

Bifix QM – Pulp-adjacent dentine

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An in-vitro study at the University of Zurich examined the bond strengths of different bonding systems on mantle dentine and on dentine close to the pulp.^[1]

The leucite-reinforced IPS Empress glass ceramic material has been used million-fold to restore teeth indirectly. The long-term clinical success of these restorations do not only depend on the physical properties of the ceramic material, but also on the quality of the adhesive luting. A study by Burgess et al. carries out an evaluation of various luting materials in the luting of IPS Empress crowns.^[1]

The structure of dentine is not uniform; a distinction can be made between mantle dentine, dentine close to the pulp and root dentine. Mantle dentine exhibits a higher proportion of intertubular dentine and a pronounced collagen fibre structure. Very good adhesion values are generally achieved here. The situation is rather different in the dentine close to the pulp. The water content in particular inhibits reliable bonding in this area. The question whether or not these differences are relevant to the bonding of indirect restorations was examined at the University of Zurich.

Measuring the adhesive strength on dentine

The occlusal surfaces of freshly extracted human molars were cut with a trimmer to create a level dentine surface. To produce the test specimens for the pulp-adjacent dentine test group, preparation was carried out to at least one millimetre below the dentinoenamel junction, with an equal distance of at least 1 mm to the pulp. The surfaces were then ground level with silicon carbide paper (400 grain). The teeth were assigned to the different groups and treated, according to manufacturer's instructions, with a) Solobond Plus and Bifix QM (VOCO), b) Clearfil Esthetic Cement and ED Primer II (Kuraray), c) Ketac Fil (3M ESPE), d) Multilink Automix and Multilink Primer (Ivoclar Vivadent), e) Panavia F 2.0 and ED Primer II (Kuraray), f) Superbond C&B (Sun Medical) and g) Variolink II and Syntac (Ivoclar Vivadent). The test specimens produced in this way were subjected to thermocycling (500 cycles, 5 / 55 °C), followed by a shear bond test.

Figure 1 shows a graphical representation of the results of the adhesion value measurement. The combination Solobond Plus/Bifix QM produced the highest adhesion values on both dentine types. The distinction between mantle dentine and pulp-adjacent dentine led to significantly different results only in the case of Variolink II. The two self-etching systems Multilink Automix and Clearfil Esthetic Cement produced the lowest adhesion values.

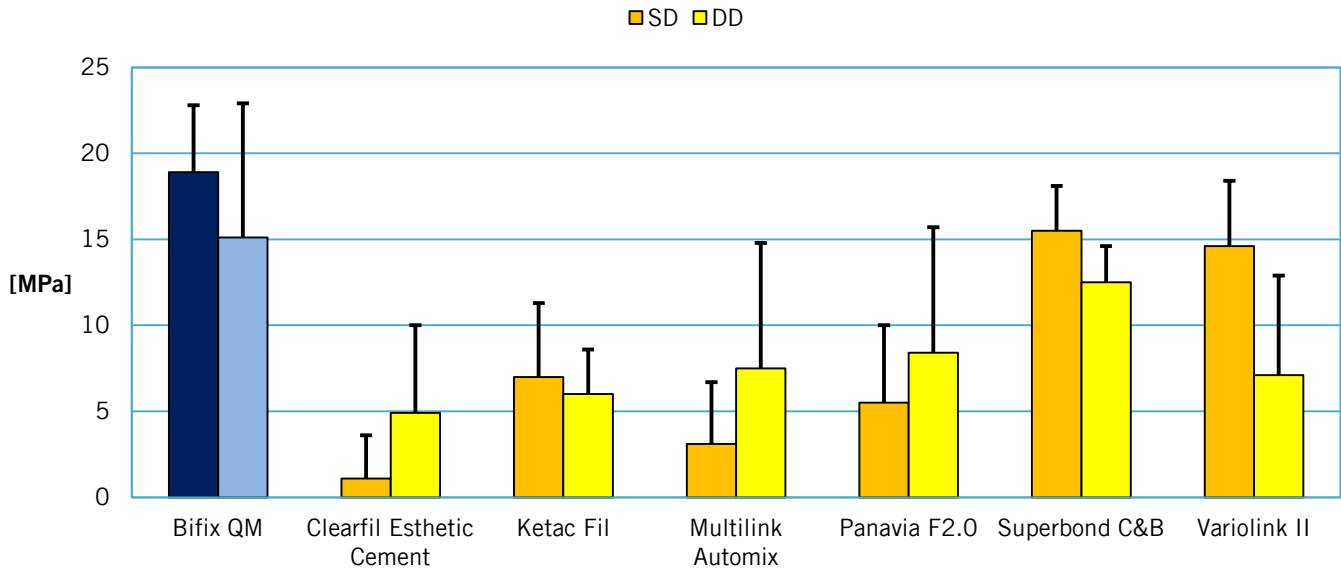


Figure 1: Bond strength on dentine (SD = mantle dentine, DD = pulp-adjacent dentine) [MPa]

Conclusion: The combination of Solobond Plus and Bifix QM produces excellent adhesion values, both on mantle dentine as well as on dentine close to the pulp, therefore resulting in a reliable hold, irrespectively of the quantity of remaining dentine.

[1] M. Özcan, A. Mese, *Clin. Oral Invest.* **2011**, online.