

Die Wurzelkanalaufbereitung

Bei der antibakteriellen Desinfektion müssen mögliche Nebenwirkungen beachtet werden. Ebenfalls kann es bei der Kombination verschiedener Präparate zu Interaktionen zwischen den Wirkstoffen kommen. Von Prof. Dr. Peter Städtler, Graz.

Literaturverweise

- [1] Gencoglu N, Samani S, Günday M. Evaluation of sealing properties of Thermafil and Ultrafil techniques in the absence or presence of smear layer. *J of Endodontics* 1993;19:599-6604.
- [2] Taylor JK, Jeansson BG, Lemon RR. Coronal leakage: Effects of smear layer, obturation technique, and sealer. *J of Endodontics* 1997;23:508-512.
- [3] De-Deus G, Namen F, Galan J, Jr., Zehnder M: Soft chelating irrigation protocol optimizes bonding quality of Resilon/Epiphany root fillings. *J Endod* 2008;34:703-705.
- [4] Shahravan A, Haghdoost A-A, Adl A, Rahimi H, Shadifar F: Effect of Smear Layer on Sealing Ability of Canal Obturation: A Systematic Review and Meta-analysis *J Endod* 2007; 33:96–105.
- [5] Paque F, Luder HU, Sener B, Zehnder M: Tubular sclerosis rather than the smear layer impedes dye penetration into the dentine of endodontically instrumented root canals. *Int Endod J* 2006;39:18-25.
- [6] De-Deus G, Soares J, Leal F, Luna AS, Fidel S, Fidel RA: Similar Glucose Leakage Pattern on Smear-covered, EDTA-treated and BioPure MTAD-treated Dentin. *J Endod* 2008;34:459-462.
- [7] Saleh IM, Ruyter IE, Haapasalo M, Orstavik D: Bacterial penetration along different root canal filling materials in the presence or absence of smear layer. *Int Endod J* 2008;41:32-40.
- [8] Spano JC, Silva RG, Guedes DF, Sousa-Neto MD, Estrela C, Pecora JD: Atomic absorption spectrometry and scanning electron microscopy evaluation of concentration of calcium ions and smear layer removal with root canal chelators. *J Endod* 2009;35:727-730.
- [9] De-Deus G, Paciornik S, Pinho Mauricio MH, Prioli R: Real-time atomic force microscopy of root dentine during demineralization when subjected to chelating agents. *Int Endod J* 2006;39:683-692.
- [10] Amaral KF, Rogero MM, Fock RA, Borelli P, Gavini G. Cytotoxicity analysis of EDTA and citric acid applied on murine resident macrophages culture. *International Endodontic Journal* 2007; 40: 338–343.
- [11] Sadr Lahijani MS, Raoof Kateb HR, Heady R, Yazdani D: The effect of German chamomile (*Marticaria recutita* L.) extract and tea tree (*Melaleuca alternifolia* L.) oil used as irrigants on removal of smear layer: a scanning electron microscopy study. *Int Endod J* 2006;39:190-195.

- [12] Kuah HG, Lui JN, Tseng PS, Chen NN: The effect of EDTA with and without ultrasonics on removal of the smear layer. *J Endod* 2009;35:393-396.
- [13] Gu XH, Mao CY, Kern M: Effect of different irrigation on smear layer removal after post space preparation. *J Endod* 2009;35:583-586.
- [14] Kastáková A, Wu MK, Wesselink PR: An in vitro experiment on the effect of an attempt to create an apical matrix during root canal preparation on coronal leakage and material extrusion. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2001; 91: 462-467.
- [15] Berber VB, Gomes BP, Sena NT, Vianna ME, Ferraz CC, Zaia AA, Souza-Filho FJ: Efficacy of various concentrations of NaOCl and instrumentation techniques in reducing Enterococcus faecalis within root canals and dentinal tubules. *Int Endod J* 2006;39:10-17.
- [16] Marending M, Paque F, Fischer J, Zehnder M: Impact of irrigant sequence on mechanical properties of human root dentin. *J Endod* 2007;33:1325-1328.
- [17] Öncag Ö, Hosgör M, Hilmioglu S, Zekioglu O, Eronat C, Burhanoglu D: Comparison of antibacterial and toxic effects of various root canal irrigants. *Int Endod J* 2003; 36: 423-432.
- [18] Hahn W: Zwischenfall bei der Wurzelkanalspülung mit NaOCl und H₂O₂. *Endodontie* 2000; 1: 53-59.
- [19] Gernhardt CR, Eppendorf K, Kozlowski A, Brandt M: Toxicity of concentrated sodium hypochlorite used as an endodontic irrigant *International Endodontic Journal* 2004; 37: 272.
- [20] Schwerin C, Gerlach KL: Iatogene Zwischenfälle bei der Wurzelkanalspülung mit Natriumhypochlorit - Falldarstellung. *Quintessenz* 2007; 58: 1041-1044.
- [21] Sennhenn-Kirchner S, Hülsmann M: Probleme bei der Diagnostik eines Spülzwischenfalls mit Natriumhypochlorit - Ein Fallbericht. *Endodontie* 2008; 17: 243-249.
- [22] Hülsmann M, Hahn W: Complications during root canal irrigation - literature review and case reports. *International Endod J* 2000; 33:186-193
- [23] Zairi A, Lambrianidis T: Injektion von Natriumhypochlorit in die Kieferhöhle. Ein Spülzwischenfall. *Quintessenz* 2009; 60 (1): 27-30.
- [24] Peters OA, Roehlike JO, Baumann MA: Effect of immersion in sodium hypochlorite on torque and fatigue resistance of nickel-titanium instruments. *J Endod* 2007;33:589-593.
- [25] Marending M, Paque F, Fischer J, Zehnder M: Impact of irrigant sequence on mechanical properties of human root dentin. *J Endod* 2007;33:1325-1328
- [26] Ormiga Galvao Barbosa F, Antonio da Cunha Ponciano Gomes J, Pimenta de Araujo MC: Influence of sodium hypochlorite on mechanical properties of K3 nickel-titanium rotary instruments. *J Endod* 2007;33:982-985
- [27] Nielsen BA, Craig Baumgartner J: Comparison of the EndoVac system to needle irrigation of root canals. *J Endod* 2007;33:611-615.

- [28] Hockett JL, Dommisch JK, Johnson JD, Cohenca N: Antimicrobial efficacy of two irrigation techniques in tapered and nontapered canal preparations: an in vitro study. *J Endod* 2008;34:1374-1377.
- [29] Desai P, Himel V: Comparative safety of various intracanal irrigation systems. *J Endod* 2009;35:545-549.
- [30] Boutsioukis C, Lambrianidis T, Kastrinakis E: Irrigant flow within a prepared root canal using various flow rates: a Computational Fluid Dynamics study. *Int Endod J* 2009;42:144-155.
- [31] Boutsioukis C, Lambrianidis T, Kastrinakis E, Bekiaroglou P: Measurement of pressure and flow rates during irrigation of a root canal ex vivo with three endodontic needles. *Int Endod J* 2007;40:504-513.
- [32] DGZ-Stellungnahme. Die Wurzelkanalspülung. *Dtch zahnärztl Z* 2006;61: 449 -449
- [33] Schwerin C, Gerlach KL: Iatogene Zwischenfälle bei der Wurzelkanalspülung mit Natriumhypochlorit - Falldarstellung. *Quintessenz* 2007; 58: 1041-1044.
- [34] Siqueira JF, Jr., Magalhaes KM, Rocas IN: Bacterial reduction in infected root canals treated with 2.5% NaOCl as an irrigant and calcium hydroxide/camphorated paramonochlorophenol paste as an intracanal dressing. *J Endod* 2007;33:667-672.
- [35] Martinho FC, Gomes BP: Quantification of endotoxins and cultivable bacteria in root canal infection before and after chemomechanical preparation with 2.5% sodium hypochlorite. *J Endod* 2008;34:268-272.
- [36] Vianna ME, Horz HP, Gomes BP, Conrads G: In vivo evaluation of microbial reduction after chemo-mechanical preparation of human root canals containing necrotic pulp tissue. *Int Endod J* 2006;39:484-492.
- [37] Vianna ME, Gomes BP: Efficacy of sodium hypochlorite combined with chlorhexidine against Enterococcus faecalis in vitro. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2009; 107: 585-589.
- [38] Sayin TC, Cehreli ZC, Deniz D, Akcay A, Tuncel B, Dagli F, Gozukara H, Kalayci S: Time-dependent decalcifying effects of endodontic irrigants with antibacterial properties. *J Endod* 2009;35:280-283.
- [39] Krause TA, Liewehr FR, Hahn CL: The antimicrobial effect of MTAD, sodium hypochlorite, doxycycline, and citric acid on Enterococcus faecalis. *J Endod* 2007; 33: 28-30.
- [40] Gomes BP, Montagner F, Berber VB, Zaia AA, Ferraz CC, de Almeida JF, Souza-Filho FJ: Antimicrobial action of intracanal medicaments on the external root surface. *J Dent* 2009;37:76-81.
- [41] Davis JM, Maki J, Bahcall JK: An in vitro comparison of the antimicrobial effects of various endodontic medicaments on Enterococcus faecalis. *J Endod* 2007;33:567-569.
- [42] Newberry BM, Shabahang S, Johnson N, Aprecio RM, Torabinejad M: The

Antimicrobial Effect of Biopure MTAD on Eight Strains of Enterococcus faecalis: An In Vitro Investigation. J Endod 2007;33:1352-1354.

[43] Giardino L, Ambu E, Becce C, Rimondini L, Morra M: Surface tension comparison of four common root canal irrigants and two new irrigants containing antibiotic. J Endod 2006;32:1091-1093.

[44] De-Deus G, Reis C, Fidel S, Fidel R, Paciornik S: Dentin Demineralization When Subjected to BioPure MTAD: A Longitudinal and Quantitative Assessment. J Endod 2007;33:1364-1368.

[45] Shabahang S, Aslanyan J, Torabinejad M: The substitution of chlorhexidine for doxycycline in MTAD: the antibacterial efficacy against a strain of Enterococcus faecalis. J Endod 2008;34:288-290.

[46] Bui TB, Baumgartner JC, Mitchell JC: Evaluation of the interaction between sodium hypochlorite and chlorhexidine gluconate and its effect on root dentin. J Endod 2008;34:181-185.

[47] Rasimick BJ, Nekich M, Hladek MM, Musikant BL, Deutsch AS: Interaction between Chlorhexidine Digluconate and EDTA. J Endod 2008;34:1521-1523.

[48] Al-Jadaa A, Paque F, Attin T, Zehnder M: Necrotic pulp tissue dissolution by passive ultrasonic irrigation in simulated accessory canals: impact of canal location and angulation. Int Endod J 2009;42:59-65.

[49] Munley PJ, Goodell GG: Comparison of passive ultrasonic debridement between fluted and nonfluted instruments in root canals. J Endod 2007;33:578-580.

[50] van der Sluis LW, Versluis M, Wu MK, Wesselink PR: Passive ultrasonic irrigation of the root canal: a review of the literature. Int Endod J 2007;40:415-426.

[51] McGill S, Gulabivala K, Mordan N, Ng YL: The efficacy of dynamic irrigation using a commercially available system (RinsEndo) determined by removal of a collagen 'bio-molecular film' from an ex vivo model. Int Endod J 2008;41:602-608.

[52] Hauser V, Braun A, Frentzen M: Penetration depth of a dye marker into dentine using a novel hydrodynamic system (RinsEndo). Int Endod J 2007;40:644-652.

[53] Huth KC, Quirling M, Maier S, Kamereck K, Alkhayer M, Paschos E, Welsch U, Miethke T, Brand K, Hickel R: Effectiveness of ozone against endodontopathogenic microorganisms in a root canal biofilm model. Int Endod J 2009;42:3-13.

[54] Virtej A, Mackenzie CR, Raab WH, Pfeffer K, Barthel CR: Determination of the performance of various root canal disinfection methods after in situ carriage. J Endod 2007;33:926-929.

[55] Bergmans L, Moisiadis P, Teughels W, Van Meerbeek B, Quirynen M, Lambrechts P: Bactericidal effect of Nd:YAG laser irradiation on some endodontic pathogens ex vivo. Int Endod J 2006;39:547-557.

- [56] George R, Walsh LJ: Apical extrusion of root canal irrigants when using Er:YAG and Er,Cr:YSGG lasers with optical fibers: an in vitro dye study. *J Endod* 2008;34:706-708.
- [57] Siqueira JF, Jr., Guimaraes-Pinto T, Rocas IN: Effects of chemomechanical preparation with 2.5% sodium hypochlorite and intracanal medication with calcium hydroxide on cultivable bacteria in infected root canals. *J Endod* 2007;33:800-805.
- [58] Siqueira JF, Jr., Paiva SS, Rocas IN: Reduction in the cultivable bacterial populations in infected root canals by a chlorhexidine-based antimicrobial protocol. *J Endod* 2007;33:541-547.
- [59] Yang WK, Kim MR, Lee Y, Son HH, Lee W: Effect of Calcium Hydroxide-Treated *Prevotella nigrescens* on the Gene Expression of Matrix Metalloproteinase and Its Inhibitor in MG63 Cells. *J Endod* 2006; 32: 1142-1145.
- [60] Khan AA, Sun X, Hargreaves KM: Effect of calcium hydroxide on proinflammatory cytokines and neuropeptides. *J Endod* 2008;34:1360-1363.
- [61] Baik JE, Kum KY, Yun CH, Lee JK, Lee K, Kim KK, Han SH: Calcium hydroxide inactivates lipoteichoic acid from *Enterococcus faecalis*. *J Endod* 2008;34:1355-1359.
- [62] Komabayashi T, D'Souza R N, Dechow PC, Safavi KE, Spangberg LS: Particle size and shape of calcium hydroxide. *J Endod* 2009;35:284-287.
- [63] Saif S, Carey CM, Tordik PA, McClanahan SB: Effect of Irrigants and Cementum Injury on Diffusion of Hydroxyl Ions through the Dentinal Tubules. *J Endod* 2008;34:50-52.
- [64] Kim JW, Cho KM, Park SH, Song SG, Park MS, Jung HR, Song JY, Kim JS, Lee SK: Overfilling of calcium hydroxide-based paste Calcipex II produced a foreign body granuloma without acute inflammatory reaction. *Oral Surg* 2009; 107 (3): e73-e76.
- [65] Krithikadatta J, Indira R, Dorothykalyani AL: Disinfection of dentinal tubules with 2% chlorhexidine, 2% metronidazole, bioactive glass when compared with calcium hydroxide as intracanal medicaments. *J Endod* 2007;33:1473-1476.
- [66] Lee JK, Baik JE, Yun CH, Lee K, Han SH, Lee W, Bae KS, Baek SH, Lee Y, Son WJ, Kum KY: Chlorhexidine gluconate attenuates the ability of lipoteichoic acid from *Enterococcus faecalis* to stimulate toll-like receptor 2. *J Endod* 2009;35:212-215.
- [67] Basrani B, Tjaderhane L, Santos M, et al. Efficacy of chlorhexidine and calcium hydroxide containing medicaments against *Enterococcus faecalis* in vitro. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2003;96:618 –824.
- [68] Podbielski A, Spahr A, Haller B. Additive antimicrobial activity of calcium hydroxide and chlorhexidine on common endodontic bacterial pathogens. *J Endod* 2003;29:340–345.
- [69] da Silva RA, Leonardo MR, da Silva LA, de Castro LM, Rosa AL, de Oliveira PT: Effects of the Association between a Calcium Hydroxide Paste and 0.4% Chlorhexidine on the Development of the Osteogenic Phenotype In Vitro. *J Endod* 2008;34:1485-1489.

- [70] Wang CS, Arnold RR, Trope M, Teixeira FB: Clinical efficiency of 2% chlorhexidine gel in reducing intracanal bacteria. *J Endod* 2007;33:1283-1289.
- [71] Kontakiotis EG, Tsatsoulis IN, Papanakou SI, Tzanetakis GN: Effect of 2% chlorhexidine gel mixed with calcium hydroxide as an intracanal medication on sealing ability of permanent root canal filling: a 6-month follow-up. *J Endod* 2008;34:866-870.
- [72] Peters CI, Koka RS, Highsmith S, Peters OA: Calcium hydroxide dressings using different preparation and application modes: density and dissolution by simulated tissue pressure. *Int Endod J* 2005;38:889-895.
- [73] Stoll R, Jablonski B, Jablonski-Momeni A, Stachniss V: Zur Qualität der Applikation von Wurzelkanalmedikationen in Gelform und als Paste in Abhängigkeit von der Aufbereitungsgröße. *Deutsche Zahnärztl Z* 2008; 63: 544-549.
- [74] Chu FC, Leung WK, Tsang PC, Chow TW, Samaranayake LP: Identification of cultivable microorganisms from root canals with apical periodontitis following two-visit endodontic treatment with antibiotics/steroid or calcium hydroxide dressings. *J Endod* 2006;32:17-23.
- [75] Jacinto RC, Montagner F, Signoretti FG, Almeida GC, Gomes BP: Frequency, Microbial Interactions, and Antimicrobial Susceptibility of *Fusobacterium nucleatum* and *Fusobacterium necrophorum* Isolated from Primary Endodontic Infections. *J Endod* 2008;34:1451-1456.
- [76] Jacinto RC, Gomes BP, Shah HN, Ferraz CC, Zaia AA, Souza-Filho FJ: Incidence and antimicrobial susceptibility of *Porphyromonas gingivalis* isolated from mixed endodontic infections. *Int Endod J* 2006;39:62-70.
- [77] Garcez AS, Nunez SC, Hamblin MR, Ribeiro MS: Antimicrobial effects of photodynamic therapy on patients with necrotic pulps and periapical lesion. *J Endod* 2008;34:138-142.
- [78] Bergmans L, Moisiadis P, Huybrechts B, Van Meerbeek B, Quirynen M, Lambrechts P: Effect of photo-activated disinfection on endodontic pathogens ex vivo. *Int Endod J* 2008;41:227-239.