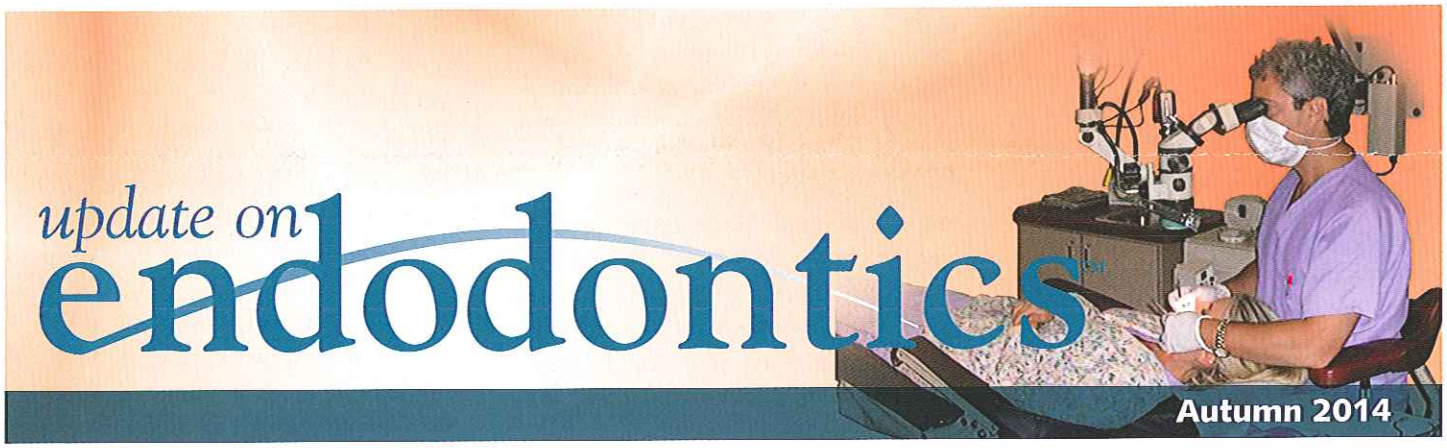
A Professional Courtesy of:

A. K. Bobby Mallik, D.M.D.

3719-B University Commons
Durham, North Carolina 27707
919-493-5332
www.durhamendo.com

Practice Limited to Endodontics



Long-term Survival Rate of Teeth Receiving Multidisciplinary Treatments

The ultimate goal of every dental intervention is to restore and maintain the functionality of the patient's dentition. For the compromised tooth, the overall prognosis will depend upon the outcome of each component of the treatment plan. Adequate remaining tooth structure may be the most important factor affecting the treatment outcome in endodontic procedures, while the remaining bone support is a prognostic determinant from the periodontal standpoint. Coronal reinforcement is also considered a major contributing factor in the longevity and survival of endodontically treated teeth.

Whether to replace or preserve a compromised tooth is a common dilemma for practitioners. Moghaddam, a private practitioner from Iran, et al conducted a retrospective study to determine the 3- to >10-year survival rates of endodontically treated teeth that had undergone surgical crown-lengthening procedures and restoration with a prosthetic restoration (with or without post).

Clinical records and radiographs of 87 patients (245 teeth) who had received endodontic therapy (primary or retreatment), crown-lengthening surgery (CLS) and prosthetic restoration (with or without post) between 1996 and 2009 were included. Patients had been referred to the periodontist for CLS after consultation; all patients had a favorable prognosis, as well as a preference for this treatment over other possible treatment options. Having optimal root canal treatment and the remaining sound tooth and bone structures were prerequisites for performance of CLS. Thus, agreement of methods was achieved between practitioners.

The cumulative survival rates are shown in Figure 1. The survival rate analysis and Kaplan–Meier table revealed that the 3-, 5- and 10-year survival rates were 98.3 ± 1.0%, 96.0 ± 1.6% and 83.1 ± 4.5%, respectively.

Inside this issue:

Conclusion

The long-term survival rate for compromised teeth that underwent combined endodontic, periodontal and prosthodontic therapy was 83% to 98%. This study also took into consideration the expertise and ability of the clinicians for appropriate case selection and performance of each treatment.

Long-term outcomes strongly relied on interdisciplinary dental practice, inevitably one of the most influential factors in determining overall success and failure rates. Thus, the treatment of compromised teeth should not only be put in the hands of proficient specialists but should also rely upon the highly competent general dentist.

For further accurate determination of the predictors of failure, prospective studies with long-term follow-ups are recommended.

Moghaddam AS, Radafshar G, Taramsari M, Darabi F. Long-term survival rate of teeth receiving multidisciplinary endodontic, periodontal and prosthodontic treatments. J Oral Rehabil *2014;41:236-242.*

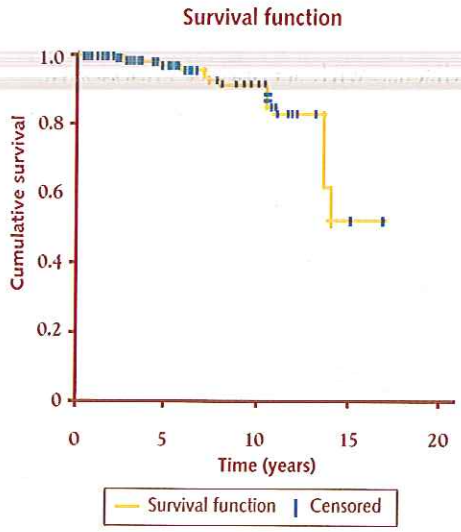


Figure 1. Cumulative survival rate relative to time.

Effect of Dentin Conditioning on Stem Cells of the Apical Papilla

Pulpal necrosis of immature permanent teeth from either caries or dental trauma results in a tooth with an open apex and thin, fragile dentinal walls, making it more susceptible to fracture and subsequent tooth loss. In the last decade, case reports and case series have described a new treatment protocol called "revascularization" or "regeneration" that can result in continued root development and positive responses to pulp vitality testing in certain treated immature teeth.

Regenerative endodontic treatment starts with chemical debridement of the root canal with minimal to no instrumentation, followed by application of an intracanal medicament such as triple antibiotic paste (TAP; ciprofloxacin/metronidazole/minocycline), a double antibiotic paste (DAP; ciprofloxacin/metronidazole) or a calcium hydroxide ($Ca[OH]_2$) dressing. Resolution of endodontic pathosis and radiographic evidence of continued root development depend largely on adequate disinfection of the root canal system. However, the disinfectant may affect viable stem cells of the apical papilla (SCAP).

Regenerative endodontics relies on 3 important factors:

1 availability of stem cells

2 scaffolding to support these cells

3 availability of growth factors

Because regenerative endodontic procedures promote an influx of abundant undifferentiated stem cells into the root canal space after disinfection, maintaining stem cell survival and promoting stem cell proliferation and differentiation are crucial. Althumairy et al from the University of Texas Health Science Center at San Antonio evaluated the indirect effect of TAP, DAP and $Ca(OH)_2$ dressings on the survival of SCAP.

Human dentin disks with a standardized lumen of 3.2 mm were exposed to TAP, DAP (both at concentrations of 1 mg/mL and 1000 mg/mL), $Ca(OH)_2$ or Hank's balanced salt solution (control) for 7 days (Figure 2) or 28 days (Figure 3). The medicaments were removed with copious irrigation, and SCAP was placed in a basement membrane matrix in the disks' lumen. These were then cultured for 7 days, followed by a determination of cellular viability by using the CellTiter-Glo luminescence assay. Data were analyzed using 1-way analysis of variance with the Bonferroni post hoc test.

Conclusion

Dentin conditioning or alteration with TAP and DAP at commonly used clinical concentration changes dentin in such a way as to prevent SCAP survival. These lethal indirect effects of both TAP and DAP were avoided when these medicaments were used at the 1 mg/mL concentration. However, dentin conditioning with $Ca(OH)_2$ promoted SCAP survival and proliferation.

Althumairy RI, Teixeira FB, Diogenes A. Effect of dentin conditioning with intracanal medicaments on survival of stem cells of apical papilla. J Endod *2014;40:521-525.*

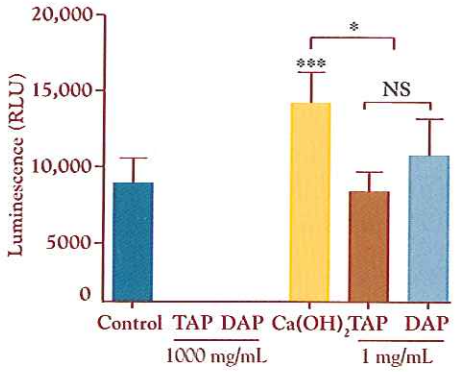


Figure 2. SCAP culture on dentin treated for 7 days with TAP or DAP at the concentration of 1000 mg/mL resulted in no viable cells. Dentin conditioning with TAP or DAP at the concentration of 1 mg/mL supported cell viability, with no difference from control. $^{*}p < .05$; $^{***}p < .001$; NS, no statistical difference; RLU, relative luminescence units.

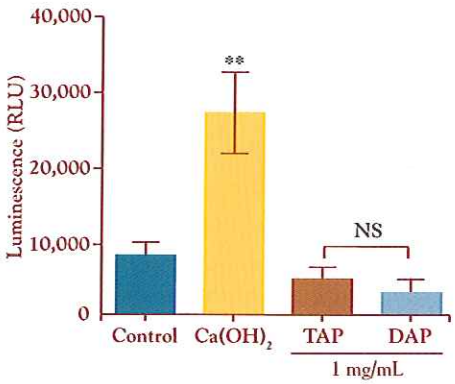


Figure 3. SCAP culture on dentin treated for 28 days with TAP or DAP at the concentration of 1 mg/mL supported cell viability, with no difference from control. $^{**}p < .01$; NS, no statistical difference; RLU, relative luminescence units.

Diagnosis and Management of Endo-perio Lesions

Many factors contribute to the development and progression of endodontic and periodontal diseases; however, the primary cause of both is the presence of a bacterial infection. It has been speculated that pulpal and periodontal problems are responsible for more than half of all tooth mortality. Often, the patient may present with either an endodontic or a periodontal disease problem, making the diagnosis and subsequent treatment decisions straightforward.

Clinically and/or radiographically, the disease process at times involves both the root canal space (endodontic infection) and the attachment apparatus (periodontal infection). When this occurs, diagnosis and management of the situation may become more complex and require additional considerations.

The following classification of endo-perio lesions by Simon et al (*J Periodontol* 1972) is frequently used:

- primary endodontic disease
- primary periodontal disease
- combined disease (primary endodontic disease with secondary periodontal involvement, primary periodontal disease with secondary endodontic involvement and "true" combined disease)

The main factors to take into account for making treatment decisions are pulp vitality and type, and the extent of periodontal defect. Aksel and Serper from Hacettepe University, Turkey, reported on the diagnosis and management of different types of endo-perio lesions, emphasizing the importance of the correct treatment sequence.

Teeth with primary endodontic disease are associated with a necrotic and infected pulp and attachment loss in the presence of plaque and calculus. These teeth are nonresponsive to thermal and electrical testing. Occasionally, periradicular lesions of endodontic origin may be radiographically indistinguishable from periodontal disease, with loss of bone in the furcation area and/or along the root surface (Figure 4). If a sinus tract develops along the root surface, deep clinical probing defects will be present. These defects do not indicate the presence of periodontal disease, nor do they require scaling or root planing; instead, the probing defect reveals a sinus tract, which should close within 1 to 2 weeks after the cleaning and shaping, and the use of calcium hydroxide as an intracanal medication.

Following conventional endodontic treatment, the furcation, apical and lateral radiolucencies will heal. After the cleaning and shaping of the root canal system and the removal of visible plaque and calculus, the tooth should be reevaluated in 2 to 3 months to ascertain the need for additional periodontal treatment. Often, the radiolucencies will begin to disappear after endodontic treatment alone.

In cases of primary periodontal disease with secondary endodontic involvement, the apical progression of periodontal disease may continue until the periapical tissues are involved. The pulp may become

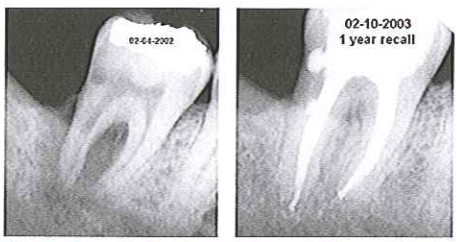


Figure 4. At left, a preoperative radiograph of a mandibular molar diagnosed with extensive bone loss. At right, a 1-year follow-up radiograph after endodontic treatment. *(Images courtesy of Dr. Frederic Barnett.)*

necrotic as a result of the periodontal infection entering via lateral canals or the apical foramen. These case types require both endodontic and periodontal therapies. In true combined disease cases, the teeth with concurrent endodontic and periodontal diseases have 2 simultaneously occurring disease processes and therefore require both endodontic and periodontal therapies.

Conclusion

Periradicular lesions of endodontic origin may be radiographically indistinguishable from periodontal disease (furcation radiolucencies, deep probing defects). Sensitivity testing (cold testing, electric pulp testing) is required to assess pulp vitality. Treatment of teeth with concurrent endodontic and periodontal diseases must address both problems.

Aksel H, Serper A. A case series associated with different kinds of endo-perio lesions. J Clin Exp Dent *2014;6:e91-e95.*

The Anesthetic Efficacy of Supplemental Articaine

Obtaining profound anesthesia for proper patient management is critically important. For mandibular teeth diagnosed with symptomatic irreversible pulpitis, the inferior alveolar nerve block (IANB) is the recommended procedure to obtain local anesthesia. However, several studies have shown that the IANB has a high failure rate, especially in patients presenting with pain in endodontically involved mandibular molars with irreversible pulpitis. Various mechanisms have been proposed to explain this phenomenon, the most plausible explanation being the activation of tetrodotoxin and capsaicin-sensitive transient receptor potential vanilloids as a result of the inflammation.

Several studies have reported that supplemental articaine infiltration in addition to the IANB injection had significantly higher success rates than IANB alone in patients with irreversible pulpitis. To compare the anesthetic efficacy of 2 different volumes (1.8 mL and 3.6 mL) of 4% articaine with 1:100,000 epinephrine, injected as buccal infiltrations after a failed IANB injection in patients with symptomatic irreversible pulpitis, Singla et al from SGT Dental College, India, studied 234 adults diagnosed with irreversible pulpitis in a mandibular tooth who participated in a multicenter randomized, double-blind trial.

Patients received IANB injections with 1.8 mL of 4% articaine with 1:100,000 epinephrine. Pain during treatment was recorded using the Heft-Parker visual analog scale (HP VAS). The primary outcome measure and the definition of success was the ability to undertake pulp chamber access and canal instrumentation with no pain or mild pain (HP VAS score <55 mm).

Patients experiencing moderate-to-severe pain (HP VAS score ≥55 mm) were randomly allocated to 2 groups and received buccal infiltrations with either 1.8 mL or 3.6 mL of 4% articaine with 1:100,000 epinephrine. Root canal treatment was reinitiated after 10 minutes.

Success was defined as no pain or mild pain during endodontic access preparation and instrumentation. Statistical analysis was performed using the Mann-Whitney *U* and χ^2 tests. Overall, the success rate with supplementary buccal infiltration was

- 62% with 1.8 mL
- 64% with 3.6 mL

Neither technique had a 100% success rate.

Conclusion

Increasing the volume of 4% articaine with 1:100,000 epinephrine from 1.8 mL to 3.6 mL, given as supplementary buccal infiltrations after a failed primary IANB with 1.8 mL of 4% articaine with 1:100,000 epinephrine, did not significantly improve anesthetic success rates in patients with symptomatic irreversible pulpitis.

Singla M, Subbiya A, Aggarwal V, et al. Comparison of the anaesthetic efficacy of different volumes of 4% articaine (1.8 mL and 3.6 mL) as supplemental buccal infiltration after failed inferior alveolar nerve block. Int Endod J *2014;doi:10.1111/iej.12283.*

In the next issue:

- Decision-making for apical periodontitis
- Post-obturation pain following root canal
- Treatment outcome of MTA

Do you or your staff have any questions or comments about **Update on Endodontics**? Please call or write our office. We would be happy to hear from you.