Title: Levels of evidence for the outcome of regenerative endodontic therapy

Author: Evangelos, G et al.

Journal: JOE, Vol. 40, No. 8, 1045

Reviewer: Raj Shenoy, DDS

Purpose: To assign levels of evidence to existing clinical articles related to the outcome of regenerative endodontic therapy and to evaluate the clinical and radiographic outcomes of this treatment modality.

Regenerative endodontic therapy- biologically based procedure that aims to replace previously damaged pulp-dentin complex by new vital tissue resulting in partial restoration of the functional properties of the involved tooth.

Materials & Methods:
- Electronic search performed using PubMed database from January 1993-December 2003
- Targeted medical subject headings (MeSH) terms for electronic search were used
- Scopus and Cochrane databases were explored to find additional relevant articles
- 4 other relevant scientific journal were hand searched
- Specific inclusion and exclusion criteria were determined
- LOE was assessed independently by 3 reviewers.
- Quality assessment of the observational studies was executed by using the Newcastle-Ottawa scale

Results: Fifty-one clinical studies were used (LOE 2: 2 studies, LOE 4: 8 studies, LOE 5: 41 studies). The majority of the teeth treated in the papers showed resolution of clinical symptoms and PARL's during follow up. Most of the treated teeth increased in root length, root wall thickness, and apical closure during follow up.

Conclusions: Due to the lack of high level evidence, it was not possible to answer the review question and definitely determine the outcome of regenerative therapy. Regenerative endodontic therapy is considered to be a safe and effective treatment option. More high quality studies would strengthen the EBD recommendation.

LOE: 3
Introduction: Pulse oximetry is a noninvasive method for assessing vascular health based on oxygen saturation level. The method has recently also been used to assess dental pulp vitality, but a median oxygen saturation level suggestive of normal pulp physiology has not been determined. The objective of this study was to make a critical analysis of the published research to establish the median oxygen saturation for the diagnosis of normal dental pulps in maxillary anterior permanent teeth using pulse oximetry.

Materials and Methods: Studies reporting on the use of pulse oximeters to determine oxygen saturation in dental pulps were retrieved using the MEDLINE, Scientific Electronic Library Online, and Cochrane Central Register of Controlled Trials databases plus a manual search of relevant references cited by selected articles. Different combinations of the terms “oximetry,” “oximeter,” “pulp,” “dental,” and “dentistry” were used in the search. Statistical analysis was performed for each group of teeth (central incisors, lateral incisors, and canines) using R statistical software (US EPA ORD NHEERL, Corvallis, OR) and a random effects model ($P < .0001$) with an $I^2$ of 99%.

Results: Of the 295 articles found, only 6 met the inclusion criteria (472 teeth). Of these, the number of articles included in each analysis (according to tooth group) was as follows:

- all 6 studies (288 teeth) for central incisors at a median oxygen saturation of 87.73%,
- 3 studies (90 teeth) for lateral incisors at a median oxygen saturation of 87.24%, and
- 4 studies (94 teeth) for canines at a median oxygen saturation of 87.26%.

Conclusion: The median oxygen saturation in normal dental pulps of permanent central incisors, lateral incisors, and canines was higher than 87%.

LOE: 3
Title: Effect of ibuprofen on masking endodontic diagnosis.

Author: Read J, et al.

Journal: JOE- 40,8: 1058-1062, 2014

Reviewed by: Saehee Kim, DMD

Purpose: To Measure the effect of Ibuprofen on mechanical allodynia in patients with odontalgia caused by symptomatic apical periodontitis and to measure the effect of ibuprofen on endodontic diagnostic tests.

Material and Methods: This is a randomized double-blind placebo-controlled clinical trial: Patient randomized, Treating dentist and patient unaware of treatment allocation, Randomized drug allocation. Two test groups were formed: ibuprofen vs. placebo. Sample size determined to be 20 in each group. Inclusion and Exclusion criteria:

- Inclusion criteria: premolar and molar with symptomatic apical periodontitis.
- Exclusion criteria: ASA physical status >3, periodontal pocketing >6 mm, absence of contralateral tooth, sensitivity to percussion in contralateral tooth, persistent use of steroids and antidepressants, NSAID allergy, Use of NSAIDS in previous 12 hours.

Once enrolled patients rated their pain using verbal numeric rating scale (VNRS). The examination includes palpation, percussion, and Endo Ice to the contralateral un-inflamed tooth, to the affected tooth, and to the contralateral and affected adjacent 2 teeth. The examine also include tooth’s bite force measured using bite force transducer (mechanical pain threshold). Five (5) measurements taken from the unaffected contralateral tooth and 2+ measurements taken to the inflamed affected tooth.

Once all the data were collected, statistics used the averages of pre- and post- bite force measurements, summarized demographics, patient characteristic, and outcome measures, compare the mean changes in outcomes from pretreatment to post-treatment of the two groups, compare mechanical pain threshold (bite force) to percussion and palpation, and compare before and after measurements of cold tests, palpation, and percussion.

Results: Forty-two subjects enrolled but 3 dropped out. Of the 39, 19 received ibuprofen while 20 received placebo. Percussion, palpation and cold test recorded before giving test drug and 1 hour after giving test drug. Ibuprofen treatment group: No statistical difference for palpation and percussion.

- 5/19 went from sensitive to percussion preoperatively to non-sensitive 1 hour after.
- 1/19 changed from moderately sensitive to slightly sensitive.
- 3/19 subjects changed slightly sensitive to non-sensitive(NS) to percussion.
- Placebo group: 2/20 changed from sensitive to percussion preoperative to NS postoperatively.

Mechanical pain thresholds tests show that it is highest among normal un-inflamed teeth and lowest among symptomatic teeth. This biting force remains relatively constant compared with the control teeth values (both treatment group and control group increased post-treatment). There was no statistical difference between the control and Ibuprofen group as measured by the increase in bite force. Contralateral control teeth mechanical pain thresholds increase by 24N for ibuprofen group and 25N for placebo group. The affected teeth showed 20 N for ibuprofen group and 33 N for placebo group. When comparing masking effects of ibuprofen on all diagnostic groups:

- Ibuprofen masked palpation the most while percussion less on the affected teeth.
- No masking effect noted in the placebo treatment group on palpation and percussion.

Conclusion: Ibuprofen taken before dental appointment can affect endodontic diagnostic tests results. However bite force measurements can assist with diagnosis in patients taking ibuprofen or analgesics.

LOE: 3
Title: Radiographic and clinical outcomes of the treatment of immature permanent teeth by revascularization or apexification: A pilot retrospective cohort study

Author: Alobaid A et al.

Journal: JOE – Volume 40(8), p 1063-5

Reviewer: Hao Tran, DDS

Purpose: This study compared clinical and radiographic outcomes of immature non-vital permanent teeth by apexification (calcium hydroxide or apical barrier with mineral trioxide aggregate) vs. revascularization in a retrospective cohort study.

Materials and Methods: A chart review of previous completed cases with recalls at NYU College of Dentistry was performed. Clinical and radiographic data were collected for 31 treated teeth (19 revascularization and 12 apexification cases). The patient ages were 6 to 16 yrs old. Permanent teeth in need of endodontic treatment that could be classified as calcium hydroxide, apexification, MTA apexification, or revascularization the tooth were included. Immature teeth (stage 1-4 according to Čvek’s criteria) were included. The average follow-up time of 17 months and a recall rate of 63% were given. Tooth survival, success rates, and adverse events were analyzed. Changes in radiographic root length, width, and area were quantified.

Results:

- Measurements: survival, clinical success, and adverse events.
- Survival was defined as the tooth remaining present in the arch throughout the study period.
- Clinical success was defined as a tooth that survived and also did not require another endodontic intervention during the recall period.
- TurboReg Plugin was used to minimize any dimensional changes that occurred as a result of angulation differences at the time the images were taken.
- Adverse events were defined as intraoperative or postoperative pain, flared-ups, staining and or internal bleaching, reinfection and fracture
- Characterization of adverse events was defined as follow:
  - Mild: No need for additional endodontic treatment
  - Moderate: Further endodontic treatment indicated after an event (eg: pain, swelling, or sinus tract) was present.
  - Severe: Tooth was or needed to be extracted

<table>
<thead>
<tr>
<th>Variable</th>
<th>Revascularization n(19)</th>
<th>Apexification n(12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survival: number (%)</td>
<td>18(95)</td>
<td>12(100)</td>
</tr>
<tr>
<td>Clinical success: number (%)</td>
<td>15(79)</td>
<td>12(100)</td>
</tr>
<tr>
<td>All adverse events: number (%)</td>
<td>8(42)</td>
<td>1(8)</td>
</tr>
</tbody>
</table>

Discussion: Among a total of 49 cases that were included, 18 cases did not have documentation of a recall visit (recall rate=63%) and were excluded. Of the remaining 31 cases, 19 were treated with revascularization treatment (Revasc group), 7 with Ca(OH)₂ apexification, and 5 with MTA apexification. Because of the small number of cases in the apexification group [Ca(OH)₂ and MTA], both were consolidated into 1 group (APEX group) with 12 APEX cases. The between-group difference in survival and clinical success were no significant between the two groups. (risk difference for clinical success- 0.21; 95% confidence interval [CI], 0.03-0.39), P=.09 and risk difference for nonsurvival = 0.05; 95% CL, 0.15 to 0.04, P=.40). This retrospective cohort study found that the clinical success and survival of immature teeth receiving revascularization treatment was comparable with that of traditional apexification treatment [Ca(OH)₂ or MTA]. However, the possibility of adverse events was more with revascularization.

LOE: 2
Title: The role of insurance and training in dental decision making.

Author: Aminobariae A et al.

Journal: JOE, Vol 40, Number 8, Pages 1082-1087

Reviewer: Christopher Adams, DMD

Purpose: The purpose of this investigation was to evaluate (1) the differences in treatment planning decisions between dental general practitioners and specialists and (2) the role of patients' insurance and/or type of treatment in decision making.

Materials and Methods: One hundred eighty subject charts were selected from 1,740 dental charts. Two specialists examined radiographs and reviewed the charts and then independently generated treatment plans. If there was disagreement between the 2 specialists, they discussed all aspects of the case until a consensus was reached.

Results: Four subjects were excluded. Thus, 176 patients were evaluated. A statistically significant difference ($\chi^2 = 202.303, P = .0001$) was found between treatment plans designed by GPs and those designed by specialists. Patients' insurance status did not influence the degree of agreement between specialists and GPs. The odds ratio for Medicaid was 0.431 (95% confidence interval [CI], 0.103–1.801; $P = .249$), and for self-pay, it was 0.801 (95% CI, 0.328–1.955; $P = .627$). However, logistic regression analysis showed that the type of treatment plan designed by GPs (i.e., endodontic treatment, endodontic retreatment, and extraction followed by implant placement) was significantly related to the degree of disagreement with the specialists (odds ratio = 4.522; 95% CI, 1.378–14.84; $P = .013$).

Conclusion: Insurance did not play a role in the decision-making portion of the treatment plan. However, the type of treatment was found to be significant. Implant cases had the highest disagreement between the specialists and the general dentists.

LOE: 3
Title: Prognostic factors relating to the outcome of endodontic microsurgery

Author: Lui J, et al.

Journal: JOE- 40,8: 1071-1076, 2014

Reviewed by: Saehee Kim, DMD

Purpose: Evaluate the outcome of endodontic microsurgery and examine prognostic factors related to healing.

Material and Methods: This is a Retrospective study using clinical records of all patients undergoing endodontic microsurgery over period of 6 years (1997-2003) at the National Dental Centre of Singapore. Teeth with previous root-end surgery, vertical root fractures, root resorption and perforations were excluded. Model:

- Surgical Technique: surgical procedures were performed using Surgical Operating microscope. Triangular flaps and osteotomies, root-end preparations performed with surgical ultrasonic tips, and IRM or MTA used for filling materials. Patient seen 5 days post operatively for suture removal while PA radiograph taken on surgery completion and every 6 months subsequently for 1 to 2 years.
- Radiographic Evaluation: Preoperative and postoperative radiographs evaluated by 2 independent endodontist. A third endodontist evaluation was used in case there is a disagreement between the initial 2 endodontists. Radiographic interpretations were based on Rud et al. categories (Complete healing, Incomplete healing, Uncertain healing, Unsatisfactory healing).
- Outcome Assessment grouped into 3 categories based on Friedman criteria (healed, healing, persistent disease).
- Statistical Analysis of variables (Demographics, Preoperative variables, Intraoperative variables, histology results) was examined using Fisher exact tests.

Results: Two hundred forty-three patients underwent endodontic microsurgery during the study period. Exclusion criteria left only 93 teeth (38%) eligible for study and subjected to further analysis.

- Outcome assessment: healed (71%), healing (7.5%), and with persistent disease (21.5%).
- Prognostic Factors: Sex, tooth type and probing depth are significantly predictive of outcome.
  - Females have higher odds of healing than males.
  - Maxillary teeth more likely to be healed than mandibular teeth. Maxillary anterior more successful then mandibular anterior teeth. No difference in success between maxillary and mandibular posterior teeth.
  - Presence of preoperative probing depth less than or equal 3 mm was predictive of higher likelihood of healing.

Conclusion: Use of modern endodontic surgical techniques and materials resulted in 78.5% healed and healing teeth during recall period of 1-2 years. Good prognostic factors include sex (females greater males), maxillary anterior teeth (higher success rate than mandibular anterior), and preoperative probing depths (less than or equal to 3 mm were associated with higher success rate).

LOE: 4
Title: Five year results comparing mineral trioxide aggregate and adhesive resin composite for root-end sealing in apical surgery

Author: von Arx T et al.


Reviewer: Nadia Liss, DMD

Purpose: Recent meta-analyses of the outcome of apical surgery using modern techniques including microsurgical principles and high-power magnification have yielded higher rates of healing (success rates of 94% reported by Seltzer et al and 89% by Tsesis et al.). However, the information is mainly based on 1- to 2-year follow-up data. This article assessed a large sample of teeth treated with apical surgery after 5 years

Materials & Methods:

- 5-year follow-up assessment of a previously evaluated 1-year follow-up cohort of 339 patients with the same number of treated teeth
- Patients originally enrolled consecutively in a prospective clinical study comparing 2 different methods of root-end cavity preparation and root-end sealing without randomization
- All patients were treated by the same surgeon with local anesthesia in an operating room using a surgical microscope. After flap elevation, osteotomy, root-end resection, and hemostasis, the cut root inspected with an endoscope.
- Root-end cavities prepared and filled with MTA (ProRoot; Dentsply Tulsa Dental) or a dentin-bonded adhesive resin composite (COMP) (Retroplast, Denmark) was placed in a shallow and concave root-end preparation.
- Outcome was categorized as healed or not healed based on clinical and radiographic findings. The latter was performed independently by 3 observers.
- Radiographic periapical healing was classified as complete, incomplete (scar tissue formation), uncertain, or unsatisfactory. 2 examiners needed to agree on the same healing category (healed - absence of clinical signs and symptoms with complete or incomplete (scar tissue) radiographic healing. In multirooted teeth, the least favorable root determined the healing classification of the tooth.
- Data was collected and statistically analyzed

Results: A total of 271 patients and teeth from a 1-year follow-up sample of 339 could be re-examined after 5 years (dropout rate = 20.1%). 134 patients treated with MTA and 137 treated with COMP. The overall rate of healed cases was 84.5% with a significant difference when comparing MTA (92.5%) and COMP (76.6%). The evaluation of secondary study parameters yielded no significant difference for healing outcome when comparing subcategories (i.e., sex, age, type of tooth treated, post/screw, type of surgery).

Conclusion: The results from this prospective nonrandomized clinical study with a 5-year follow-up of 271 teeth indicate that MTA exhibited a higher healing rate than COMP in the longitudinal prognosis of root-end sealing. The weaknesses of the study are that treatment methods were not randomly assigned and that only a single observer (the surgeon) assessed the clinical healing.

LOE: 4
Title: A comparative study of BioAggregate and ProRoot MTA on adhesion, migration, and attachment of human dental pulp cells

Author: Zhu L et al.

Journal: JOE, Vol. 40 (8); 1118-1123

Reviewer: Jeffrey Yui, DDS

Purpose: To evaluate the effects of BioAggregate on the adhesion, migration, and attachment behavior of human dental pulp cells and to compare the results to MTA.

Materials and Methods:

- BioAggregate and mineral trioxide aggregate (MTA) were prepared according to manufacturer instructions and separated in several dilutions (undiluted, ½, ¼)
- Healthy human dental pulp cells (HDPC) extracted from premolars (18-25 years of age)
- Cell counting kit-8 assay and cell adhesion assay measured optical densities at 450 nm and 560 nm, respectively after HDPC added with dilutions
- Cell migration assessed using scratch wound healing model; pipette tip created artificial scratch wound on monolayer and cells counted under high-powered fields
- Double-labeling immunofluorescence assay performed by incubating cells with mouse antihuman vinculin and then incubating with TRITC-conjugated (fluorescent) goat antimouse immunoglobulin G; cells observed and photographed under fluorescence microscope
- Samples of each test material observed under scanning electron microscope
- Statistical analysis performed using 1-way analysis of variance followed by Student-Newman-Keuls test.

Results:

- Influence of different material extracts on cell viability of HDPCs
  - Undiluted extracts of BioAggregate: statistically higher cell viability than control at 24, 48 hrs and similar cell viability at 72 hrs
  - Cell viability of HDPCs treated with all 3 dilutions of MTA extracts was slightly lower than control group at 72 hrs
  - BioAggregate extracts significantly higher than MTA’s for all dilutions at 72 hrs
  - No significant difference in cell viabilities between ½ and ¼ dilutions at 24, 48 hrs
- Influence of different material extracts on cell adhesion
- Undiluted BioAggregate extracts – significantly enhanced adhesion ability of HDPCs compared to control and MTA groups but comparable in ½ and ¼ dilutions.
- Material extracts on migration of HDPCs
  - BioAggregate in all 3 dilutions as well as MTA at 1/1 and ½ dilutions showed higher migration ability than control
  - Undiluted BioAggregate significantly higher than MTA
- Double-labeling immunofluorescence
  - Control cells: few dot-like focal contacts distributed at tip of cell protrusions
  - Undiluted extracts of BioAggregate and MTA showed distinct shape of focal contacts containing vinculin
- Scanning electron microscopy
  - HDPCs cultured on BioAggregate more flattened and exhibited better spreading than cells cultured on MTA

Discussion: Findings show that BioAggregate is able to promote the adhesion, migration, and attachment of HDPCs, indicating excellent cytocompatibility compared to MTA. While BioAggregate appears to be a possible alternative to MTA for pulp capping, future in vivo experimental models as well as randomized clinical trials are recommended.

LOE: 5
Title: Apical constriction: location and dimensions in molars - A micro-computed tomography study

Author: ElAyouti A et al.

Journal: Journal of Endodontics, Vol 40 (8); 1095

Reviewer: Christina Lee, DDS

Purpose: To validate the existence of the apical constriction and determine its location and dimensions in molars by using micro-computed tomography analysis

Materials and Methods:

- 90 extracted human maxillary and mandibular molars = 271 canals were evaluated, separated into three age groups, exclusions: apical resorption, incomplete root formation and wisdom teeth
- Teeth were scanned by micro-computed tomography with a resolution of 27 μm
- Multi-threshold segmentation was performed to trace the canal outline in a total of 25,093 sections
- Tracing threshold accuracy was confirmed by scanning a tooth with a drill hole of known dimensions with the same MCT protocol
- 25,093 sections were analyzed using 88 parameters, e.g. canal area, maximum and minimum diameter
- Parameters were plotted using JMP® statistic program to find abrupt widening or narrowing of canals
- Apical constriction: the narrowest area extending along a distance of 0.1mm or more at the apex
- Size and form of the apical constriction (AC) were recorded as well as the distance to the apical foramen (AC-AF) and apex (AC-A)
- Two operators individually determined the location of the apical constriction and consensus reached when necessary

Results: The apical constriction was found in all canals. The apical constriction was in close proximity to the foramen (0.2mm). The mean distance of AC-AF was 0.2 mm (99% confidence interval, 0.15–0.24; range, 0–0.6 mm), and of AC-A it was 0.9 mm (99% confidence interval, 0.86–1.0; range, 0.1–1.7 mm). The type of canal had no influence on AC-AF and AC-A. The most common form of constriction was the parallel form (76%). The mean size of constriction corresponded to endodontic instrument size 30. Those in the younger age group had a significantly larger constriction.

Conclusions: The apical constriction was found to be located at or close to the foramen. The most common form was the parallel form.

LOE: 5
Title: Effect of verapamil, a calcium channel blocker on odontogenic activity of HDPC’s cultured with silicate based materials.

Authors: Buor- Chang WV et al.

Journal : J Endo, 40(8):1105-11

Reviewed by: Hari P Chebrolu, DMD

Purpose: The purpose of this study was to examine the protein changes related to odontoblastic differentiation in Human dental pulp cells (HDPC) when Calcium Silicate (CS) based material is applied to cells and to examine the role of silicon ions in the differentiation of HDPC’s by using L-type calcium channel blocker, Verapamil.

Materials & Methods:

- Specimen: MTA and CS cement are mixed at same liquid/ powder ratio of 0.3ml/g and incubated in a 24 well plate for 24 hrs in 100% relative humidity.
- HDPC Isolation & Culture: Pulp extracted from caries free premolars extracted for orthodontic purpose was used.
- Preparation of Test Medium with different Silicon Concentration: The cement extract and DMEM are used to prepare media with different silicon ion concentrations, 1, 2, and 4 mmol/l. The silicon concentration at different time periods was analyzed by using inductively coupled plasma-atomic emission spectrometer.
- Cytotoxicity: Cell viability was tested using Preston Blue assay. Cell cultures on tissue culture plates without the cements were used as control. Western blot was done to view odontogenic markers. Alzarin Red S Stain is used to see the calcium deposits.

Results:

- Ion Concentration: The silicon ion concentration released from the CS cement is higher than that released from MTA. Also, the ion concentration increased with increasing incubation times.
- Cell Viability: Cell viability increased with increasing concentration of Silicon ions, however, lower amounts of HDPC’s were cultured on DMEM blocked with Verapamil.
- Silicon is shown to up regulate the levels of differentiation markers while Verapamil has significantly decreased it.

Conclusion: Silicon ions play a significant role in the proliferation and differentiation of HDPC’S through Calcium channels by MAPK signaling pathway. Patients on Calcium channel blockers show decreased proliferation and differentiation of HDPC’s when CS based cements are used.

LOE: 5
Title: Effective analysis of the use of peracetic acid after instrumentation of root canals contaminated with *Enterococcus faecalis*

Author: Berwanger Cord C et al.

Journal: JOE, Vol.40, No 8, Pages 1145–1148

Reviewer: Youngsook Chae, DMD

Purpose: This is an evaluation the effectiveness of peracetic acid (PAA) in cleaning root canals contaminated with *Enterococcus faecalis*.

Materials and Methods:

- 60 Mand. 1st molars and 2nd molars were used.
- MB canals were prepared with Reciproc System (VDW, Munich, Germany) and irrigated with 10 mL saline during instrumentation.
- Randomly divided into 3 groups (n = 20), according to the irrigation solution to be used after instrumentation:
  - group PAA (5 mL 1% PAA)
  - group EDTA/sodium hypochlorite (NaOCl) (5 mL 17% EDTA followed by 5 mL 2.5% sodium hypochlorite)
  - group S (5 mL saline)
- Microbiological samples were collected before instrumentation and after final irrigation.
- Bacterial quantification was performed by counting the number of colony-forming units (CFUs/mL).
- Analysis by the nonparametric Wilcoxon and Kruskal-Wallis tests.

Results: All 3 groups showed a significant reduction (P < .05) in CFUs/mL after final irrigation. PAA and NaOCl associated with EDTA produced a significantly higher reduction in CFUs/mL (P < .05) compared with saline. There was no statistically significant difference between PAA and EDTA + 2.5% NaOCl (P > .05).

<table>
<thead>
<tr>
<th>Table 1. Viable Counts (log₁₀ CFU/mL, median values) of <em>Enterococcus faecalis</em> before Instrumentation and after Final Irrigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before instrumentation</td>
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<tr>
<td>------------------------</td>
</tr>
<tr>
<td></td>
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<tr>
<td>After final irrigation</td>
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</tbody>
</table>

N₄O₄, sodium hypochlorite; PAA, peracetic acid.

Different letters in the vertical direction and different numbers in the horizontal direction indicate statistically significant differences (P < .05).

Conclusion: According to the results of the present study, the effectiveness of 1% PAA was similar to that of 17% EDTA + 2.5% NaOCl in cleaning curved root canals contaminated with *E. faecalis*.

LOE: 5
Title: Blood profile and histology in oral infections associated with diabetes

Author: Tavares L et al.

Journal: JOE, Volume 40, Number 8, pages 1139-1144

Reviewed by: Shin-Chieh Yang, DMD

Purpose: To Investigate the relationship between blood profile and histologic findings in both apical periodontitis (AP) and periodontal disease (PD) associated with diabetes (DM).

Materials and Methods:

- 80 male Wistar rats, weighing 200-250g and housed in temperature-controlled room, were assigned to the following 8 groups: (1)control, (2)AP, (3)PD, (4)AP associated with PD, (5)DM, (6)DM with AP, (7)DM with PD, (8)DM with both AP and PD.
- Induction Method: DM (Diabetes) was induced with Streptozotocin, AP was induced by creating pulpal exposure on the mesial surface of upper right 1st molars, PD was induced using periodontal ligature around the maxillary left 2nd molars.
- After 30 days, blood samples were collected. Hematologic examinations were conducted to determine the total number of erythrocytes and leukocytes, erythrocyte constant, and blood glucose level. The rats were then euthanized. The maxilla were processed for light microscopy, intensity and extension of inflammatory infiltrate and alveolar bone loss were then evaluated.

Results:

- Blood Profile: A statistically significant difference was observed among the mean cell volume (MCV), leukocyte, neutrophil, lymphocyte counts and blood glucose levels.
  - MCV of diabetic subjects was greater than that of non-diabetic subjects (p < 0.05)
  - The total number of leukocyte in the DM+ AP and DM+AP+PD groups was higher than that of C and PD groups.
  - The neutrophil count was higher in diabetic rats (P <0.05), and the presence of both oral infections and diabetes (DM+AP+PD) yielded the highest number of lymphocytes and neutrophils when compared with all the non-diabetic groups.
  - The presence of oral infections raised blood glucose concentrations in diabetic subject groups.
- Histologic Findings: No inflammation was noted in the periapical and periodontal regions of normal and diabetic rats without oral infection. When periapical lesions were established, the periapical inflammatory infiltrates composed primarily of neutrophils and mononuclear cells in DM + AP group were more severe than those in the AP group (P= 0.029). In the PD group, a chronic inflammatory response was observed. Periodontal inflammatory infiltrates were more severe in the diabetic groups (p = 0.045). DM+ AP group exhibited the most significant periapical lesions (P= 0.028), whereas the DM+DP group exhibited the most significant alveolar bone loss ( P=.000).

Conclusion: Diabetes accelerated the development and progression of AP and PD in the rats and caused an increase in the average erythrocyte volume as well as the leukocyte and neutrophil counts. Oral infections increase the total number of leukocytes, the number of neutrophils and lymphocytes, and blood glucose concentrations in DM rats.

LOE: 5