Frequency of postoperative pain in one- versus two-visit endodontic treatment

Drs. Jorge Paredes Vieyra, Francisco Javier Jimenez Enriquez, and Fabián Ocampo Acosta evaluate the incidence of postoperative pain in one- versus two-visit root canal treatment of necrotic teeth with apical periodontitis after a 1-year healing period

The goal of endodontic therapy is to prevent or eliminate apical periodontitis by means of cleaning, shaping, disinfecting and filling the root canal system. Since the vast majority of endodontic problems are microbial in origin, their removal is considered the most important step in root canal therapy (Hülsmann, Rümmelin, Schäfers, 1997). The success of endodontic treatment is directly related to the control of endodontic infection. When the pulp is vital, endodontic treatment in a single session is ideal if there is time for the accomplishment of the procedure.

This treatment modality is based on the fact that the canal is free from bacteria. Since the aseptic chain has been maintained by the clinician, there is no reason for not finishing the procedure in the same session (Siqueira, et al., 1997). Little controversy exists that teeth diagnosed with irreversible pulpitis should be treated in one session. However, in cases of pulp necrosis with or without apical periodontitis, the literature is more controversial. Single- versus multiple-visit root canal treatment has been the subject of long-standing debate in the endodontic community (Abbott, Yu, 2007).

In the case of necrotic teeth with visible periradicular lesions on a radiograph, the biochemical preparation and the immediate filling of the root canal raises doubts over the quality of canal disinfection due to the diffuse nature of the infection through the isthmuses, dentinal tubules, secondary and accessory canals, apical cementum, and areas of apical cemental resorption (Abbott, Yu, 2007; Möller, et al., 1981; Kakehashi, Stanley, Fitzgerald, 1965). Possibly, some reports of refractory periradicular lesions or many cases of partially healed radiolucencies are consequences of such remaining infection.

It has been established that apical periodontitis is caused by bacteria within root canals (Kakehashi, Stanley, Fitzgerald, 1965). Logically, the treatment of apical periodontitis should be the removal of the cause of the disease. The reduction of the microbial load as well as the disruption of biofilms are achieved by a combination of mechanical instrumentation, irrigation with tissue-dissolving and microbicidal solutions, and application of antimicrobial medications in the root canal between appointments.

Soares, et al. (2001), have assessed the incidence of postoperative pain and periapical healing, following endodontic treatment in a single session in patients with necrotic pulps associated with radiolucent periradicular lesions. After a 12-month period, endodontic treatment in a single session proved to be clinically successful in 100% of the cases, although radiographic success lagged far behind.

However, the endodontic literature reports cases of treatment of teeth with necrotic pulps and apical periodontitis in a single session and sometimes within a relatively short period (Berger, 1991; Coutinho Filho, Gurgel Filho, Diblasi, 1997; Walton, Fouad, 1992; Glennon, et al., 2004; Ng, et al., 2004), which had a good outcome.

Pain and swelling are often indicators of an existing disease process associated with an offending tooth. Endodontic treatment aims to reverse the disease process and thereby eliminate the associated signs and symptoms (Berger, 1991; Coutinho Filho, Gurgel Filho, Diblasi, 1997). When the treatment itself appears to initiate the onset of pain and/or swelling, the result can be very distressing to both the patient and the operator.

Patients might even consider postoperative pain and flare-up as a benchmark against which the clinician’s skills are measured. Incidence of postoperative pain or flare-up is, therefore, one of the influencing factors when making a clinical decision. Obviously, treatment with the lower incidence of postoperative pain is usually the treatment of choice. Even though postoperative pain in endodontics is not a particularly good outcome measure because it tends to be transient, it has been widely used as an argument either for or against one-visit root canal treatment (Walton, Fouad, 1992).

Postoperative pain is defined as pain of any degree that happens after the initiation of root canal treatment, while an endodontic flare-up has been defined as the onset or

Educational aims and objectives
This clinical article aims to evaluate the incidence of postoperative pain in one- versus two-visit root canal treatment of necrotic teeth with apical periodontitis after a 1-year healing period.

Expected outcomes
Endodontic Practice US subscribers can answer the CE questions on page 40 to earn 2 hours of CE from reading this article. Correctly answering the questions will demonstrate the reader can:

- Identify compelling evidence that indicates a significantly different incidence of postoperative pain/flare-up of either single- or multiple-visit root canal treatment is lacking.
- Realize some of the reasons for the debate for either single- or multiple-visit root canal treatment.
- Identify reasons for patient discomfort after an endodontic treatment.
- Recognize how postoperative pain can be an argument either for or against one-visit root canal treatment.
continuation of pain and/or swelling after endodontic treatment that is of such severity that it disrupts the patient’s lifestyle enough so that the patient requires an unscheduled appointment where active treatment is undertaken (Walton, Fouad, 1992).

Endodontic therapy can be followed by short-term and long-term complications. The former includes signs and symptoms of postoperative inflammation of the periapical tissues, with discomfort being the most common short-term outcome of root canal treatment procedures (Glennon, et al., 2004).

Discomfort after an endodontic treatment is thought to be related to a periapical inflammatory response caused by one or more of the following factors:

- Instrumentation
- Passage of medications or infected debris into the periapical tissues
- Damage of vital neural or pulpal tissue
- Central sensitization (Ng, et al., 2004)

In previous studies, postoperative discomfort after non-surgical root canal treatment has been reported to range from approximately 3% to more than 50% (Roane, Dryden, Grimes, 1983; Ashkenaz, 1979). Postoperative discomfort can lead to increased analgesic usage or unscheduled dental visits.

Another short-term adverse event is swelling, which could result from an exacerbation of a chronic periapical lesion or could occur without a detectable periapical lesion. Swelling is thought to be dependent on bacterial contamination of the periapical tissues caused by instrumentation, inadequate canal disinfection, bacterial recontamination of the root canal system because of unsatisfactory coronal seal, or host factors (Ng, et al., 2004).

The idea of speeding up root canal disinfection while maintaining the same efficacy observed in two-visit treatment has been fuelled by some clinicians and researchers. The purpose of this randomized controlled trial was to compare the incidence of postoperative pain in one- versus two-visit root canal treatment of necrotic teeth with apical periodontitis after a 1-year healing period.

**Materials and methods**

This study took place at the Autonomous University of Baja California, School of Dentistry in Tijuana, Mexico. The subjects were freely accepted.

The aims and requirements of the study were explained to the patients, and they were invited to participate. A financial incentive was offered for patients to return for follow-up clinical and radiographic examination. After explaining the clinical procedures and risks and clarifying all questions raised, each patient signed a written informed consent form, and the patient was randomly assigned to either the one-visit or two-visit group by the author, and radiographic interpretation was verified by two certified endodontists.

Patient selection was based on the following criteria:

1. The aims and requirements of the study were freely accepted.
2. Treatment was limited to patients in good health.
3. All teeth had non-vital pulps and apical periodontitis, with or without a sinus tract.
4. A negative response to hot and cold pulp sensibility tests.
5. Presence of enough coronal tooth structure for rubber dam isolation.
6. No prior endodontic treatment on the involved tooth.
7. No analgesics or antibiotics were used before the clinical procedures began.

Exclusion criteria were patients without inclusion requirements or failure to obtain patient’s authorization, patients younger than 16 years old, pregnant, those with a positive history of antibiotic use within the past month, diabetic, or if the tooth had been previously accessed or endodontically treated.

Once eligibility was confirmed, the study was explained to the patients, and they were invited to participate. A financial incentive was offered for patients to return for follow-up clinical and radiographic examination. After explaining the clinical procedures and risks and clarifying all questions raised, each patient signed a written informed consent form, and the patient was randomly assigned to either the one-visit or two-visit group by using a block of random numbers generated by one of the investigators.

Randomization was performed before the clinical examination using the minimization method described by Pocock (1983). Two randomization factors were considered: tooth group and pain as a clinical symptom (Tables 1 and 2). Sample size was

<table>
<thead>
<tr>
<th>Tooth group</th>
<th>Maxillary n=150 (%)</th>
<th>Mandibular n=150 (%)</th>
<th>One-visit n=75 (%)</th>
<th>One-visit follow-up n=72 (%)</th>
<th>Two-visit n=75 (%)</th>
<th>Two-visit follow-up n=71 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incisor</td>
<td>16 (10.66)</td>
<td>10 (6.66)</td>
<td>13 (17.33)</td>
<td>9 (12.5)</td>
<td>13 (17.33)</td>
<td>8 (11.26)</td>
</tr>
<tr>
<td>Canines</td>
<td>8 (5.33)</td>
<td>6 (4.0)</td>
<td>7 (9.33)</td>
<td>7 (9.72)</td>
<td>7 (9.33)</td>
<td>7 (9.85)</td>
</tr>
<tr>
<td>Premolar</td>
<td>28 (18.66)</td>
<td>17 (11.33)</td>
<td>22 (29.33)</td>
<td>19 (26.38)</td>
<td>23 (30.66)</td>
<td>18 (25.35)</td>
</tr>
<tr>
<td>Molar</td>
<td>36 (24)</td>
<td>29 (19.33)</td>
<td>33 (44)</td>
<td>37 (51.58)</td>
<td>32 (42.66)</td>
<td>38 (53.52)</td>
</tr>
<tr>
<td>Total</td>
<td>88 (58.66)</td>
<td>62 (41.33)</td>
<td>75 (100)</td>
<td>72 (100)</td>
<td>75 (100)</td>
<td>71 (100)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tooth group</th>
<th>Maxillary n=150 (%)</th>
<th>Mandibular n=150 (%)</th>
<th>One-visit n=75 (%)</th>
<th>One-visit follow-up n=72 (%)</th>
<th>Two-visit n=75 (%)</th>
<th>Two-visit follow-up n=71 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>With sinus tract</td>
<td>14 (9.33)</td>
<td>13 (8.66)</td>
<td>16 (21.33)</td>
<td>7 (9.72)</td>
<td>11 (14.66)</td>
<td>2 (2.81)</td>
</tr>
<tr>
<td>Without sinus tract</td>
<td>61 (40.66)</td>
<td>62 (41.33)</td>
<td>59 (80.64)</td>
<td>65 (90.27)</td>
<td>64 (85.33)</td>
<td>69 (97.18)</td>
</tr>
<tr>
<td>Total</td>
<td>75 (50.0)</td>
<td>75 (50.0)</td>
<td>75 (100)</td>
<td>72 (100)</td>
<td>75 (100)</td>
<td>71 (100)</td>
</tr>
</tbody>
</table>
Clinical procedures

All treatment sessions were approximately 45 minutes in length to allow for acceptable time for completion of treatment for one or two visits. After local anesthesia by 2% lidocaine with 1:100,000 epinephrine and rubber dam isolation, the tooth was disinfected with 5.25% NaOCl. All caries were removed and endodontic access cavities made with sterile high-speed carbide #331 (SS White) and Zekrya Endo burs (Dentsply-Maillefer, Switzerland).

Working length was established with the Root ZX® Electronic Apex Locator (J. Morita Manufacturing Corporation) and confirmed radiographically using the digital Schick system (Schick Technologies). The canals were negotiated and enlarged with hand instruments until reaching an ISO #20 at the working length.

The coronal portions of the canals were flared with sizes 1-3 Gates Glidden burs (Dentsply-Maillefer, Switzerland). Canals were then irrigated with 2.0cc of 5.25% NaOCl. All caries were removed and endodontic access cavities made with sterile high-speed carbide #331 (SS White) and Zekrya Endo burs (Dentsply-Maillefer, Switzerland).

Working length was established with the Root ZX® Electronic Apex Locator (J. Morita Manufacturing Corporation) and confirmed radiographically using the digital Schick system (Schick Technologies). The canals were negotiated and enlarged with hand instruments until reaching an ISO #20 at the working length.

After completion of canal instrumentation, all canals were irrigated with 2.5cc of 17% ethylenediaminetetraacetic acid for 30 seconds. Chemomechanical procedures were completed by performing a final rinse with 5ml of 2% aqueous chlorhexidine solution using the EndoVac® irrigation system (SybronEndo). The EndoVac system is able to apply the irrigant to working length and evacuate it using apical negative pressure. The negative pressure avoids forcing the irrigant beyond the apex into the periapical tissues (Nielsen, Baumgarnter, 2007).

For the one-visit group, the canals were dried with sterile coarse paper points and obturated at the same appointment by using lateral condensation of gutta percha and Sealapex™ sealer (SybronEndo). Access cavities of anterior teeth were etched and restored with Fuji IX (GC Corporation). Access cavities (occlusal/palatal surface) were sealed (Nielsen, Baumgarnter, 2007).

For the two-visit group, the canals were dried with sterile coarse paper points and obturated at the same appointment by using lateral condensation of gutta percha and Sealapex™ sealer (SybronEndo). Access cavities of anterior teeth were etched and restored with Fuji IX (GC Corporation). Access cavities (occlusal/palatal surface) were sealed (Nielsen, Baumgarnter, 2007).
was disinfected as previously stated, and the calcium hydroxide was removed with hand instruments and copious irrigation with 2.5% sodium hypochlorite followed by 2.5cc of 17% ethylenediaminetetraacetic acid and a final rinse of 5ml of 2% aqueous chlorhexidine solution using the EndoVac irrigation system.

After complete removal of the calcium hydroxide, the canals were dried with sterile coarse paper points, and obturation was performed with the same protocol described for the one-visit group, and posttreatment radiographs taken. All teeth were restored with Fuji IX buildup.

After completion of treatment, patients were instructed to return to their referring dentist for definitive restoration as soon as possible.

One-year follow-up

The healing results were clinically and radiographically evaluated 1-year post-operatively. All radiographic films obtained preoperatively and at follow-up were coded blind and organized in random order.

Two pre-calibrate endodontist examiners (author not included) independently evaluated all radiographs under moderate illumination at a light table using a 2X magnifying viewer equipped with a masking frame the same size as the dental film. Before evaluation of the study images, each examiner graded a series of 10 radiographic images not associated with the study sample and representing a wide range of periapical bone densities.

To minimize a false-positive diagnosis, observers used a strict definition of periapical disease (Peters, Wesselin, 2002; Byström, Sundqvist, 1981). In case of disagreement, joint re-evaluation was performed until a consensus was reached on all images. The consensus score for each image was considered the true score and used for statistical analysis. Follow-up radiographs were made with the individual custom index and recorded exposure settings; all radiographs were obtained by using the same digital imaging system (Schick Technologies).

The primary outcome measures were the presence of postoperative pain or abnormal findings at 1 year (spontaneous pain, presence of sinus tract, swelling, mobility, periodontal probing depths greater than baseline measurements, or sensitivity to percussion or palpation) as shown in Table 2.

Secondary outcome measure for this study was classified by using a modification of the Strindberg study (1956) used for radiographic healing assessment. Teeth with symptoms of persisting periapical inflammation were scored as not healed, as were the cases with periapical radiolucencies that remained unchanged or increased in size. Teeth with a reduced periapical rarefaction were judged as uncertain. Teeth with complete restitution of the periodontal contours were judged as healed. In teeth with more than one root, the least favorable outcome was recorded.

The periapical index (PAI) was used as a scoring system to evaluate radiographic healing (Peters, Wesselin, 2002) as shown in Figure 2. Radiographic images were coded and stored and evaluated blindly and independently by two endodontists. Before evaluation of the study images, each examiner graded a series of 10 radiographic images not associated with the study sample and representing a wide range of periapical bone densities.

The periapical index (PAI) was used as a scoring system to evaluate radiographic healing (Peters, Wesselin, 2002) as shown in Figure 2. Radiographic images were coded and stored and evaluated blindly and independently by two endodontists. Before evaluation of the study images, each examiner graded a series of 10 radiographic images not associated with the study sample and representing a wide range of periapical bone densities. The examiners then reviewed all scores to improve calibration and inter-rater agreement. Consensus was reached on images that were not formerly scored the same by all examiners. A chi-square test was used to test trends in contingency tables. Hypothesis tests were conducted at the 0.05 level of significance.

<table>
<thead>
<tr>
<th>Tooth group</th>
<th>One-visit n=72 (%)</th>
<th>Two-visit n=71 (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healed</td>
<td>70 (97.22)</td>
<td>71 (100)</td>
<td>141 (91.33)</td>
</tr>
<tr>
<td>Uncertain healing</td>
<td>1 (1.38)</td>
<td>(none)</td>
<td>1 (0.66)</td>
</tr>
<tr>
<td>Not healed</td>
<td>1 (1.38)</td>
<td>........</td>
<td>1 (0.66)</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>71</td>
<td>143</td>
</tr>
</tbody>
</table>

### Table 4: Distribution of teeth by randomization factors (sinus tract)

<table>
<thead>
<tr>
<th>Tooth group</th>
<th>Maxillary n=150 (%)</th>
<th>Mandibular n=150 (%)</th>
<th>One-visit n=75 (%)</th>
<th>One-visit follow-up n=72 (%)</th>
<th>Two-visit n=75 (%)</th>
<th>Two-visit follow-up n=71 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>With sinus tract</td>
<td>27 (18.0)</td>
<td>11 (7.33)</td>
<td>23 (30.66)</td>
<td>3 (4.16)</td>
<td>15 (20.0)</td>
<td>2 (2.8)</td>
</tr>
<tr>
<td>Without sinus tract</td>
<td>61 (40.66)</td>
<td>51 (34.0)</td>
<td>52 (69.33)</td>
<td>2 (2.77)</td>
<td>60 (80.0)</td>
<td>1 (1.40)</td>
</tr>
<tr>
<td>Total</td>
<td>88 (58.66)</td>
<td>62 (41.33)</td>
<td>75 (100)</td>
<td>5 (100)</td>
<td>75 (100)</td>
<td>3 (100)</td>
</tr>
</tbody>
</table>

### Results

Randomization allocated 75 teeth to one-visit and 75 teeth to two-visit treatment. Seven teeth (three in the one-visit and four in the two-visit group) were lost to follow-up, leaving 143 teeth that were evaluated at the 1-year follow-up period (72 one-visit, 71 two-visit; Table 1). Seven cases (9.72%) experienced postoperative pain in the one-visit group, and two cases (2.81%) in the two-visit group (Figure 1 and Table 1).

At the end of the study, 68 (94.4%) of the 75 teeth in the one-visit group and 69 (97.18%) of the 75 teeth in the two-visit group were classified as healed (Table 3). The number of cases classified as uncertain was lower (none) in the two-visit group as compared with one (1.38%) in the one-visit group. One patient (one-visit group) presented with persistent draining sinus tracts at 12 months (had sinus tract present at the initial treatment appointment), as seen in Table 4.

The statistical analysis of the healing results did not show any significant difference between the groups (p=0.05).

### Discussion

Endodontic treatment consists of the complete shaping and cleaning of the main root canal followed by three-dimensional obturation usually with gutta percha. The best environment conducive to periradicular healing would be an absence of microorganisms, a condition similar to that found in vital cases that have a very high potential for success (Veira, et al., 2012).
In apical periodontitis of long-standing duration, bacteria can spread into ramifications, lateral canals, isthmuses, apical deltas, and dentinal tubules. Located in such areas, these microorganisms cannot be removed during the chemical-mechanical preparation. Some studies comparing the success rate of endodontic treatment of teeth with apical periodontitis performed in one or more visits revealed that two or more visits with calcium hydroxide as the intracanal medication offer a success rate that is 10%-20% higher than a one-visit treatment (Penesis, et al., 2008).

The longer the intracanal medication remains inside the root canal system, it is able to act in sites not reached by the endodontic instruments or by the irrigating solution. Thus, it enhances the bacterial reduction as well as repair of the periapical tissues (Weiger, Rosendahl, Lost, 2000). However, in the last few years, great technological advances have made the operative stages simpler, allowing the endodontic treatment of teeth with periapical lesions to be performed in one session (Pocock, 1983).

Variables that are not controlled (such as the patient’s immunological condition or the ability of the operator) exert some influence on the success of the endodontic treatment (Hülsmann, Rümmler, Schäfer, 1997). In this study, such variables were kept under control. Treatment was performed by the same clinician and in the same individual, which meant teeth with similar periapical lesions were subject to the same immunological defense mechanisms.

The maintenance of an aseptic protocol during endodontic treatment, the appropriate shaping of the canal root to allow its satisfactory irrigation with antiseptic solutions, is more important than performing treatments in one single visit or in multiple visits than concerns about periapical lesion repair (Hülsmann, Hahn, 2000).

One argument in favor of treating infected root canals in one visit is that residual bacteria surviving treatment are entombed by obturation and die because their source of nutrients is denied (Sathorn, Parashos, Messer, 2005; Ricucci, et al., 2011; Peters, Wesselink, Moore, 1995). This argument might be valid for bacteria remaining on untouched canal walls or within dentinal tubules (Peters, Wesselink, 2002). However, the simple fact that bacteria can be found in the main root canal of many cases with posttreatment disease (Siqueira, et al., 2002) indicates that entombment is not reliable.

The aim of this study was to compare the incidence of postoperative pain in one- versus two-visit root canal treatment of necrotic teeth with apical periodontitis after a 1-year healing period. Clinical outcome studies take a long time to monitor, demand substantial economic resources, and run the risk of losing patients at follow-ups.

A determination of healed, not healed, or uncertain was made radiographically 1-year following treatment. Radiographic images of periapical bone lesions range from impossible or difficult to see to being easily seen. In this study, false-positives were minimized because periapical radiolucencies were recorded only when absolutely certain.

No statistically significant difference in success rates (healed lesion) was observed between the one- and two-visit groups and corroborates the results of previous studies (Berger, 1991; Penesis, et al., 2008; Weiger, Rosendahl, Lost, 2000). Published studies including the present one have failed to show any statistically significant difference in the outcome between one- and two-visit root canal treatment (Hülsmann, Hahn, 2000; Sathorn, Parashos, Messer, 2005; Ricucci, et al., 2011). Other studies have compared the healing rate after one- and two-visit root canal therapy, although the criteria for endodontic success were often poorly defined and varied across the studies (Berger, 1991; Walton, Fouad, 1992; Peters, Wesselink, Moore, 1995; Siqueira et al, 2002).

Success and failure of endodontic treatment is determined by long-term results and not the presence or absence of short-term postoperative pain. Our results agree with Mattscheck (2001), who found that root canal treatments with postoperative pain occurring shortly after treatment could result in long-term success, whereas treatment without such pain may result in failure. Glennon (2004) and Ng (2004) reported that discomfort was the most common short-term outcome of root canal treatment procedures. Patients with single-visit follow-up experienced postoperative pain less frequently (1.35%) than those with multiple-visit root canal treatment (2%). The adoption of clinical procedures in endodontic therapy depends not just on their effectiveness or biological consequences but also on minimization of patients’ discomfort.

Although successfully eliminating bacteria from the root canal system remains the most important therapeutic goal in endodontics, there is no consensus as to the most effective clinical approach. Our results agree with Sjogren (1990) and Doyle (2007), who found that the prognosis for complete healing of endodontically treated teeth with the pretreatment diagnosis of apical periodontitis is approximately 10%-15% lower than for teeth without apical periodontitis.

Discomfort is the main short-term complication of root canal treatment. However, the measurement of discomfort is fraught with hazards and opportunities for errors. Therefore, it is necessary to rate the level of discomfort in categories arranged in advance and exactly described by authors. Some investigators, such as Yoldas, et al. (2004), have provided accurate criteria to categorize patient’s pain to accomplish this.

Most studies on single-visit endodontics have focused on postoperative pain and flare-up (Siqueira, et al., 2002; Fava, 1991; Law, Messer, 2004), despite the fact that pain has been shown to have no effect on long-term healing success (Sathorn, Parashos, Messer, 2005; Yoldas, et al., 2004). It is known that uncontrolled variables, such as metabolic diseases and smoking, can affect success rates and result in poorer treatment outcomes (Vlieg, 2005).

In our study, significantly less postoperative pain was observed in the single-visit root canal treatment in anterior teeth. This is very close to the findings of Eleazer and Eleazer (1998), who reported fewer flare-ups for the single-visit group (3.0%) as compared to the multiple-visit group (8.0%).

Historically, several treatments and inter-appointment dressings were used for infected teeth, but over the years, the number of sessions has been reduced (Fava, 1991). A two-visit model using an inter-appointment dressing with calcium hydroxide has been proposed as a standard (Law, Messer, 2004; Spangberg, 2001). The expectation that teeth treated in two visits with an inter-appointment dressing of calcium hydroxide
microorganisms from the root canal system to promote periapical healing. This study gave evidence that a meticulously instrumented one-visit root canal treatment can be as successful as a two-visit treatment. Compelling evidence indicating a significantly different incidence of postoperative pain/fare-up of either single- or multiple-visit root canal treatment is lacking. In conclusion, 12 months after initial non-surgical root canal therapy on necrotic teeth with apical periodontitis, there was no significant difference in radiographic evidence of periapical healing between one- and two-visit therapy with an interim calcium hydroxide/chlorhexidine paste dressing.

Conclusion
Endodontic treatment tries to eradicate

REFERENCES