

Ein universelles adhäsives Befestigungs- und Stumpfaufbaumaterial

Indikationsspektrum und Fallbeispiele

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1. Aboushelib MN, Sleem D. Microtensile bond strength of lithium disilicate ceramics to resin adhesives. *J Adhes Dent* 2014; 16: 547-552.
2. Aksornmuang J, Nakajima M, Senawongse P, Tagami J. Effects of C-factor and resin volume on the bonding to root canal with and without fibre post insertion. *J Dent*. 2011; 39: 422-429.
3. Aristidis GA, Dimitra B. Five-year clinical performance of porcelain laminate veneers. *Quintessence Int* 2002; 33:185-189.
4. Aykor A, Ozel E. Five-year clinical evaluation of 300 teeth restored with porcelain laminate veneers using total-etch and a modified self-etch adhesive system. *Oper Dent* 2009; 34: 516–523.
5. Asmussen E, Peutzfeld A. Short- and long-term bonding efficacy of a self-etching, one-step adhesive. *J Adhes Dent* 2003; 5: 41–45.
6. Báez Rosales A, De Nordenflycht Carvacho D, Schlieper Cacciutolo R, Gajardo Guineo M, Gandarillas Fuentes C. Conservative Approach for the Esthetic Management of Multiple Interdental Spaces: A Systematic Approach. *J Esthet Restor Dent*. 2015, 27: 344–354.
7. Barghi N, McAlister E. Porcelain for Veneers. *J Esth Dent* 1998; 10, 191-197.
8. Bavbek NC, Roulet JF, Ozcan M. Evaluation of microshear bond strength of orthodontic resin cement to monolithic zirconium oxide as a function of surface conditioning method. *J Adhes Dent* 2014; 16: 473–480.
9. Bitter K, Schubert A, Neumann K, Blunck U, Sterzenbach G, Rüttermann S. Are self-adhesive resin cements suitable as core build-up materials? Analyses of maximum load capability, margin integrity, and physical properties. *Clin Oral Investig* 2016; 20: 1337–1345.
10. Bock T, Özcan M. Protocol for Removal of Clinically Relevant Contaminants from Glass Ceramic-based Restorations. *J Adhes Dent* 2015; 17: 474–475.
11. Bömicke W, Schürz A, Krisam J, Rammelsberg P, Rues S. Durability of Resin-Zirconia Bonds Produced Using Methods Available in Dental Practice. *J Adhes Dent* 2016, 18: 17–27.
12. Bömicke W, Rammelsberg P, Krisam J, Rues S. The Effects of Surface Conditioning and Aging on the Bond Strength Between Composite Cement and Zirconia reinforced Lithium-Silicate Glass-Ceramics. *J Adhes Dent* 2019; 21: 567–576.
13. Botelho MG, Chan AW, Leung NC, Lam WY. Long-term evaluation of cantilevered versus fixed-fixed resin-bonded fixed partial dentures for missing maxillary incisors. *Journal of Dentistry* 2016; 45: 59–66.

14. Bottino MA, Snellaert A, Bergoli CD, Özcan M, Bottino MC, Valandro LF. Effect of ceramic etching protocols on resin bond strength to a feldspar ceramic. *Oper Dent* 2015; 40: 40–46.
15. Bouillaguet S, Troesch S, Wataha JC, et al. Microtensile bond strength between adhesive cements and root canal dentin. *Dent Mater* 2003; 19: 199–205.
16. Castellanos M, Delgado AJ, Sinhoreti MAC, de Oliveira DCRS, Abdulhame N, Geraldeli S, Roulet JF. Effect of Thickness of Ceramic Veneers on Color Stability and Bond Strength of Resin Luting Cements Containing Alternative Photoinitiators. *J Adhes Dent*. 2019; 21:67–76.
17. Cecchin D, Farina AP, Guerreiro CA, Carlini-Júnior B. Fracture resistance of roots prosthetically restored with intra-radicular posts of different lengths. *J Oral Rehabil* 2010; 37: 116–122.
18. Dietschi D, Spreafico R. Current clinical concepts for adhesive cementation of tooth-colored posterior restorations. *Pract Periodontics Aesthet Dent* 1998; 10: 47–54.
19. Dimitriadi M, Panagiotopoulou A, Pelecanou M, Yannakapoulou K, Eliades G. Stability and reactivity of γ -MPTMS silane in some commercial primer and adhesive formulations. *Dent Mater* 2018; 34: 1089–1101.
20. Edelhoff D, Prandtner O, Saeidi Pour R, Liebermann A, Stimmelmayer M, Güth JF. Frontzahnrestaurationen: Leistungsfähigkeit von Keramikveneers. *Wissen Kompakt* 2019; 13 (3): 115–1278.
21. Egilmez F, Ergun G, Cekic-Nagas I, Vallittu PK, Lassila LV. Light Transmission of Novel CAD/CAM Materials and Their Influence on the Degree of Conversion of a Dualcuring Resin Cement. *J Adhes Dent* 2017; 19: 39–48.
22. Ernst CP. Die einfache adhäsive Befestigung einer Lithiumdisilikat-Teilkrone. *ZMK* 2012; 28: 244–251.
23. Ernst CP. Mut zur Klebung: die einflügelige Adhäsivbrücke. *ZMK* 2013; 29: 98-107.
24. Ernst CP. Chairside CAD / CAM-Neuversorgung mit ZLS-Keramik. *ZMK* 2014; 30: 304–310.
25. Ernst CP. Keramikteilkronen als Versorgungsoption von Zähnen mit Infraktionen. All ceramic partial crowns as a treatment option for cracked, but symptomless teeth. *Deutsche Zahnärztl Z* 2015; 70: 165–173.
26. Ernst CP, Schaffner H, Nauth C. Vom Exoten zum „State of the Art“: einflügelige Klebebrücken. *ZMK* 2016; 32: 650–664.
27. Ernst CP, Glaskeramik vorbehandeln ohne Flusssäure? *Dental Magazin* 2016; 34: 86–90.
28. Ernst CP, „Innovatives Konzept zur adhäsiven Befestigung am Beispiel zweier IPS e.max-Kronen. *ZMK* 2015; 31: 833–839.
29. Ernst CP. Die korrekte Vorbehandlung indirekter Restaurationen zur adhäsiven Befestigung. *ZMK* 2017; 33: 98–110.
30. Ernst CP. Selbstkonditionierender Keramikprimer. Eine erste Metaanalyse zu Monobond Etch&Prime *ZMK* 2018; 34: 864–873.
31. Ernst CP. Direkte Frontzahnrestaurationen aus Komposit -aktuelle Studienlage und Fallbeispiele. *ZMK* 2017; 33; 2–8.

32. Feilzer AJ, De Gee AJ, Davidson CL. Setting stress in composite resin in relation to configuration of the restoration. *J Dent Res* 1987; 66: 1636–1639.
33. Ferrari M, Sorrentino R, Juloski J, Grandini S, Carrabba M, Discepoli N, Ferrari Cagidiaco E. Post-Retained Single Crowns versus Fixed Dental Prostheses: A 7-Year Prospective Clinical Study *J Dent Res* 2017; 96: 1490–1497.
34. Fradeani M, Redemagni M, Corrado M. Porcelain laminate veneers: 6- to 12-year clinical evaluation – a retrospective study. *Int J Periodontics Restorative Dent* 2005; 25:9-17.
35. Frankenberger R, Hehn J, Hajto N, Krämer N, Naumann M, Koch A, Roggendorf MJ. Effect of proximal box elevation with resin composite on marginal quality of resin composite inlays in vitro. *Clin Oral Investig* 2013; 17: 177–183.
36. Frankenberger R, Hartmann VE, Krech M, Krämer N, Reich S, Braun A, Roggendorf. Adhesive luting of new CAD/CAM materials. *Int J Comput Dent* 2015; 18: 9–20.
37. Frese C, Schiller P, Staehle HJ, Wolff D. Recontouring teeth and closing diastemas with direct composite buildups: a 5-year follow-up. *J Dent* 2013; 41: 979–985.
38. Giraldo TC, Villada VR, Castillo MP, Gomes OM, Bittencourt BF, Dominguez JA. Active and Passive Application of the Phosphoric Acid on the Bond Strength of Lithium Disilicate. *Braz Dent J* 2016; 27: 90–94.
39. Guarda GB, Correr AB, Gonçalves LS, Costa AR, Borges GA, Sinhoreti MA, Correr-Sobrinho L. Effects of surface treatments, thermocycling, and cyclic loading on the bond strength of a resin cement bonded to a lithium disilicate glass ceramic. *Oper Dent* 2013; 38: 208–217.
40. Hajto J. Veneers Materialien und Methoden im Vergleich. *Teamwork* 2000; 3: 195–202.
41. Hajto J. Freud und Leid mit direktem Komposit. Teil 1: Adhäsive, Indikationsstellung und Chamäleoneneffekt. *Teamwork* 2006; 9: 50063.
42. Hajto J. Freud und Leid mit direktem Komposit. Teil 2: Schichttechnik, Versorgung multipler Füllungen im Frontzahnbereich. *Teamwork* 2006; 9: 86–97.
43. Hajto J. Frontzahnrestorationen: Sind Keramikveneers die beste Wahl? *Quintessenz* 2010; 61: 521–528
44. Hajto J. Veneers – eine wertvolle Ergänzung für jede Praxis. *Cosmetic Dentistry* 2018; 16: 18–21.
45. Haller B, Merz A. Standortbestimmung Universaladhäsive Teil 2. Der Einfluss der Komposithärtung und die Haftung an Werkstücken zm 2017; 107 (6), 76–82.
46. Ilgenstein I, Zitzmann NU, Bühler J, Wegehaupt FJ, Attin T, Weiger R, Krastl G. Influence of proximal box elevation on the marginal quality and fracture behavior of root-filled molars restored with CAD/CAM ceramic or composite onlays. *Clin Oral Investig* 2015; 19: 1021-1028.
47. Inokoshi M, De Munck J, Minakuchi S, Van Meerbeek B. Meta-analysis of bonding effectiveness to zirconia ceramics. *J Dent Res* 2014; 93: 329–334.
48. Inokoshi M, Poitevin A, De Munck J, Minakuchi S, Van Meerbeek B. Bonding effectiveness to different chemically pre-treated dental zirconia. *Clin Oral Investig* 2014; 18: 1803–1812.
49. Inokoshi M, Van Meerbeek B. Adhesively luted zirconia restorations: why and how? *J*

- Adhes Dent 2014;16: 294.
50. Ishii R, Tsujimoto A, Takamizawa T, Tsubota K, Suzuki T, Shimamura Y, Miyazaki M. Influence of surface treatment of contaminated zirconia on surface free energy and resin cement bonding. *Dent Mater J* 2015; 34: 91–97.
 51. Kalavacharla VK, Lawson NC, Ramp LC, Burgess JO. Influence of Etching Protocol and Silane Treatment with a Universal Adhesive on Lithium Disilicate Bond Strength. *Oper Dent* 2015; 40: 372–378.
 52. Kern M, Sasse M. Ten-year survival of anterior all-ceramic resin-bonded fixed dental prostheses. *J Adhes Dent* 2011;13: 407–410.
 53. Kern M, Pasia N, Sasse M, Yazigi C. Ten-year outcome of zirconia ceramic cantilever resin-bonded fixed dental prostheses and the influence of the reasons for missing incisors. *J Dent* 2017; 65: 521–555.
 54. Kim RJ, Woo JS, Lee IB, Yi YA, Hwang JY, Seo DG. Performance of universal adhesives on bonding to leucite-reinforced ceramic. *Biomater Res* 2015 22; 19: 11.
 55. Klaiber B: Alles noninvasiv – Zahnformveränderung, Lückenschluss, Reduktion schwarzer Dreiecke. *zm* 2006; 96: 52–59.
 56. Krejci I, Lutz F., Reimer M. Marginal adaptation and fit of adhesive ceramic inlays. *J Dent* 1993; 21: 39-46.
 57. Kunzelmann KH, Kern M. Das Keramik Veneer. Substanzschonend und ästhetisch. *Dental Magazin* 2005; 4: 36–41.
 58. Lenhard M. Diastemaschluss mit Kompositrestaurationen. *Eur J Esthet Dent* 2008; 3: 282–292.
 59. Lenhard M. Ästhetische Frontzahnrestaurationen mit Komposit. *Quintessenz* 2004; 55: 961–976.
 60. Lambade DP, Gundawar SM, Radke UM. Evaluation of adhesive bonding of lithium disilicate ceramic material with dual cured resin luting agents. *J Clin Diagn Res* 2015; 9: ZC01-5.
 61. Lise D, Perdigão J, Van Ende A, Zidan O, Lopes G. Microshear Bond Strength of Resin Cements to Lithium Disilicate Substrates as a Function of Surface Preparation. *Oper Dent* 2015; 40: 524–532.
 62. Lührs AK: Diastemaschluss mittels direkter Technik im Frontzahnbereich. *Deutsch Zahnärztl Z* 2011; 66, 628–635.
 63. Lührs AK, Pongprueksa P, De Munck J, Geurtsen W, Van Meerbeek B. Curing mode affects bond strength of adhesively luted composite CAD/CAM restorations to dentin. *Dent Mater* 2014; 30: 281–291.
 64. Lührs AK, De Munck J, Geurtsen W, Van Meerbeek B. Composite cements benefit from light-curing. *Dent Mater* 2014; 30: 292–301.
 65. Magne, P., Douglas, W.H.: Additive Contour of Porcelain Veneers: A Key Element in Enamel Preservation, Adhesion, and Esthetics for Aging Dentition. *J Adhesive Dent* 1999; 1, 81092.
 66. Magne P, Spreafico RC. Deep Margin Elevation: A Paradigm Shift. *Am J Esthet Dent* 2012; 2: 86-96. Reiner A. “margin elevation technique”. *zm* 2013; 103: 44–46.
 67. Meyer G, Ahsbahs S, Kern M (2015). Vollkeramische Kronen und Brücken – S3-

Leitlinie (AWMF-Registernummer 083-012). <http://www.awmf.org/leitlinien/detail/II/083-012.html>.

68. Müller V, Friedl KH, Hahnel S, Handel G, Lang R. Influence of proximal box elevation technique on marginal integrity of adhesively luted Cerec inlays. *Clin Oral Investig* 2017; 21: 607–612.
69. Neto DS, Naves LZ, Costa AR, Correr AB, Consani S, Borges GA, Correr-Sobrinho L. The Effect of Hydrofluoric Acid Concentration on the Bond Strength and Morphology of the Surface and Interface of Glass Ceramics to a Resin Cement. *Oper Dent* 2015; 40: 470–479.
70. Nova V, Karygianni L, Altenburger MJ, Wolkewitz M, Kielbassa AM, Wrbas KT. Pull-out bond strength of a fibre-reinforced composite post system luted with self-adhesive resin cements. *J Dent* 2013; 41: 1020–1026.
71. Özcan M. Air abrasion of zirconia resin-bonded fixed dental prostheses prior to adhesive cementation: why and how? *J Adhes Dent* 2013; 15: 394.
72. Özcan M, Bock T. Protocol for Removal of Clinically Relevant Contaminants from Zirconium Dioxide Fixed Dental Prostheses. *J Adhes Dent* 2015; 17: 576–577.
73. Özcan M, Volpato CAM. Surface Conditioning and Bonding Protocol for Polymer-infiltrated Ceramic: How and Why? *J Adhes Dent* 2016; 18: 174-175.
74. Passia N, Lehmann F, Freitag-Wolf S, Kern M. Tensile bond strength of different universal adhesive systems to lithium disilicate ceramic. *J Am Dent Assoc* 2015; 146: 729–734.
75. Perdigao J, Gomes G, Augusto V. The effect of dowel space on the bond strengths of fiber posts. *J Prosthodont* 2007; 16: 154–164.
76. Peumans M, De Munck J, Van Landuyt K, Van Meerbeek B. Thirteen-year randomized controlled clinical trial of a two-step self-etch adhesive in non-carious cervical lesions. *Dent Mater* 2015; 31: 308–314.
77. Pjetursson BE, Tan WC, Tan K, Brägger U, Zwahlen M, Lang NP. A systematic review of the survival and complication rates of resin-bonded bridges after an observation period of ~~10~~ at least 5 years. *Clin Oral Implants Res* 2008; 19: 131–141.
78. Politano G, Van Meerbeek B, Peumanns M. Nonretentive Bonded Ceramic Partial Crowns: Concept and Simplified Protocol for Long-lasting Dental Restorations. *J Adhes Dent* 2018; 20: 495–510.
79. Rocca GT, Krejci I. Bonded indirect restorations for posterior teeth: from cavity preparation to provisionalization. *Quintessence Int* 2007; 38: 371–379.
80. Rocca GT, Krejci I. Bonded indirect restorations for posterior teeth: the luting appointment. *Quintessence Int* 2007; 38: 543–553.
81. Rocca GT, Gregor L, Sandoval MJ, Krejci I, Dietschi D. In vitro evaluation of marginal and internal adaptation after occlusal stressing of indirect class II composite restorations with different resinous bases and interface treatments. "Post-fatigue adaptation of indirect composite restorations". *Clin Oral Investig* 2012; 16: 1385–1393.
82. Roggendorf MJ, Krämer N, Dippold C, Vosen VE, Naumann M, Jablonski-Momeni A, Frankenberger R. Effect of proximal box elevation with resin composite on marginal

- quality of resin composite inlays in vitro. *J Dent* 2012; 40: 1068–1073.
83. Romanini-Junior JC, Kumagai RY, Ortega LF, Rodrigues JA, Cassoni A, Hirata R, Reis AF. Adhesive/silane application effects on bond strength durability to a lithium disilicate ceramic. *J Esthet Restor Dent* 2018; 30: 346–351.
 84. Roulet JF. Reasonable Adhesion. *J Adhes Dent* 2010; 12: 255.
 85. Sasse M, Kern M. CAD/CAM single retainer zirconia-ceramic resin-bonded fixed dental prostheses: clinical outcome after 5 years. *Int J Comput Dent* 2013; 16: 109–118.
 86. Sasse M, Kern M. Survival of anterior cantilevered all-ceramic resin-bonded fixed dental prostheses made from zirconia ceramic. *J Dent* 2014; 42: 660–663.
 87. Sasse M, Kern M. All-ceramic resin-bonded fixed dental prostheses: Treatment planning, clinical procedures, and outcome. *Quintessence International* 2014; 45: 291–297.
 88. Schroeder AA, Ford NL, Coil JM. Micro-computed tomography analysis of post space preparation in root canals filled with carrier-based thermoplasticized gutta-percha. *Int Endod J* 2017; 50: 293–302.
 89. Sidharta JJ. Veneer-System: Ästhetische Korrekturen minimalinvasiv durchführen *ZMK* 2014; 30: 672–673.
 90. Song M, Shin Y, Park JW, Roh BD. A study on the compatibility between one-bottle dentin adhesives and composite resins using micro-shear bond strength. *Restor Dent Endod.* 2015; 40: 30–36.
 91. Sterzenbach G, Karajouli G, Tunjan R, Spintig T, Bitter K, Naumann M. Damage of lithium-disilicate all-ceramic restorations by an experimental self-adhesive resin cement used as core build-ups. *Clin Oral Investig* 2014; 19: 281–288.
 92. Tay FR, Loushine RJ, Lambrechts P, Weller RN, Pashley DH. Geometric factors affecting dentin bonding in root canals: a theoretical modeling approach. *J Endod* 2005; 31: 584–589.
 93. Tey KC, Lui JL. The effect of glass fiber-reinforced epoxy resin dowel diameter on the fracture resistance of endodontically treated teeth. *J Prosthodont* 2014; 23: 572–581.
 94. Tian T, Tsoi JK, Matinlinna JP, Burrow MF. Aspects of bonding between resin luting cements and glass ceramic materials. *Dent Mater* 2014; 30: e 147–162.
 95. Thomsen KB, Peutzfeldt A. Resin composites: strength of the bond to dentin versus mechanical properties. *Clin Oral Investig* 2007; 11: 45–49.
 96. Veneziani M. Adhesive restorations in the posterior area with subgingival cervical margins: new classification and differentiated treatment approach. *Eur J Esthet Dent* 2010; 5: 50–76.
 97. Vohra R, Velez LI, Rivera W, Benitez FL, Delaney KA. Recurrent life-threatening ventricular dysrhythmias associated with acute hydrofluoric acid ingestion: observations in one case and implications for mechanism of toxicity. *Clin Toxicol (Phila)* 2008; 46: 79–84.
 98. Wiedhahn K, Kerschbaum T, Fasbinder DF. Clinical long-term results with 617 Cerec veneers: a nine-year report. *Int J Comput Dent* 2005; 8:233–246.
 99. Yang B, Barloi A, Kern M. Influence of air-abrasion on zirconia ceramic bonding using an adhesive composite resin. *Dent Mater* 2010; 26: 44–50.

100. Yoshida F, Tsujimoto A, Ishii R, Nojiri K, Takamizawa T, Miyazaki M, Latta MA. Influence of surface treatment of contaminated lithium disilicate and leucite glass ceramics on surface free energy and bond strength of universal adhesives. *Dent Mater J* 2015; 34: 855–862.
101. Yoshihara k, Nagaoka N, Sonoda A Maruo y, Makita Y, Okihara T Irie M, Yoshida Y, V. Meerbeek B. Effectiveness and stability of silane coupling agent incorporated in 'universal' adhesives. *Dent Mater* 2016, 32: 1218–1225.
102. Zaruba M, Göhring TN, Wegehaupt FJ, Attin RT. Influence of a proximal margin elevation technique on marginal adaptation of ceramic inlays. *Acta Odontol Scand* 2013; 71: 317–324.