Adhesion – A Fix for Everything?

Dear Reader,

In dentistry, adhesive procedures are performed every day worldwide. Considering the conditions under which they are done, they must be rated top! Remember, we are bonding all kind of substrates (direct and indirect composites, glass-based ceramics, oxide ceramics, noble and base alloys) to dental tissues (enamel and dentin) in less than a minute, at room temperature, under ambient pressure with nontoxic materials. The outcome is on the order of 30 MPa (shear bond strength). This is excellent! Have you ever thought what 30 MPa means? If you do the calculations, you come to the conclusion that to suspend a mass of 80 kg, you need a round bonded button with a diameter of just 6 mm!

Having such a powerful tool at hand may tempt the dentist to think that dentistry has become easier: if a crown preparation deviates from the ideal and is not retentive at all, it doesn't matter; adhesion will fix it. If there is not enough space for all the ceramic layers required, it doesn't matter; adhesion will fix it. The fix-it list is long.

But looking back, we must realize that there were times when we had to learn the hard way. The resin bonded fixed dental protheses are a good example. To replace anterior teeth, the original design with metals did not require any preparation. However, debondings led us to prepare small groves and rests in order to minimize shear forces, with the result that debondings were minimized. Basically, the same thing happened with posterior resin bonded ceramic fixed dental protheses. First attempts just used the classical inlay preparation for the retainers. Fractures taught us to redesign and use "clasps" to increase the bonded surface in order to avoid fractures under load (M. Kern, unpublished data).

So what is the lesson we must learn from this? In the world outside dentistry, adhesive technology is known to be very critical and require well-controlled processes done with great care and cleanliness. The same must apply in dentistry: we must remember that the success of an adhesive procedure highly depends on clean, dry surfaces, well-controlled application of the adhesives (if needed, in a predetermined sequence), careful evaporation of solvents, and – for light-cured adhesives – proper curing as indicated by the manufacturer's instructions for use.

Certainly in dentistry, people's lives do not depend on the adhesive as they may when flying in an airplane or driving a car or boat. You would not like a critical structure of an airplane to debond in flight, just because an engineer or adhesion specialist did a sloppy job, because sitting in this airplane, you would most certainly die. Being the victim of a sloppy dental adhesive procedure, I as a patient would "only" lose a bridge or, in the worst case, a tooth. I would not die from it, but still I would not like it at all – would you?

Despite the general trend toward convenience, dentistry has not become easier. Success is based on meticulously following procedures!

Sincerely yours,

J.-F. Roulet
Editor-in-Chief