

# Service Alternative

# Root

# Canal

## OUTLINE

### SECTION I: FAQs

#### WHAT IS A ROOT CANAL?

A root canal-treated (RCT) or root-filled tooth is one in which the dental nerve, commonly called the pulp, is intentionally removed and is filled with an inert material called gutta percha.

Once an RCT is performed, the tooth must be restored with a post and a crown. These will strengthen the tooth and prevent a crack or fracture from developing after treatment. A good analogy is a tree branch. When it's alive, it flexes or bends when pressure is applied. On the other hand, a dead branch, like an RCT, will break under the same stress.

#### WHAT ARE THE PROS AND CONS OF ROOT CANALS?

The pro of a root canal is obvious: the painful or dead tooth is treated and extraction is avoided. But we must ask two key questions before starting a root canal.

- Can the tooth be restored?
- Can a predictable RCT be performed, or are there risks for a poor result?

The cons or risks with an RCT are less obvious. They center on the fact that a tooth is an "open" biological system which interacts with the body. In other words, anything placed into the tooth will eventually find its way into the body and may interact with a susceptible cell or organ.

An RCT seals the inner main nerve trunks of the dental nerve. However, accessory nerves and dental tubules, which are present in all teeth, can still communicate with the body. The dental tubules alone may present a surface area equal to two miles per tooth. Furthermore, the seal at the root apex or tip does not constitute a true "hermetic" seal. As a result, it may, under conditions of low resistance, provide passage into the body for bacteria and bacterial toxins.

Although there are millions of healthy individuals with root canals in their mouths, it's wise to consider these systemic risks, particularly if a patient has any medical symptoms or diseases already present.

#### DOES TOOTH PAIN INDICATE I NEED A ROOT CANAL?

Generally, a dentist first will tap on several teeth and look for signs of an abscess or a radiograph. However, a tooth with constant or severe pain does not necessarily indicate the need for a root canal. Nor does an x-ray image.

It's important to realize that other conditions can simulate tooth pain. These include sinus infections, myofascial pain, neurovascular disorders, neuralgias (a common cause), neuritis (a viral infection of the tooth), neuropathy, and neuromas. Even heart attacks can refer pain to the teeth of the lower jaw.

#### HOW IS A ROOT CANAL PROPERLY DIAGNOSED?

A root canal is a treatment, not a diagnosis. Good dentistry, like good medicine, starts with a proper diagnosis of the tooth.

In order to confirm a proper diagnosis, we need to establish two facts: the cause and the effect.

Some dentists argue that a diagnosis is academic and a waste of a patient's time. The result is always the same, they say, a root canal. However, establishing a true diagnosis of tooth pain may avert an unnecessary root canal of an otherwise healthy tooth.

Other "causes" of tooth pain, other than those listed above, can include decay, bite trauma, bruxism (grinding or clenching at night), referred pain, nerve disorders and cracked teeth. These causes result in various "effects," such as tooth nerve infection, inflammation and ischemia (a reduction of blood flow to the tooth). All of these will produce pain, even severe pain. But some of them are reversible, provided a timely diagnosis and proper treatment are given.

#### WHAT ARE MY OPTIONS ONCE A ROOT CANAL IS INEVITABLE?

It's important to understand that all teeth problems are unique. No treatment is universal. Individual circumstances may dictate that a specific treatment is not an option. Or perhaps one option will offer a superior result over another.

Once the dental nerve has been properly diagnosed as dead, we can assume that the dental nerve space inside the tooth (called the root canal system) and the bone surrounding the tooth are now infected. At this point, either the tooth must be extracted or a root canal performed. If a patient is undecided about which procedure to pursue, a dentist can perform a pulpectomy (removal of the nerve) to alleviate pain and buy time for the patient to make his decision.

The root canal is a three-step procedure. Failure to follow all three steps may result in tooth (and money) loss. First, the dentist must remove the nerve from the root system and seal the space with an inert material called gutta percha. Second, a post-core must be placed to prevent root fracture. Third, a crown should be added to prevent fracture of the tooth. As mentioned earlier, a tooth is like a branch. While alive, they both can be flexed and return to their normal positions. Once dead, they each break when flexed. Placement of the post-core and crown are designed to minimize that breakage.

On the other hand, if the patient chooses extraction, the following surgical and tooth replacement options need to be considered:

## **SURGICAL OPTIONS:**

- Tooth Extraction
- Bone Grafting to prevent bone loss and improve bone healing.

## **TOOTH REPLACEMENT OPTIONS:**

- Bridge Definition: three or more crowns joined together to “bridge” a missing tooth space.

### **PROS:**

- Excellent cosmetics, chewing and maintenance
- Good long-term prognosis (bridges and implants are essentially equal in this regard)

### **CONS:**

- Must involve the use of adjacent teeth
- A high decay rate may contraindicate bridges
- Implants: These involve a zirconium or titanium post which is surgically placed into the jaw bone.

### **PROS:**

- Excellent cosmetics, chewing and maintenance
- Good long-term prognosis
- Does not involve the use of adjacent teeth

### **CONS:**

- Are invasive by virtue of implantation into the bone. (Autoimmune is currently being studied in Europe.)
- Root canal teeth with no apparent infections visible on x-rays have resulted in the loss of some implants.
- High dental stress patients (those who knowingly or unknowingly clench or grind their teeth) have a higher failure rate.

- Smokers, diabetics, and those with autoimmune may have a contra-indication for implants.
  - Sinuses and nerves close to surgical sites may be more difficult to treat or may contraindicate treatment.
  - A removable appliance must be used until the implant restoration is completed.
- Removable Dentures: This is a false tooth (or set of teeth) which can be removed.

### **PROS:**

- Can be designed to be temporary or long-term.
- Can be flexible and constructed from a variety of substances such as acrylic, nylon, and metal.
- The cosmetic appearance in certain cases may be excellent.
- The cost is less expensive than the bridge or implant option.

### **CONS:**

- They are removable
- In certain cases, chewing is difficult, and food may collect under them when eating.
- Clasps are sometimes visible on the front teeth (although they often can be made to match the teeth or gums).
- In some cases, it's necessary to cover the palate, which can interfere with tasting food.

## **SECTION II: SCIENTIFIC RESEARCH**

DOES SEVERE TOOTH PAIN INDICATE THE TOOTH REQUIRES A ROOT CANAL?

Several studies were performed to investigate the hypothesis that the more severe the symptoms of tooth pain, the more advanced the damage to the tooth nerve and the greater the

need for root canal treatment (RCT).

The results shocked dentists. There was no statistical correlation between the amount of pain and the amount of nerve damage. The conclusion: pain is not an indicator of the need for a root canal.

## **REFERENCES**

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Selzer S, Bender IB, Ziontz M: "The dynamics of pulp inflammation: correlation between diagnostic data and actual histological findings in the pulp." Oral Surgery, Oral Medicine, Oral Pathology, 16:846, 1963.

**WHAT IS THE SUCCESS RATE OF ROOT CANALS AND WHAT CONSTITUTES FAILURE?**

With recent improvements in technology, root canal success rates are estimated between 86% and 98% (Friedman, 1989 and Friedman et al, 2003) That means that as many as one tooth in seven may be classified as a root canal failure. In addition, many of those failures are chronic, that is, producing no radiographic signs or pain symptoms to indicate failure.

The reasons for root canal failure are not entirely clear. Failure may occur predictably on teeth which have a poor clinical result. This might be caused by doctor error, the inability to clean out all the canals, or the failure to place a post or crown after the root canal. Failure can also occur unpredictably on teeth with excellent results.

**Research has found four major causes of root canal failure:**

- Tooth or root fracture
- Infections including bacteria (primarily enterococcus fecalis, etc), viruses, and fungus (candida, etc).

- The body's reaction to root canal materials, microorganisms, and cements which inadvertently are pushed past the tooth into the bone.
- Cysts

## CAN A FAILED ROOT CANAL HAVE A SYSTEMIC EFFECT ON THE BODY?

When we consider that a tooth is an open biological system which communicates with the body, whether alive or dead following a root canal, the question of systemic effects on the body becomes an important issue.

Such concerns were raised when studies were done on patients with acute myocardial infarctions (heart attacks). One study focused on chronic dental infections, that is, infections which produced no visible or symptomatic signs (Matilla et al, 1989). A follow-up study was performed to determine the correlation between chronic (silent) dental infections and coronary atherosclerosis (Matilla et al, 1993). Both studies cited endotoxins from dental infections as a potential mechanism for cardiac disease.

Root canal infections also have close access to blood circulation and systemic dissemination (Tronstad, 1992). One study, performed during root canal therapy, isolated bacteria from the blood stream of patients (Debihan, 1995). That leaves us with a basic question which has yet to be thoroughly investigated. Can root canal failures, which may be as high as one in seven treated teeth, seed infection in the body and contribute to systemic disease?

The question regarding the safety of failed root canals may never be adequately answered. Also, the basic question about whether a root canal failure can be determined due to pain is still debated. Pain, as we have discussed, shows little correlation to histological findings. Researchers as far back as the 1960s have demonstrated that infections can be present without radiographic evidence (Bender and Selzer, 1961; Bender, 1982; Van der Stelt, 1985; Huumanen and Orstarik, 2002). In fact, one study found infections up to 8mm may be

present without any trace or radiographic evidence (Ricucci and Bergenholtz, 2003).

Root canal failure, an issue of systemic proportion, remains a little understood and hotly debated subject.

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