“Doctor, I may have a failed root canal treatment case on my first maxillary molar”

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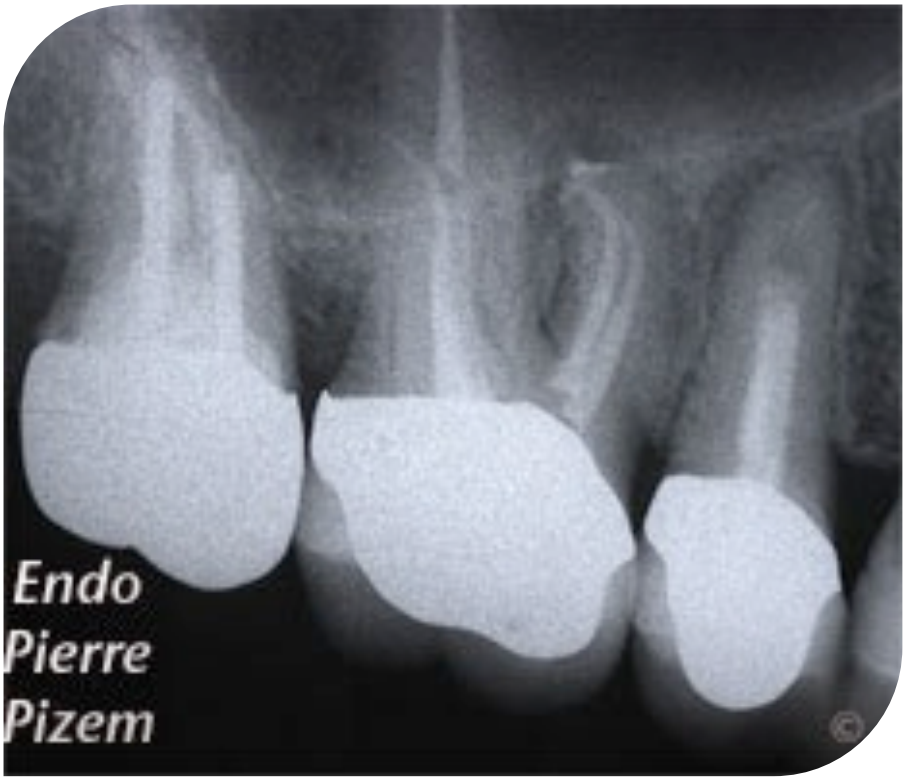
About one year ago a patient underwent a root canal treatment on his first maxillary molar followed by the fitting of a crown. The patient feels the root canal treatment has failed as he has some gum swelling next to the tooth accompanied with some pain. The patient would like to save the tooth instead of having it removed and replaced by an implant-supported crown. Is there any hope?

One might wonder why the patient is still having some gum swelling next to the tooth associated with some pain. A year following the root canal treatment, the patient should neither have any swelling or pain. Many factors could be considered as the potential cause for gum swelling and a painful tooth. Since our radiographic examination shows three properly cleaned and filled root canals, the most evocative might be a cracked tooth. Since this maxillary molar has also been fitted with a crown and no deep and narrow pocket (bone loss) can be probed around the tooth, the next probable cause is the presence of a previously unseen, thus untreated root canal. Studies have found that frequently, a fourth root canal (known as the mesiovestibular or MB2) is present in 90 percent of first maxillary molars. If this root was not detected, it could very well be colonized by bacteria which in turn are releasing toxins responsible for severe apical inflammation, pain and also maxillary bone destruction.

Eliminating infection and inflammation is the key factor to allow for the symptoms to subside and the root surrounding bone to heal. In order to achieve that goal, beside removing the tooth and replacing by an implant (which is a last resort option) there are two possible procedures which can allow that to happen.

Bacteria can either be entombed within the untreated root canal by placing a filling at the root tip of the tooth through a surgical procedure known as apical surgery or it can be eliminated as much as possible within the canal by mean of an non surgical root canal retreatment (an orthograde retreatment). Which of the two procedures should be chosen?



Apical surgery and retrograde filling implies opening a flap, removing some maxillary bone to access the root, removing at least 3 mm of the root tip and placing a retrograde super EBA or MTA filling. As it is the case with the tooth presented above, the patient undergoing this surgery bears the risk of a sinus perforation and sinus membrane tear up because the sinus floor is in direct contact with the root apex of the tooth. This procedure is much quicker for the practitioner to perform than non surgical retreatment and, as opposed to orthograde retreatment it doesn't require to bore a hole into the existing crown. Thus, it has been recognized as the most cost effective approach.

Consequently, apical surgery and retrograde filling does mean entrapping zillions of bacteria within the untreated root canal and among those, the infamous Enterococcus *faecalis*. From time to time, retrograde apical filling leakage allows for those bacteria to be released as well as their byproducts and toxins into the surrounding bone. This might explain why endodontic apical surgeries have had statistically lower healing success rate than orthograde retreatments. In the event that this surgical procedure does not work, what are the remaining options? One could think about root amputation, but complete root amputation is not as popular as implant therapy among the dental community. Extracting the tooth and replacing it by an implant or a fixed bridge would then be the next accepted step to follow.

Compared to apical surgery, orthograde endodontic retreatment procedure is definitely much more time consuming for the practitioner to perform (and therefore more costly than surgery). It also implies a thorough knowledge of tooth anatomy when locating a previously missed root canal and, as it appears to be the case with this molar, it is especially true if external landmarks have been lost due to crown preparation.
No rapid technique exists for locating a hidden root canal entry because there is, as well, a risk of pulpal chamber floor perforation, hence, calcified dentin must be carefully removed with long thin ultrasonic tips under the high magnification of dental operating microscope. Once located, this hidden canal will require more time for the practitioner to shape and clean because, in most instances, it is sharply angulated or calcified. As it is also the case in this specific root canal, it can be sharply curved, and thus, becomes more difficult to clean and shape up to the root tip without zipping or blocking the canal. Despite these drawbacks, orthograde retreatment, when properly managed, has proven to offer a better success rate than apical surgery. Above dental X ray image shows the four treated root canals instead of three.

> "If nonsurgical retreatment is not an option, then endodontic surgery should be considered"
>
> *American Association of Endodontists*

Taking into account the proven fact that orthograde retreatment has a higher success rate than apical surgery, and taking into account that the step following an apical surgery failure would most probably be implant therapy and its related costs, both biological (tooth loss) and financial (implant and implant supported crown), when taking into account that in case of orthograde endodontic retreatment failure, an apical surgery can still be performed, thus, allowing for one more treatment step before loosing your tooth and replace it by an implant, it is not surprising that whenever possible, orthograde endodontic revision is widely recognized by the American Association of Endodontists as the treatment of choice, apical surgery being second.