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**Thema:** Erhöht die mechanische Wurzelkanalaufbereitung die Inzidenz für Vertikalfrakturen und Microcracks?

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**Literatur:**

1. Ørstavik D, Ford TP. Essential Endodontology. 2 ed: Blackwell Munksgaard Ltd Oxford; 2008.
2. Garcia-Guerrero C, Parra-Junco C, Quijano-Guauque S, Molano N, Pineda GA, Marin-Zuluaga DJ. Vertical root fractures in endodontically-treated teeth: A retrospective analysis of possible risk factors. J Investig Clin Dent. 2017.
3. Tsesis I, Rosen E, Tamse A, Taschieri S, Kfir A. Diagnosis of vertical root fractures in endodontically treated teeth based on clinical and radiographic indices: a systematic review. J Endod. 2010;36(9):1455-8.
4. Fuss Z, Lustig J, Katz A, Tamse A. An evaluation of endodontically treated vertical root fractured teeth: impact of operative procedures. J Endod. 2001;27(1):46-8.
5. Dang DA, Walton RE. Vertical root fracture and root distortion: effect of spreader design. J Endod. 1989;15(7):294-301.
6. Rao MS, Shameem A, Nair R, Ghanta S, Thankachan RP, Issac JK. Comparison of the remaining dentin thickness in the root after hand and four rotary instrumentation techniques: an in vitro study. J Contemp Dent Pract. 2013;14(4):712-7.
7. Zandbiglari T, Davids H, Schafer E. Influence of instrument taper on the resistance to fracture of endodontically treated roots. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2006;101(1):126-31.
8. Wilcox LR, Roskelley C, Sutton T. The relationship of root canal enlargement to finger-spreader induced vertical root fracture. J Endod. 1997;23(8):533-4.
9. Helvacioğlu-Yigit D, Aydemir S, Yilmaz A. Evaluation of dentinal defect formation after root canal preparation with two reciprocating systems and hand instruments: an in vitro study. Biotechnol Biotechnol Equip. 2015;29(2):368-73.
10. Abou El Nasr HM, Abd El Kader KG. Dentinal damage and fracture resistance of oval roots prepared with single-file systems using different kinematics. J Endod. 2014;40(6):849-51.

11. Arias A, Lee YH, Peters CI, Gluskin AH, Peters OA. Comparison of 2 canal preparation techniques in the induction of microcracks: a pilot study with cadaver mandibles. *J Endod.* 2014;40(7):982-5.
12. Ashwinkumar V, Krithikadatta J, Surendran S, Velmurugan N. Effect of reciprocating file motion on microcrack formation in root canals: an SEM study. *Int Endod J.* 2014;47(7):622-7.
13. Bahrami P, Scott R, Galicia JC, Arias A, Peters OA. Detecting Dentinal Microcracks Using Different Preparation Techniques: An In Situ Study with Cadaver Mandibles. *J Endod.* 2017;43(12):2070-3.
14. Bayram HM, Bayram E, Ocak M, Uzuner MB, Geneci F, Celik HH. Micro-computed Tomographic Evaluation of Dentinal Microcrack Formation after Using New Heat-treated Nickel-titanium Systems. *J Endod.* 2017;43(10):1736-9.
15. Bier CA, Shemesh H, Tanomaru-Filho M, Wesselink PR, Wu MK. The ability of different nickel-titanium rotary instruments to induce dentinal damage during canal preparation. *J Endod.* 2009;35(2):236-8.
16. Borges AH, Damiao MS, Pereira TM, Filho GS, Miranda-Pedro FL, Luiz de Oliveira da Rosa W, et al. Influence of Cervical Preflaring on the Incidence of Root Dentin Defects. *J Endod.* 2017.
17. Burklein S, Tsotsis P, Schafer E. Incidence of dentinal defects after root canal preparation: reciprocating versus rotary instrumentation. *J Endod.* 2013;39(4):501-4.
18. Capar ID, Arslan H, Akcay M, Uysal B. Effects of ProTaper Universal, ProTaper Next, and HyFlex instruments on crack formation in dentin. *J Endod.* 2014;40(9):1482-4.
19. Ceyhanli KT, Erdilek N, Tatar I, Celik D. Comparison of ProTaper, RaCe and Safesider instruments in the induction of dentinal microcracks: a micro-CT study. *Int Endod J.* 2016;49(7):684-9.
20. Cicek E, Kocak MM, Saglam BC, Kocak S. Evaluation of microcrack formation in root canals after instrumentation with different NiTi rotary file systems: a scanning electron microscopy study. *Scanning.* 2015;37(1):49-53.
21. de Oliveira BP, Camara AC, Duarte DA, Heck RJ, Antonino ACD, Aguiar CM. Micro-computed Tomographic Analysis of Apical Microcracks before and after Root Canal Preparation by Hand, Rotary, and Reciprocating Instruments at Different Working Lengths. *J Endod.* 2017;43(7):1143-7.
22. De-Deus G, Belladonna FG, Souza EM, Silva EJ, Neves Ade A, Alves H, et al. Micro-computed Tomographic Assessment on the Effect of ProTaper Next and Twisted File Adaptive Systems on Dentinal Cracks. *J Endod.* 2015;41(7):1116-9.

23. De-Deus G, Cesar de Azevedo Carvalhal J, Belladonna FG, Silva E, Lopes RT, Moreira Filho RE, et al. Dentinal Microcrack Development after Canal Preparation: A Longitudinal in Situ Micro-computed Tomography Study Using a Cadaver Model. *J Endod.* 2017;43(9):1553-8.
24. De-Deus G, Silva EJ, Marins J, Souza E, Neves Ade A, Goncalves Belladonna F, et al. Lack of causal relationship between dentinal microcracks and root canal preparation with reciprocation systems. *J Endod.* 2014;40(9):1447-50.
25. Devale MR, Mahesh MC, Bhandary S. Effect of Instrumentation Length and Instrumentation Systems: Hand Versus Rotary Files on Apical Crack Formation - An In vitro Study. *J Clin Diagn Res.* 2017;11(1):ZC15-ZC8.
26. Gergi RM, Osta NE, Naaman AS. Dentinal crack formation during root canal preparations by the twisted file adaptive, Reciproc and WaveOne instruments. *Eur J Dent.* 2015;9(4):508-12.
27. Hin ES, Wu MK, Wesselink PR, Shemesh H. Effects of self-adjusting file, Mtwo, and ProTaper on the root canal wall. *J Endod.* 2013;39(2):262-4.
28. Jalali S, Eftekhar B, Paymanpour P, Yazdizadeh M, Jafarzadeh M. Effects of Reciproc, Mtwo and ProTaper Instruments on Formation of Root Fracture. *Iran Endod J.* 2015;10(4):252-5.
29. Kansal R, Rajput A, Talwar S, Roongta R, Verma M. Assessment of dentinal damage during canal preparation using reciprocating and rotary files. *J Endod.* 2014;40(9):1443-6.
30. Karatas E, Gunduz HA, Kirici DO, Arslan H. Incidence of dentinal cracks after root canal preparation with ProTaper Gold, Profile Vortex, F360, Reciproc and ProTaper Universal instruments. *Int Endod J.* 2016;49(9):905-10.
31. Karatas E, Gunduz HA, Kirici DO, Arslan H, Topcu MC, Yeter KY. Dentinal crack formation during root canal preparations by the twisted file adaptive, ProTaper Next, ProTaper Universal, and WaveOne instruments. *J Endod.* 2015;41(2):261-4.
32. Kesim B, Sagsen B, Aslan T. Evaluation of dentinal defects during root canal preparation using thermomechanically processed nickel-titanium files. *Eur J Dent.* 2017;11(2):157-61.
33. Kfir A, Elkes D, Pawar A, Weissman A, Tsisis I. Incidence of microcracks in maxillary first premolars after instrumentation with three different mechanized file systems: a comparative ex vivo study. *Clin Oral Investig.* 2017;21(1):405-11.
34. Li SH, Lu Y, Song D, Zhou X, Zheng QH, Gao Y, et al. Occurrence of Dentinal Microcracks in Severely Curved Root Canals with ProTaper Universal, WaveOne, and ProTaper Next File Systems. *J Endod.* 2015;41(11):1875-9.

35. Liu R, Hou BX, Wesselink PR, Wu MK, Shemesh H. The incidence of root microcracks caused by 3 different single-file systems versus the ProTaper system. *J Endod.* 2013;39(8):1054-6.
36. Miguens-Vila R, Martin-Biedma B, Varela-Patino P, Ruiz-Pinon M, Castelo-Baz P. Vertical Root Fracture initiation in curved roots after root canal preparation: A dentinal micro-crack analysis with LED transillumination. *J Clin Exp Dent.* 2017;9(10):e1218-e23.
37. Monga P, Bajaj N, Mahajan P, Garg S. Comparison of incidence of dentinal defects after root canal preparation with continuous rotation and reciprocating instrumentation. *Singapore Dent J.* 2015;36:29-33.
38. Oliveira BP, Camara AC, Duarte DA, Heck RJ, Antonino ACD, Aguiar CM. Effect of Reciprocating Systems and Working Lengths on Apical Microcrack Development: a micro-CT Study. *Braz Dent J.* 2017;28(6):710-4.
39. Pedulla E, Genovesi F, Rapisarda S, La Rosa GR, Grande NM, Plotino G, et al. Effects of 6 Single-File Systems on Dentinal Crack Formation. *J Endod.* 2017;43(3):456-61.
40. Pop I, Manoharan A, Zanini F, Tromba G, Patel S, Foschi F. Synchrotron light-based muCT to analyse the presence of dentinal microcracks post-rotary and reciprocating NiTi instrumentation. *Clin Oral Investig.* 2015;19(1):11-6.
41. Shemesh H, Bier CA, Wu MK, Tanomaru-Filho M, Wesselink PR. The effects of canal preparation and filling on the incidence of dentinal defects. *Int Endod J.* 2009;42(3):208-13.
42. Ustun Y, Aslan T, Sagsen B, Kesim B. The effects of different nickel-titanium instruments on dentinal microcrack formations during root canal preparation. *Eur J Dent.* 2015;9(1):41-6.
43. Yoldas O, Yilmaz S, Atakan G, Kuden C, Kasan Z. Dentinal microcrack formation during root canal preparations by different NiTi rotary instruments and the self-adjusting file. *J Endod.* 2012;38(2):232-5.
44. Zhou X, Jiang S, Wang X, Wang S, Zhu X, Zhang C. Comparison of dentinal and apical crack formation caused by four different nickel-titanium rotary and reciprocating systems in large and small canals. *Dent Mater J.* 2015;34(6):903-9.
45. Zuolo ML, De-Deus G, Belladonna FG, Silva EJ, Lopes RT, Souza EM, et al. Micro-computed Tomography Assessment of Dentinal Micro-cracks after Root Canal Preparation with TRUShape and Self-adjusting File Systems. *J Endod.* 2017;43(4):619-22.
46. Wei X, Hu B, Peng H, Tang M, Song J. The incidence of dentinal cracks during root canal preparations with reciprocating single-file and rotary-file systems: A meta-analysis. *Dent Mater J.* 2017;36(3):243-52.
47. Bayram HM, Bayram E, Ocak M, Uygun AD, Celik HH. Effect of ProTaper Gold, Self-Adjusting File, and XP-endo Shaper Instruments on Dentinal

Microcrack Formation: A Micro-computed Tomographic Study. *J Endod.* 2017;43(7):1166-9.

48. Blum JY, Machtou P, Esber S, Micallef JP. Analysis of forces developed during root canal preparation with the balanced force technique. *Int Endod J.* 1997;30(6):386-96.
49. Arbab-Chirani R, Chevalier V, Arbab-Chirani S, Calloch S. Comparative analysis of torsional and bending behavior through finite-element models of 5 Ni-Ti endodontic instruments. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2011;111(1):115-21.
50. Lertchirakarn V, Palamara JE, Messer HH. Load and strain during lateral condensation and vertical root fracture. *J Endod.* 1999;25(2):99-104.
51. Assif D, Nissan J, Gafni Y, Gordon M. Assessment of the resistance to fracture of endodontically treated molars restored with amalgam. *J Prosthet Dent.* 2003;89(5):462-5.
52. Hansen EK, Asmussen E, Christiansen NC. In vivo fractures of endodontically treated posterior teeth restored with amalgam. *Endod Dent Traumatol.* 1990;6(2):49-55.
53. Cheung GS, Chan TK. Long-term survival of primary root canal treatment carried out in a dental teaching hospital. *Int Endod J.* 2003;36(2):117-28.
54. Salehrabi R, Rotstein I. Endodontic treatment outcomes in a large patient population in the USA: an epidemiological study. *J Endod.* 2004;30(12):846-50