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Material selection for CAD/CAM dentistry: Glass ceramic or hybrid materials?

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Over the past few years, nonmetallic (metal-free) computer-aided design/computer-aided manufacturing (CAD/CAM) materials, including ceramics and composites, have been widely used in dentistry [1]. Given that both materials have unfavorable properties related to the longevity of the restoration, the resin-ceramic hybrid materials are introduced to include the positive characteristics of ceramics and composites and to overcome their disadvantages [2]. Currently, two types of hybrid materials are available in dentistry: polymer-infiltrated ceramic network (PICN) materials (e.g., Vita Enamic) and materials with dispersed fillers (e.g., GC CeraSmart, 3M Lava Ultimate Restorative, and Shofu Block HC) [2]. The hybrid materials have an elasticity modulus closer to that of dentin and the property of absorbing masticatory forces, which can be particularly valuable for implant-supported restorations [2]. Additionally, the hybrid materials may be more easily fabricated and repaired than ceramics [3]. Regarding adhesive bonding to the hybrid materials, the literature seems to reach a consensus that the combination of mechanical conditioning and chemical conditioning prior to bonding yields the highest bond strength of the hybrid materials [4,5]. More specifically, well-established mechanical conditioning (e.g., alumina air abrasion for materials with dispersed fillers and hydrofluoric acid etching for PICN materials) followed by silanization could be beneficial for the long-term bond strength. However, due to the relative novelty of the hybrid materials, the author is unaware of any standard bonding protocols in the literature. Moreover, the manufacturer (3M ESPE) recently withdrew the crown indication for Lava Ultimate Restorative because of a reportedly high debonding rate. Moreover, although the hybrid materials can be stained and glazed, they still could not achieve the esthetic quality of veneered ceramic restorations, especially when a poly-chromatic restoration is needed.

The hybrid materials are claimed to cover the indications of onlays, inlays, and crowns. Moreover, they have been recommended for occlusal rehabilitation [6]. However, there are only limited *in vivo* data regarding the clinical performance of the hybrid materials. Lu, *et al.* [7] reported that the survival rates for Vita Enamic and Vitablocs Mark II were 97.0% and 90.7% after 3 years, respectively (P>.05). After an observation time of 3 years, the survival rates were 97.4% for inlays and 95.6% for partial coverage restoration made with Vita Enamic [8]. Although the PICN restorations showed a favorable clinical performance over a short-term observation, long-term clinical data are needed to confirm this finding.

Based on the current scientific evidence, it may be concluded that the novel hybrid materials exhibit a similar mechanical behavior to that of human tooth. Compared with the ceramics, the use of hybrid materials may reduce the fracture rate due to the flexibility. In general, the hybrid materials are properly indicated for posterior onlays and inlays in a single appointment, while the laminate veneers, crowns, and bridges made of the ceramics are still the best options.

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