

Crowns after root canals: are they a necessity?

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The aim of this column is not only to examine how minimally invasive dentistry (MID) can be used to restore teeth, but also to share with readers how each experience with MID supports us in our endeavors to formulate views on restoring teeth. As I've mentioned in previous columns, no one in dentistry intentionally practices *maximally* invasive dentistry. So why is there even a need to section out a discipline of MID at all? To complicate things further, we are now also using the term, *minimally invasive biomimetic dentistry* (MIBD). The core philosophy of MIBD is to restore teeth as closely as possible to their original form, function, and esthetics, with a minimal amount of tooth trauma or reduction. By exploring the educational niche of MIBD, dentists can learn how to utilize this philosophy in their day-to-day practice.

As we move forward in dentistry, many new materials, technologies, and procedures allow us to provide care for our patients that is less invasive. A less invasive approach can have an impact on the longevity of our restorations and, ultimately, on outcomes and prognoses. Treatment planning and restorative decisions are based on a dentist's accumulated knowledge, experiences, and practice of dentistry. With all the materials, equipment, products, continuing education, and techniques available to us, it is no wonder that there is such a diversity of outcomes and opinions of what is best for treating individual teeth. Couple these options with patient variables such as diet, hygiene, genetics, and habits, and the ability to predict success with even a single restoration becomes very complex. Further, there are the dentist's variables, including clinical skills and proficiencies, experience with new techniques and materials, and the quality of equipment. For example, spraying water or oil onto a prepared surface during a bonding process can result in premature bond failure or achieving a very low bond interface

with the tooth. With all of these variables, it's a wonder anything works at all in dentistry, and yet we have a great deal of success with our restorations, albeit with often extremely variable outcomes.

Case report

This case illustrates not only the variability of treatment planning decisions available, but also the mindset utilized to determine a long-term course of care for an individual tooth. The patient in this case has a career that took her to various parts of the world where she received care in a number of dental offices that left her confused about what was best for her teeth.

The 25-year-old patient presented with the chief complaint of sporadic pain in the upper left quadrant of her mouth that had been diagnosed as irreversible pulpitis at the emergency clinic of a major university dental school. Treatment had been planned for a root canal, post and core, and a crown. However, the patient was informed that it would be over a month before the school could get her in for a comprehensive evaluation and treatment. The patient chose to seek care outside of the school before the pain became constant or intolerable.

When the patient presented at our office for an emergency appointment the next day, a preoperative clinical photo of tooth No. 13 revealed a very intact tooth (Fig. 1). A visual examination showed a healthy looking tooth with some possible wear. When the tooth was dried interproximally, there was some demineralization. A radiograph (Fig. 2) revealed that not only was there deep decay on tooth No. 13, but that there were also interproximal caries on the distal of tooth No. 12. Tooth No. 13 responded with a lingering discomfort to cold testing, a slightly enhanced response to percussion, and no heat hyperemia. The decision was made to remove the decay and restore



Fig. 1. Mirrored view of teeth No. 12 and 13 showing very little wear.

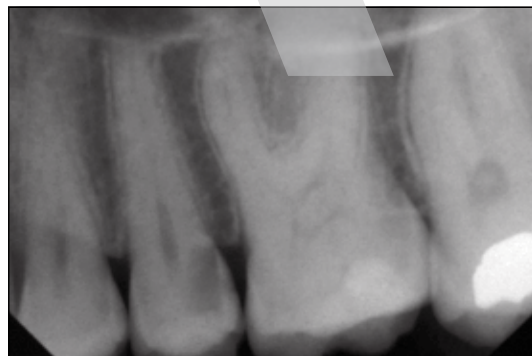


Fig. 2. A radiograph revealing deep caries on tooth No. 13 distal and interproximal caries on No. 12 distal.



Fig. 3. Intraoral photograph of carious exposure of the buccal pulp horn or chamber of tooth No. 13.



Fig. 4. Intraoral photograph of the root canal performed on tooth No. 13.



Fig. 5. Photograph showing the final restoration of teeth No. 13 and 12. Note there are no visible fractures.



Fig. 6. Radiograph of the final fill in the root canal on tooth No. 22. Note the proximity of the fixation wire to the apex of the root.

the teeth in that area to determine if pain could be reduced. During the treatment discussion, the patient was informed that if the decay was deep enough to breach into the pulp, a root canal would be performed.

The area was anesthetized and isolated with a rubber dam to keep the area as aseptic as possible during the procedure. Upon caries removal and removal of enamel to the level of healthy dentin supporting the remaining enamel, the nerve was breached (Fig. 3), and a root canal was performed (Fig. 4). To highlight how treatments are ever evolving, given this same situation today, we would have removed the decay, treated the surface and exposed pulp with concentrated ozone gas, placed Theralcal (Bisco, Inc.) on the exposure, and completed the restoration. We would then wait on the decision to move into a root canal. Our clinical experience so far with this protocol has been very positive, with all teeth testing normal and vital in similar cases, some of which have lasted for more than 1 year. This is not a

definitive treatment protocol, but it has shown significant promise over previous attempts to maintain a vital pulp.

The restorative decision for each of these teeth would remain the same whether a root canal was performed or not: remove all of the carious parts of the tooth, establish a solid enamel periphery for bonding, then prepare the surfaces of the teeth with air abrasion to clean and create a micromechanical surface texture to enhance the bond.^{1,2} With a root canal, the preparation would extend down into the canal slightly to get a good seal. The tooth would then be fully restored to contour, and the occlusion would be checked. Since there were no visible fractures (Fig. 5), and this was a carious exposure on a 25-year-old patient, the decision was made to not perform any coronal restoration. We could follow the tooth for years to come, and if there was ever a fracture noted, we would then move to some form of coverage to minimize tooth reductions, such as a conservative onlay or a fiber-reinforced reconstruction.³

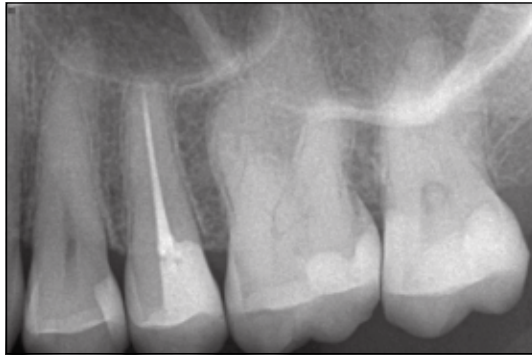


Fig. 7. Radiograph of the root canal and filling on teeth No. 12 and 13 more than 7 years post-treatment with no recurrent caries.



Fig. 8. Clinical photograph of teeth No. 12 and 13 more than 7 years post-treatment. Note there are still no fractures visible warranting cuspal coverage at this time, and minimal wear showing on the teeth.

Subsequent treatments included a comprehensive examination, caries control discussions and education, a number of conservative restorations, and finally, entering our continuing care system. Being a patient of record and having regularly scheduled examinations allowed us to monitor the status by the restored teeth. In this case, the patient moved outside our area, which created a lapse in scheduled care. While living on the East Coast, the patient developed a toothache on tooth No. 22, the source of which was undoubtedly a past orthognathic jaw surgery where a fixation wire was placed at the apex of tooth No. 22.

As this patient had sought care at another dental school close to where she was working, she received a very thorough examination and evaluation, and a root canal was completed on tooth No. 22 (Fig. 6). During the examination, the clinician discussed that the X-rays showed that there was a root canal on tooth No. 13, and that the tooth “needed” a porcelain-fused-to-metal crown because the tooth was at a greater risk of fracture. The patient, knowing that we were watching the tooth for the development of any fracture lines in the area of the marginal ridges, declined this treatment and scheduled an appointment in our office to have the access closure direct bonded restoration placed for the root canal-treated tooth No. 22, and to continue monitoring the health of tooth No. 13.

Upon arrival at our office for the access closure restoration appointment, the patient relayed a history of going to yet another office for a hygiene visit in recent years and again being told that she “needed” a crown on No. 13, as it had a root canal and would break if she did not put a crown on that tooth. The treatment we provided was to restore the access opening of tooth No. 22 and to photograph the 7-year-old fillings on teeth No. 12 and 13 (Fig. 7 and 8) to show the patient a close-up of her tooth and to determine if there were any fractures. Our current plan is to continue monitoring the success of the restoration, and when or if a fracture occurs, we will treat with the appropriate preparation and materials that are available at that time.

By creating a minimally invasive preparation and bonding in a composite restoration for this tooth, we saved a lot of peripheral tooth structure that would have to have been removed to restore with a crown, especially a porcelain-fused-to-metal crown as suggested at the dental schools and at the other private dental office. Yes, the argument could be made to do an onlay at this time to protect the tooth, but without a break in the mesial peripheral rim of enamel, we still have a strong tooth. Doing an onlay preparation sacrifices a great deal of healthy tooth structure. As stated earlier, we are provided better and better materials, technologies, and procedures every year. We don’t know how long this tooth can go with the current restoration. If or when the restoration or the tooth breaks, we will have ever more options, and possibly more conservative materials and techniques to again preserve tooth structure. Now at 32 years of age, this patient has many years ahead of her, and sacrificing good tooth structure would only hasten the life cycle of the tooth, moving it closer toward terminal status.

Author information

Dr. Malterud is in private general practice in St. Paul, Minnesota. He has practiced some form of MIBD for over 30 years and has been lecturing and publishing on MIBD for more than 18 years.

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Manufacturer

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