

As mentioned previously, porcelain surfaces in contact with enamel should be properly glazed or highly polished to reduce abrasiveness and opposing-tooth bite-enamel wear. At the tooth-to-crown line, a crown should fit smoothly against the surface of remaining tooth structure.

A quality crown should function like the original tooth. Like natural teeth, a crown should not be prone to trapping or collecting food. When in a visible area of the mouth, a good crown should also not be noticeable and be as indistinguishable from a functional natural-tooth as possible.

### **ROOT CANALS:**

Like many dental procedures, the best root canal is the one that was prevented and some controversy still exists about the “holistic” effects of root canal therapy. Often, a root canal is the most sensible treatment option. Teeth are complex bone-like structures with a number of interrelated components; they have a dual path for maintaining “nourishment”. Blood supply from the protected tooth “pulp” within, enters by way the tooth “apex” (root tip); additionally, smaller blood vessels nourish the tooth from without by way of the “periodontal ligament” (see: Tooth Anatomy diagrams, page 25.) Research is also ongoing on the use of stem cells in regenerative efforts to avoid root canals.

When bacteria penetrate deep enough, the pulp’s vessels and nerves may become too involved and pain begins. Secluded within the confines of the tooth, the pulp tissues become infected, often resulting in increased gaseous internal pressure and spreading infection out to the root tip’s outer tissues. The infection requires treatment. At this time, the tooth becomes like a castle overrun by bacterial invaders. The entire pulp with its infected content must be removed and the remaining void inside this tooth-castle must be sealed off from further bacterial use. As we have noted, untreated dental infections have serious whole-body consequences.

The inner pulp removal, or endodontic treatment, is accomplished by “instrumenting” (cleaning with tiny files) the internal pulp “chamber” and its internal walls thoroughly, before sealing it off from further bacterial attack. Since this is treatment necessitated by an internal bacterial infection, it has the potential for complications and pain. Modern-day, busy and volume-oriented offices often tend to be time-pressured. It is wise, when initially undergoing complex procedures such as root canals, to arrive for your appointment early and request that

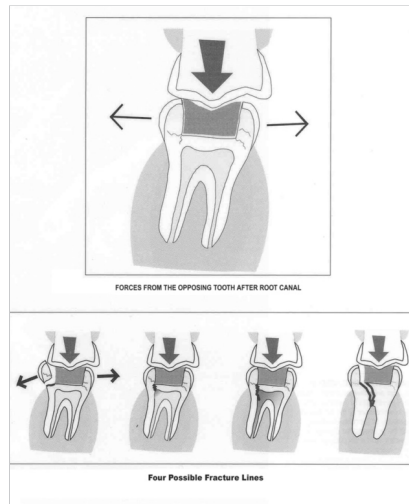
the local anesthesia be administered five to ten minutes prior to actual initial treatment in order to better numb the involved tooth. This is especially true if the tooth is severely infected, already in the presence of even slight swelling, or in the lower jaw (local anesthesia diffuses more slowly through the lower jaw's more dense bone).

A "rubber-dam" or flexible tissue-shaped sheet is most often recommended to isolate the tooth and better facilitate treatment. In recent years, third generation apex locators, digital radiography, nickel titanium rotary instruments, thermally assisted filling systems, improved cements, and other sealing methods, have even popularized a successful one-visit root canal. Nevertheless, the root canal process, though straightforward, can involve the use of more conventional, stainless-steel files and often take several visits, especially if the tooth has more than one root or if it was extremely infected. The "cleaned" pulp chamber is then filled with an inert rubber-based material (gutta-percha).<sup>1</sup> Success is dependant on adequate removal and management of the tooth's bacterial infection. Despite some holistic arguments to the contrary, after a root canal has been properly completed, while slightly more brittle, the tooth can yet provide many years of generally trouble-free service.\*

Once pain-free, many patients disregard the next treatment step: the final procedure of filling or sealing the root canal's upper-most opening (see diagram.) If this structurally important sealing procedure is not done, the tooth will often become reinfected and may eventually become unrestorable and require an extraction. In spite

of having previously completed a root canal, some teeth, but not all teeth, will also require some further structural stability, using a carbon-fiber or metal post-and-core treatment (see next section: Post-&-Cores.)

Previously, it has been suggested that *all* teeth needed to be "crowned" after root canal treatment. Given a current tendency toward larger "



\*Dental Abstracts 10-11 2003: Success rate average is 72% in cases treated by general dentists and 87% in cases treated by endodontists.

(making a bigger hole through which to remove the pulp), this philosophy has been more prevalent, for structural stability. When the amount of remaining tooth structure, after decay removal and -opening has sufficient 'bulk' and is structurally sound (not "undermined") then, a subsequent crown can often be reasonably postponed in the short-term and even avoided in the long term. When this is possible, further alteration of the natural tooth and the substantial cost of a crown or onlay restoration may become unnecessary. Thus, after root canal completion, your dentist should carefully review your individual tooth's circumstance, explaining any of these potential treatment or non-treatment options.

#### **POST-&-CORES:**

Placing some form of permanent restoration over a completed root canal is essential for treatment success. Depending on the amount and condition of the remaining tooth-crown or visible tooth area, anchoring such a restoration to the remaining tooth roots may also be necessary prior to any permanent "crown build-up" filling, or final crown. Anchoring post material, shape, and placement technique have been a source of much study, experimentation, and controversy. Translucent, bonded, carbon-fiber-based posts have now replaced cemented, cast-alloy, and metal-prefabricated posts that were considered state-of-the-art just a decade ago. The advantages and disadvantages of various types of posts are complex; more research and development of new materials will continue to improve post-and-cores and their placement techniques. In the event of your needing such treatment, ask your dentist his rationale for his particular post-and-core choice and placement methods.

#### **EXTRACTIONS:**

The best extraction is the one that is avoided; extractions are preventable. Simply removing a tooth because of extreme pain may not be in a patient's long-term best interest. Nevertheless, under a variety of circumstances and sometimes without much prior pain, certain teeth may become necessary candidates for extraction. Causes leading to extraction include being "unrestorable" (too extensive a decay-breakdown to fix); having a root "fracture" (root damage well below the tooth's underlying bone support), or having very severe and unresponsive periodontal disease.

Like with root canals, if any of these unfortunate circumstances occur, it is a good idea to arrive for an extraction appointment early and to ask if you can receive local anesthesia *five to ten minutes before* beginning the

actual procedure. Again, this will allow for the anesthetic numbness to take a more complete effect and go along way towards minimizing any potential pain during the surgical extraction.

Another aspect of the extraction procedure occurs “postoperatively” (after treatment). Some infected teeth come out relatively easily, yet the term “simple extraction” may now be somewhat antiquated.<sup>1</sup> Some discomfort, pain and swelling following a difficult extraction may be inevitable and some subsequent localized bone loss unavoidable. To minimize resulting bone defect, your dentist or oral surgeon should do their utmost to remove the tooth with as little destruction to the remaining bone structures (*atraumatically*) as possible (see next: “Advanced Extraction Therapy”.) This may slightly extend in-office duration of an extraction procedure, but will often be well appreciated postoperatively. Instructions given patients following any extraction should be very carefully explained, well reviewed, and well understood, in order to minimize a extraction site infection and maximize the healing of the post-extraction “tooth-socket.”



1. Thomas JR. Simple extractions: antiquated term or needed paradigm shift. J Esth Res Dent, V14 #1, 2002; pp135-136.

### “ADVANCED EXTRACTION THERAPY”

Some degree of bone loss results whenever a tooth is extracted. Tissue damage from dental extractions can be minimized with skillful care and through various modified surgical instrumentation techniques. These more time-consuming bone-preserving extraction techniques will not only maintain bone but often reduce subsequent patient pain. To additionally protect or increase post-extraction bone, current bone grafting and collagen membrane enhancements, are sometimes termed The greater effort and cost of these extraction treatments is usually made up for afterward, by the improved bone results and/or the reduced cost of the subsequent lost tooth’s replacement (also see: “Ögram System Extraction.”) Successful grafting therapies, with prudent use of oral implants, most recently of the “treated titanium” variety, have provided

another alternative to conventional “bridge” tooth-replacement (also see, following: Dental Implants.)

Given advances in dental treatment and prevention, the need for tooth extraction/replacement should continue to become a more rare occurrence in the future. When it does become necessary, the planned replacement options are best reviewed in advance; enhanced extraction techniques and therapies should continue to also improve the post-extraction final tissue-healing (also see following: Bone “Recontouring” & Bone “Grafts”).

**“FIXED” BRIDGES:**

When teeth are lost, their replacement (prosthodontics) is often more conventionally accomplished through “fixed” or tooth-attached bridges. The space or span created from the missing teeth is filled by anatomically-formed, connected teeth, termed “pontic” teeth. A fixed bridge is an extension of the crown technique with pontic teeth attached to dental crowns. As with crowns, bridge crown and pontic materials vary: all gold, porcelain fused to gold alloys, and, when the situation allows, pressed ceramic all-porcelains. The teeth on either side of the pontic(s) area are crowned and used as “bridge abutments” so the missing span can be bridged in a design somewhat reminiscent of a suspension bridge.

Another alternative to the classic crown-based fixed bridge is the resin-bonded retainer bridge (RBR) or resin-bonded partial denture (RBDP), also called the “Maryland bridge” (because it was originally designed at the University of Maryland School of Dentistry in the mid 1970’s). With an RBR, the need for extensive tooth reduction in order to “crown” the “abutment” (adjacent anchoring-teeth) is eliminated. The missing-tooth space is spanned like with a conventional bridge but retention to the abutment teeth is achieved by using specially designed small metal “wings” and “rests.” In the ideal, the abutment teeth for an RBR are “virgin teeth” (without any preexisting fillings) and of adequate size and shape to provide support and retention to the required wings and rests necessary for successful bridge design. The missing tooth, (or sometimes teeth) is replaced with a porcelain-fused-to-metal crown and the metal wings/rests are “resin-bonded” to the teeth adjacent to the space(s). This procedure is not indicated if the adjacent abutment teeth are mobile or if the “occlusion” (bite) is especially “heavy” (strong) in the area. When this is the case, occlusal forces can twist or rotate teeth and