Achieving the best bond strength with VITA ENAMIC

An interview with Dr Julián Conejo from the University of Pennsylvania, US

A restoration must be conditioned for a reliable adhesive bond between the luting composite and the hybrid ceramic. In a current in vitro study Dr Julián Conejo from the University of Pennsylvania is investigating how different types of conditioning and protocols influence the bond strength to the VITA ENAMIC hybrid ceramic (VITA Zahnfabrik). In this interview, he talks about his findings and what to consider when aiming for optimal results.

Dr Conejo, could you briefly explain the study methodology? What parameters were modified in the conditioning and pretreatment of the hybrid ceramic?

Seventy test specimens of VITA ENAMIC were etched for 20, 60 or 120 seconds with 5% hydrofluoric acid. The etched surfaces were cleaned either with phosphoric acid or in an ultrasound bath. For the study, including the control group with no pretreatment, seven different subgroups were formed. After the application of the bonding agent and the composite, the test specimens were stored in distilled water. The final shear strength was determined and the data was statistically analysed.

Did the exposure time to the hydrofluoric acid affect the bond strength of the luting composite?

Based on your findings, how important is etching with 5% hydrofluoric acid for a reliable adhesive bond of the luting composite to the ceramic restoration?

It is very important to apply hydrofluoric acid to create a roughened surface for good micromechanical retention. All etched sample specimens showed a significant increase in bond strength to the luting composite. In order to ensure sustained clinical success of the restoration, hydrofluoric acid is a critical process step for the treatment provider.

Dr Conejo, could you briefly explain how different types of conditioning and protocols influence the bond strength to the VITA ENAMIC hybrid ceramic?

Hybrid ceramic surface after hydrofluoric acid etching for 60 seconds.—Fig. 3: Hybrid ceramic surface after hydrofluoric acid etching for 120 seconds.—Fig. 4: Hybrid ceramic surface after hydrofluoric acid etching for 120 seconds. Source of scanning electron microscopy images of VITA ENAMIC material samples: Julián Conejo 2016.
“All etched sample specimens showed a significant increase in bond strength to the luting composite.”

How important is it to carefully observe the manufacturer’s conditioning protocol when applying hydrofluoric acid and bonding agents?

It is very important. Our results show that the current surface conditioning recommended by VITA Zahnfabrik enables the greatest adhesion and is the simplest. According to the instructions for use, the hybrid ceramic should be etched for 60 seconds. Afterwards, the silane bonding agent (primer) should be massaged in for 60 seconds.

In your experience, can the treatment provider have a positive influence on the adhesive bond with additional steps?

Not really. That was one of our hypotheses. Now, we know that additional cleaning steps after etching with hydrofluoric acid do not produce any significantly higher values. Neither the additional surface treatment with phosphoric acid nor the ultrasonic bath improved the adhesive strength values compared with the hydrofluoric acid etching. For a reliable bond, a clean, pretreated surface of the restoration is always important after the try-in.

Besides the conditioning of the restoration, what is important in the pretreatment of the tooth substance in order to achieve a good adhesive bond?

Isolation with a rubber dam allows absolute dryness and a clean working field. The surface of the preparation should also be conditioned with an adhesive system prior to attachment. This, in turn, makes a perfect connection between the hard tooth substance and the luting composite possible.