

Single Appointment Endodontics Yes or No?

The Endodontic "One shot" is a topic that generates much debate.

The single appointment endodontic treatment is an area of endodontics where there has been much controversy and entrenchment of positions.

The two positions:

1. **Necrotic (Non-vital) cases cannot be treated in a single appointment.**

This position states that the current single appointment instrumentation and irrigation methods cannot come close to canal sterility. Since bacteria are required for periapical periodontitis to occur, the lack of canal sterility (by definition) is directly responsible for lowered success rates. Endodontists such as Trope believe that "we should only consider filling the canal space when nothing further can practically be done to lower the bacterial content." (Toronto April 2004) Predictable endodontic treatment can therefore only be obtained when inter appointment medicaments are used as an adjunctive treatment to render the canal as close to sterile as possible.

The multiple appointment argument centers on the need for disinfection of the canal space with the use of inter appointment CaOH medicaments. It is the position of this group that the research has shown that filling canals while they remain "infected" contributes to demonstrably lower success rates. This group will admit that non-infected (vital) pulps (pulp that the average clinician would not describe as "necrotic") can be treated in a single appointment because they are, by definition, not infected. However, once bacterial contamination of the canal space occurs they that current instrumentation techniques, combined with endodontic irrigants are unable to adequately debride and disinfect the root canal system. This in turn leads to "untreated" areas of canals that can be the source of recurrent bacterial growth and endodontic failure.

One study found that predictable cleanliness and sterility could be obtained in a single appointment but ONLY if the canal space was opened sufficiently to allow for irrigants to reach the apex. In that case the authors favored the Lightspeed system that opened canals to a minimum size 45 in what turns out to be very parallel preparation. This not only can ruin the rheology mechanics of the warm Gutta percha technique but it can produce preparations with remaining dentin thickness that risks strip perforation or eventual root fracture. There is little point in creating a sterile canal in a tooth that is physically weak and that may ultimately fail structurally.

Advocates of the multiple appointment position cite many studies to show that success rates are reduced when canals are filled in the presence of bacteria. They

criticize single appointment “technicians” for minimizing the role of bacteria in the clinical practice of endodontics and for concentrating too much on the “shaping” and radiographic aspects of the cases. They also think that single appointment advocates place too much reliance on the role of irrigation and that these irrigants rarely “clean” as well as is believed.

In summation, it is of the position multiple appointment advocates that they have pure science on their side and that only demonstrable, reproducible tests performed with proper controls have any relevance in the discussion of the true efficacy of any treatment. They dismiss the private practitioners “perceptions” of their success rates as misguided, uninformed, unscientific and simply wrong. They bow to the gods of evidence-based dentistry. They refuse to acknowledge the relative importance of the role of clinical skills in the results of their quoted studies and in managing such cases.

2. **Necrotic (Non-vital) cases can and have been treated in a single appointment for many years.**

While there is no question that culturing methods can demonstrate that many cases are “*infected*” at the time of canal filling, the actual clinical relevance of this is open to question. Culturing has been discarded as a method of “gauging” whether canals are sterile because the technique was found to be inaccurate. It is the position of the “One Shot Artists” (myself included) that every effort should be made to obtain the cleanest possible canals but that demonstrating the presence of bacteria should not be the deciding factor as to whether the canal is ready to be filled.

Advocates of this position also understand that while canals can be cleaned very well, it is impossible to clean every last bacteria from the canal space. Furthermore there are bacteria (*E. Faecalis* for example) that are resistant to CaOH application. That is why we rely on warm gutta percha techniques (rather than cold-based lateral condensation) to attempt to “entomb” those bacteria that are inaccessible. Once entombed, they rarely are of consequence, however unlike some in the past, we acknowledge the significance of unfilled portals of exit (wherever they happen to be) and realize that these are potential sites of treatment failure if they communicate with areas that harbor remaining bacteria. It is the attainment of the MIC (Minimal Inhibitory Concentration) that allows the body to heal sufficiently for clinical and radiographic healing. The real question is whether this requires the use of CaOH and whether the merits of application outweigh the merits of the single appointment procedure. It is very tempting to look at a case that had long term CaOH placed in it and ask whether obturation of the canal at the initial appointment wouldn't have obtained the exact same result with far less inconvenience to the patient?

Advantages of Multiple Appointment Treatment

1. Enhanced contact time of CaOH with the canal. (There is no question that CaOH dissolves tissue and that this is an advantage when it comes to treating cases.)
2. Potential for greater contact time of irrigants. (This obviously depends on the length of the actual appointments. A single two hour appointment with irrigants in the canal for 1.75 hours might be better than two single hour appointments where contact time may only be 90 minutes.)
3. Flare-ups can be addressed prior to obturation. This is an interesting observation since virtually all studies show that flare-ups occur more frequently with multiple appointment cases.

Advantages of Single Appointment Treatment

1. Increased patient acceptance and less duplication of procedures
2. One less appointment, less overhead costs
3. Only one anesthesia administration required (if it is necessary at all!)
4. Less gingival trauma from Rubber Dam placement
5. The clinician has familiarity with canal angles, curvatures and instrument glide paths.
6. No risk of inter-appointment contamination through leakage or loss of integrity of the temporary restoration.
7. Logistical issues such as patient travel time, loss of time from work, arrangements for childcare, etc are minimized.

Some observations of the previous research:

Much of the argument of the advocates of the multiple appointment approach is centered on studies that appear to show how "infected" cases heal less frequently when performed in a single appointment. That justifies the need for placement of CaOH and reinforces the "bacterial" argument that endodontic success must primarily rely on the ability to chemo-mechanically cleanse the system.

I performed a PubMed study of the topic of "One vs. Two appointment endodontic treatment" invariably brings up the "classic" papers that are often quoted. One of the favorites is Sjogren's study (1997). Field, Guttman etc al recently published a paper that compared these studies. In chart form, it clearly showed that the human studies were done with techniques and materials that are not contemporary. Almost all were done with NaOCl solutions that were diluted far below the 5.25% that has become the endodontic standard. None used EDTA 17% as an irrigant. Patency checks were not mentioned and in fact some papers deliberately avoided instrumentation to the apex (as measured by an EAL) for fear of extrusion of material or because the philosophy of the researchers was that any material in the PDL was undesirable "excess". Furthermore, most of the instrumentation techniques did not involve rotary Ni-Ti instruments and were limited to

push/pull file motions. These studies cannot be considered in keeping with endodontics as it is currently being performed.

Unfortunately, one problem that seems to be overlooked with this method is how thoroughly the CaOH is removed from the canal space and what effect remnant CaOH can have on smear layer removal, sealer set and our ability to create intimate contact of gutta percha with the canal walls when warm gutta percha methods are used for filling. It is generally acknowledged that (at a minimum) use of both Ultrasonics and EDTA (17%) is required to even come close to removing most of the CaOH in those canals that have been dressed inter-appointment. How easily it is removed is also related to the method and vehicle in which the material is applied ie/ some CaOH preparations use oils, others use water or anesthetic solution.

I agree that CaOH is an excellent adjunct to treatment. However, I also know that only a few percent of General Practitioners (the clinicians doing most of the Endodontic treatment on patients) HAVE ultrasonics in their operatories. Of those that do, few have the proper dedicated ultrasonic tips that will allow them to reach close to the apex and render the walls as free as possible of CaOH. If that is the case, then for those offices, use of CaOH may actually reduce the intimacy of contact of the final sealer and filling material with the prepared canal walls. CaOH advocates say that this is not so and that if this were a significant problem then it would be reflected in the failure rates of the cited studies. I believe that this also has the potential for interfering with any attempts to bond the canal wall with the retreatable resin type fillings such as the new material Resilon.

For these reasons I was intrigued by the recently published paper " A Clinical radiographic retrospective assessment of the success rate of single-visit root canal treatment" Field, Guttman and Rakusin (Int'l Endo Journal 37, 70-82, 2004) It is (to my knowledge) the first and only paper that analyzed endodontic treatment results in a modern contemporary private practice setting while at the same time using Full strength NaOCl 5.25 %, EDTA 17% as well as Rotary and Hand filing techniques in combination with a warm gutta percha technique.

There is no doubt that placement of CaOH in the canal space after proper cleansing of the canal does lead to periapical healing. The real question is: Is CaOH necessary in all cases? Would these lesions heal regardless of the material that is placed in the canal space as long as the space is filled reasonably (well enough that the host defense mechanism can cope with what is left and allow for healing. It is very tempting to look at a case that had long term CaOH placed in it and ask whether obturation of the canal at the same appointment wouldn't have obtained the exact same result with far less inconvenience to the patient? The "anecdotal" reports of practicing clinicians are frequently dismissed as unscientific, biased, irrelevant and sometimes even "dangerous". The problems of doing this kind of research in the private practice setting are clearly noted in Field et al 2004. Recall rates were abysmal (17.8 %) and were considered by the researches themselves to be "not acceptable." This occurred even though 5 separate attempts were made to contact

patients. The “Catch 22” of this problem means that because private practice recall rates are so low, “serious controlled research” can dismiss them as anecdotal. On the other hand, these same researchers are using techniques and methods that are not in keeping with contemporary endodontics but they have the numbers to make the studies appear “legitimate”.