A fracture load study on implant-supported crown restorations

An interview with Dr Nadja Rohr, Switzerland

By DTI

Owing to the rigid ankylosic anchoring of the implant in the bone, high forces act on the superstructure, and this can lead to chipping and fractures in the case of restorations made from conventional, brittle ceramics. Owing to its dual ceramic–polymer network structure, the VITA ENAMIC hybrid ceramic (VITA Zahnfabrik) has a comparatively high, dentine-like elasticity. This elasticity allows the material to absorb masticatory forces. In this interview, Dr Nadja Rohr from the University of Basel’s centre for dental medicine in Basel in Switzerland reports on her findings in fracture load tests of implant-supported crowns.

In an in vitro study, you examined the fracture load of crowns made of hybrid ceramic and conventional ceramic seated on one-piece ceramic implants. What process did you follow?

Standardised molar crowns made of hybrid ceramics and feldspathic ceramics were attached to zirconium dioxide implants (ceramic implant, ø 4.0 mm, VITA Zahnfabrik) using four different attachment composites. After being stored in water for 24 hours at 37 °C, the crowns reached their breaking point. The luting materials used were also characterised according to their flexural strength, elastic modulus, tensile strength and pressure resistance.

What were the differences between restorations made of VITA ENAMIC hybrid ceramic and conventional ceramic in the fracture load tests?

With the use of hybrid ceramics, significantly higher fracture load values were achieved compared with feldspathic ceramics.

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High pressure resistance luting composites can increase the stability of the overall system. In the molar area, there are maximum masticatory forces of up to about 1,000 N. Choosing the right luting composite can have a positive effect on the clinical success of hybrid and feldspathic ceramic restorations.

What should be considered when choosing the luting composite, and what should be taken into account during the integration process?

Dentists should choose a luting composite that meets the specific clinical requirements of the case. For attaching hybrid ceramic crowns to zirconium dioxide implants, this would be an adhesive luting composite with high pressure resistance. Furthermore, it is important for the conditioning to be performed according to the manufacturer’s instructions.

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Fig. 1: Dr Nadja Rohr.
Fig. 2: The crowns were loaded until fracturing occurred.
Fig. 3: Measurement results for the fracture load of the crowns (ten test samples for each restoration and luting material) made of hybrid ceramic and feldspathic ceramic, which were attached with different luting composites.
Fig. 4: Correlation between the fracture load of the crowns and the pressure resistance of the luting composites.
Fig. 5: Attaching the crowns to the zirconium dioxide implants.