

Contemporary Issues in Single Versus Multiple Visits in Endodontics: A Review

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Abstract: There have been a number of controversies in endodontics some solved, some abandoned, some remaining. It is not to be expected that within a foreseeable future there will be rapid solutions to the issues reviewed here. Therefore, in teaching endodontics, academic institutions and continuing education courses must rely on science and supporting clinical evidence. While future sound scientific work may result in protocols that are effective from an outcome point of view, translation of this knowledge to the clinical profession, and the proviso under which they can be applied, will remain a challenging task for many years. A good deal of research and cognition has been expended in their behalf, but no universal agreements have been reached.

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I. Introduction

Controversy is a state of prolonged public dispute or debate, usually concerning a matter of opinion. The word was coined from the Latin word *controversia*, from *contra* – "against" – and *vertere* – to turn, or *versus* hence, "to turn against".

Endodontics has gone through many changes in the past several years. With advancements in technology, materials, equipments and even philosophy many controversies have also arisen regarding them. In endodontic therapy, success may be defined as the result obtained which achieved the initial treatment goal whereas failure may be defined as a treatment that did not reach the objective or fell short of acceptance level. Treatment of pulp lesions, which are often infectious involve several critical steps aimed to restrain infection of root canal system in teeth. Earlier treatment modalities in dentistry including endodontics, evolved based on trial-and-error observation. But in recent decades scientific methods have been adopted to support clinical strategies. Research reports, focusing on issues relevant to the disease processes of the pulp and their diagnosis and their effective management are rare in the endodontic literatures. As a consequence, the advancement of biologically based knowledge significant to clinical endodontics had been slow. It is, therefore, not surprising that, in this field of dentistry, there are many contradictory views and opinions as to the proper management of endodontic disorders.

Irving Naidorf (1972), in a critical review on contemporary issues in endodontics, observed: "The preoccupation of dentists with techniques has channelled dentistry (including endodontics) into a state of technical excellence that often is not accompanied by a biological awareness of the basic pathologic problems with which we are dealing or the biologic consequences of our therapy. The schism between clinicians and basic scientists is propagated by a tendency of each group to confer with themselves rather than with each other."

GENERAL

Historically, root canal treatment was performed in multiple visits primarily to ensure 'sterility' of root canal system prior to obturation. Culturing techniques were used to determine the nature of the root canal flora immediately upon entry to the canal, during therapy and prior to obturation. Culture techniques used, however, were fraught with shortcomings, and in due course, the findings were found to be unreliable (Bender & Seltzer, 1964) and this methodology was virtually abandoned.

In recent years, a most heated discussion has emerged as to the need for more than one treatment session in endodontics. Traditionally, treatment has been divided into two or more appointments before the placement of a permanent filling, allowing the clinician to enhance root canal disinfection, to increase patient comfort, and to observe the progress of healing (Trope and Bergenholtz, 2002). Unfortunately, the arguments for the number of patient visits are often unclear. When one carefully considers the case selection criteria from

advocates of one-visit treatments, it becomes clear that there are many exclusion criteria which are not articulated in the debate. Ashkenaz (1984) suggested that multi-rooted teeth should be excluded. Pekruhn (1986) limited the inclusion criteria to "teeth in my practice, which could be conveniently treated in a single visit". Roane et al. (1983) stated that decisions on the use of single- or multiple-visit treatment were based solely on the time available for treatment. This type of case selection does not lend itself to scientific scrutiny and should, of course, not serve as a basis for a treatment strategy. As in all branches of medicine, the choice among endodontic treatment approaches should be based on a proper diagnosis.

SINGLE VISIT

Endodontic diagnosis is simple in most cases. An important first step is to distinguish between teeth with vital pulp and those with non-vital pulp. As discussed previously, the clinical diagnosis of vital pulp cannot differentiate between various stages of severity of the inflammatory process. In a somewhat arbitrary fashion, the clinical judgment of reversible and irreversible pulpitis has been accepted. Although "irreversible pulpitis" is a poorly defined diagnosis, it is well-established that as long as the pulp tissue is vital, the infection is limited to the superficial portions of the tissue, while the larger portion is not infected. This means that the primary focus of the endodontic procedure is to prevent microbial infection of the root canal space. Appropriate procedures to be applied in this respect are well-established and will not be reviewed here. Pulp extirpation and the placement of wound dressing—the root-filling implant—are best completed in a one-treatment visit if aseptic conditions are maintained. Consequently, endodontic treatment of the vital pulp is a perfect one-visit case. If the surgical procedure is carefully carried out and is truly aseptic, a successful outcome should be expected in nearly 100% of the cases.

MULTIPLE VISITS

When the pulp tissue deteriorates to necrosis, the common diagnosis is necrotic pulp and, later, pulp necrosis with apical periodontitis. Another important treatment situation is the presence of a failing, previously root-filled tooth, where apical periodontitis has emerged or prevailed. Obviously, there are many other more rare pathological conditions that can be confused with endodontic disease processes, but the few listed here include the overwhelming number of lesions that occur in general practice.

From a pathological point of view, pulp necrosis and its sequelae are very different from the diseases of the vital pulp. They are almost all infectious. It is therefore reasonable to believe that teeth with necrotic infected pulp tissue should require a different treatment regimen than teeth with vital pulp.

The endodontic research profession for many years has estimated that the pulpal space may harbour from 107 to 108 bacterial cells (Byström and Sundqvist, 1983; Sjögren et al., 1991). The use of saline as an irrigant in combination with mechanical instrumentation may reduce this number 1000-fold, but it will not predictably eliminate all the organisms. The use of an antimicrobial agent, such as sodium hypochlorite, will further reduce the bacterial number—in some cases, to such an extent that cultivable bacteria are not recovered. There is no evidence yet available that instrumentation and antimicrobial irrigation can predictably reduce the bacterial count to zero during a single treatment session (Byström and Sundqvist, 1983, 1985; Byström et al., 1985; Sjögren et al., 1997; Cvek et al., 1976a,b; Shuping et al., 2000; Sundqvist et al., 1998). When the presently available best regimens of treating infected root canals are used, about one-third remains infected after one treatment. The number of remaining bacterial cells is then often small, in the range of 102 to 104 cells (Sjögren et al., 1991, 1997; Dalton et al., 1998; Shuping et al., 2000). Despite these small numbers, the effect on outcome can be significant (Sjögren et al., 1997).

There are conflicting opinions; however, regarding the need for a complete disinfection of the pulpal space before the root filling is placed. Peters and Wesselink (2002) found no difference in treatment outcome when root canals were filled, despite the presence of residual microbes. Weiger et al. (2000), in a randomized clinical trial, observed no difference in outcome between teeth treated in one session and teeth filled after calcium hydroxide medication. They concluded, "One-visit root canal treatment is an acceptable alternative to two-visit treatment for pulpless teeth associated with an endodontically induced lesion." Yet, both studies may have lacked sufficient statistical power for valid conclusions to be drawn. Other clinical studies suggest that the rate of successful treatment outcome will decrease if the treatment is concluded with a root filling before the root canal is free of micro-organisms. Such data are available from both prospective (Sjögren et al., ONE VS. SEVERAL VISITS 1997) and retrospective studies (Engström et al., 1964; Heling and Shapira, 1978). It is presently unknown if the numbers or types of micro-organisms remaining at the time of root filling may modify this conclusion. Therefore, if root canal disinfection remains the goal, the treatment of a tooth with an infected necrotic pulp may require at least a two-visit procedure.

POSTOPERATIVE PAIN

What has held back one-appointment endodontics? The major consideration has been the concern about postoperative pain and failure.

The fear that patients will probably develop postoperative pain and that the canal has been irretrievably sealed has probably been the greatest deterrent to single-visit therapy. Yet the literature shows no real difference in pain experienced by patients treated with multiple appointments. In spite of this evidence, 405 of the endodontic course directors surveyed were of the opinion that necrotic cases treated in one visit have more flare-ups. The University of Iowa group, however, found this not to be true – 3.2 flare-ups for two appointment cases versus 2.6 for one treatment cases. Nor did Galberry find this to be true in Louisiana, nor did Nakamuta and Nagasawa in Japan, who had only 7.5% pain incidence after treating 106 infected cases in single appointments. More to the point, the symptoms experienced by the Japanese patients were not flare-ups, but mild pain, and needed no drugs or emergency treatment.

Oliet reported that only 3% of his cohort of 264 patients receiving single-appointment treatment had severe pain, compared with 2.4% of the 123 patients treated in two visits. Eleazer and Eleazer compared the flare-up rate between one and two appointments in treating necrotic canal molars. In two-visit, cohort, there was a 16% flare-up rate, whereas in the one-visit group, there was only 1 3% flare-up experience, which proved to be significant. Orstavik et al. also reported fewer flare-ups following single-appointment therapy. And even more recently, 2006, Al-Negrish and Hababbeh reported from Jordan on 112 cases of asymptotic, necrotic pulp central incisors, half treated in one-appointment and half treated in two appointments. “. More flare-ups occurred than in the single visit group 9.2 %. Flare-ups occurred after 2 days and after 7 days, 5.2 % and 1.8 % respectively.”

In light of these studies, neither the pain nor flare-ups appear to be valid reasons to avoid single-appointment root canal therapy.

SUCCESS VERSUS FAILURE

If pain is not a deterrent, how about fear of failure? Pekruhn has published a definitive evaluation of single-visit endodontics.

A Japanese study followed one-visit cases for as long as 40 months and reported an 86% success rate. The original investigators in this field, Fox et al., Wolch, Soltanoff, and Ether et al., were convinced that single-visit root canal therapy could be just as successful as multiple-visit therapy.

In marked contrast to these positive reports, Sjogren and his associates in Sweden sounded a word of caution. At a single appointment, they cleaned and obturated 55 single-rooted teeth with apical periodontitis. All of the teeth were initially infected. After cleaning and irrigating with sodium hypochlorite and just before obturation, they cultured the canals. In follow-up study, Trope et al. treated teeth with apical periodontitis, with and without calcium hydroxide, in one or two visits. They reached a number of conclusions that are as follows:

1. “[C]alcium Hydroxide disinfection after chemomechanical cleaning will result in negative cultures in most cases.”
2. “[I]nstrumentation and irrigation alone decrease the number of bacteria in the canal 1000-fold; however the canals cannot be rendered free of bacteria by this method alone.”
3. “[T]he additional disinfecting action of calcium hydroxide obturation resulted in a 10% increase in healing rates. The difference should be considered clinically important.”

In another 52-week comparative study in North Carolina of the “periapical healing of infected roots [in dogs] obturated in one step or with prior calcium hydroxide disinfection,” the researchers concluded that “Ca(OH)₂ disinfection before obturation of infected root canals results in significantly less periapical inflammation than obturation alone.”

Although single appointments would be very appropriate in cases with vital pulps, on the other hand, for symptomatic teeth with necrotic pulps and apical periodontitis and for failed cases requiring retreatment, there may be a risk of lower success rates in the long term. To date, the evidence for recommending either one or multiple visit endodontics is not consistent. The prudent practitioner needs to make decisions carefully as new evidence becomes available .

II. Conclusion

Endodontics is no stranger to controversies. For most of the first 50 years of the 20th century, a cloud hung over endodontic therapy of any kind, as problems with the focal infection theory were attributed to pulpless teeth causing a wide variety of maladies. Even recently, endodontic treatment has been attacked as being responsible for many chronic and acute illnesses, despite a multitude of information to the contrary. The controversies we discuss here, however, have nothing to do with the decision to treat, where we have no doubt as to the efficacy for therapy, but rather how such treatment should be rendered. The analysis presents here suggest that, if many of the different opinions prevailing in the endodontic field are to be resolved, there is

considerable room for properly designed clinical studies. The most apparent gap in the published literature is the lack of randomized clinical trials, which are needed to resolve issues that relate to proper management of pulpal wounds, proper medication, and number of appointments for treatment of infected root canals. Such studies must be based not only on sufficient numbers of cases but also on due consideration of confounding factors. Trials in endodontics also require very long follow-up periods, if valid conclusions are to be generated.

References

- [1]. Naidorf JJ (1972). Inflammation and infection of pulp and periapical tissues. *Oral Surg* 34:486-497.
- [2]. Bender IB (2000). Reversible and irreversible painful pulpitis: diagnosis and treatment. *Aust Endod J* 26:10-14.
- [3]. Bergenholtz G (2001). Factors in pulpal repair after oral exposure. *Adv Dent Res* 15:84.
- [4]. Bergenholtz G, Lekholm U, Milthorpe R, Engström B (1979). Influence of apical over instrumentation and overfilling on retreated root canals. *J Endod* 5:310-314.
- [5]. Pekruhn RB (1986). The incidence of failure following single-visit endodontic therapy. *J Endod* 12:68-72.
- [6]. Roane JB, Dryden JA, Grimes EW (1983). Incidence of postoperative pain after single and multiple-visit endodontic procedures. *Oral Surg* 55:68-72.
- [7]. Ashkenaz PJ (1984). One-visit endodontics. *Dent Clin North Am* 28:853-863. Sundqvist G, Reuterwing CO (1980). Isolation of *Actinomyces israelii* from periapical lesion. *J Endod* 6:602-606.
- [8]. Sundqvist G, Johansson E, Sjögren U (1989). Prevalence of black pigmented *Bacteroides* species in root canal infections. *J Endod* 15:13-19.
- [9]. Sundqvist G, Figdor D, Persson S, Sjögren U (1998). Microbiologic analysis of teeth with failed endodontic treatment and the outcome of conservative re-treatment. Sjögren U (1996). Success and failure in endodontics (dissertation). Umeå, Sweden: Umeå University Odontological Dissertations No. 10.
- [10]. Sjögren U, Figdor D, Spångberg L, Sundqvist G (1991). The antimicrobial effect of calcium hydroxide as a short term intracanal dressing. *Int Endod J* 24:119-125.
- [11]. Sjögren U, Figdor D, Persson S, Sundqvist G (1997). Influence of infection at the time of root filling on the outcome of endodontic treatment of teeth with apical periodontitis. *Int Endod J* 30:297-306.
- [12]. Cvek M (1978). A clinical report on partial pulpotomy and capping with calcium hydroxide in permanent incisors with complicated crown fracture. *J Endod* 4:232-237.
- [13]. Cvek M, Nord CE, Hollender L (1976a). Antimicrobial effect of root canal debridement in teeth with immature roots. A clinical and microbiologic study. *Odontol Revy* 27:1-10.
- [14]. Cvek M, Hollender M, Nord CE (1976b). Treatment of non-vital permanent incisors with calcium hydroxide. VI. A clinical, microbiological and radiological evaluation of treatment in one sitting with mature and immature root. *Odontol Revy* 27:93-108.
- [15]. Heling B, Shapira J (1978). Roentgenologic and clinical evaluation of endodontically treated teeth, with or without negative cultures. *Quintessence Int* 11:79-84.
- [16]. Peters LB, van Winkelhoff AJ, Wesselink PR (2002). Effect of instrumentation, irrigation and dressing with calcium hydroxide on infection in pulpless teeth with periapical bone lesions. *Int Endod J* 35:13-21.

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