth. The tooth needs to be restored back to normal function, form, and aesthetic. The quality of the final restoration has its effect on the survival and success rate of endodontically treated tooth. Well-sealed coronal restoration will prevent the ingress of microorganisms.

Full coverage crown with or without post was found to be the best choice as it protects the tooth from fracture, but crown restoration needs a preparation which leads to decrease the strength of the remaining tooth structure (Gupta et al., 2014; Alshiddi and

Aljinbaz, 2016; Wang et al, 2016; Alaki et al., 2021; Alserhan et al., 2021)

The additional procedure of the placement of an intraorifice barrier following obturation has been proposed to minimize these risks in case of unforeseen delays in obtaining a definitive coronal restoration. The procedure for the intraorifice barrier involves the placement of a flowable composite, resin-modified glass ionomer cement or bioceramic restorative material directly over the canal obturation material within the canal orifice followed by a temporary restoration, to allow for a bonded seal.

According to AAE, The type of final restoration recommended for an anterior tooth after endodontic therapy is determined by the amount of remaining tooth structure. If the only loss of tooth structure results from a conservative access preparation, a bonded composite is adequate. If the tooth is weakened by a large or misdirected access preparation or proximal caries and/or restoration, a crown should be considered as the final restoration. A post is necessary when the remaining tooth structure (after crown preparation) will not retain the core. A post should be avoided whenever possible in order to reduce the possibility of root fracture.

Cusps of posterior teeth must be protected against vertical fracture.

The main goal of conservative dentistry is to preserve the healthy tooth structure. In a retrospective study by Aquilino and Caplan (2002) it was found that crowning the endodontically treated teeth promote higher longevity for posterior teeth.

Although treatment recommendations should be made on an individual basis, the association between crowns and the survival of root canal treated teeth should be recognized during the treatment planning if long-term tooth survival is the primary criteria for success in endodontics.

## CONCLUSION

Successful endodontics depend upon straight-line access preparation, proper debridement by biomechanical preparation and irrigation and optimum obturation of root canal system. Just like technology gets upgraded, so does the root canal

treatment. However, care should be taken while implementing new techniques to preserve the golden ideology and rationale of olden times.

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