ECF22 - Loading and Environmental Effects on Structural Integrity

Experimental setup for determining strain in dental composite veneers subjected to compressive load

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Abstract

Veneers are thin dental restorations which cover vestibular, incisal and proximal teeth surfaces. Depending on the design of the preparation, proximal extension of the veneer could be up to the contact point or could cover the entire proximal surfaces of the teeth. This paper shows development of the experimental setup for determining the strain field and failure force of direct composite veneers in upper and lower anterior teeth, subjected to compressive load up to the point of fracture. Extracted teeth were prepared using the turbine diamond conical burrs with a rounded tip of 1.6 mm in diameter and 2º conicity (Burr 6844-Komet Dental, Lemgo, Germany). The preparation was standardized so that the dental tissue was removed 0.8 to 1 mm vestibularly, 0.5 to 0.8 mm proximally and 2 mm incisally. The veneers were made of composite material (nanocomposite Geanial-GC Corp., Tokyo, Japan) using the direct layering technique. Bonding between the material and dental tissue was achieved using an adhesive agent (G bond-GC Corp., Tokyo, Japan).
The prepared specimens, which consisted of a tooth-adhesive-composite system, were immersed in acrylic for easier positioning into the tensile testing machine (Tinius Olsen H10KS). Contactless optical 3D system ARAMIS 2.0 was used for measuring strain in the veneers. In order to simulate the effect of masticatory forces, the prepared specimens were positioned under a 135 degree angle relative to the applied force.
This experimental setup will enable analysis of stress and strain of the tooth-adhesive-veneer system, based on clinically relevant parameters (design of the preparation, material characteristics and angle of the applied force).

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