Temperature modification of a hot glue gun for use with modeling plastic impression compound

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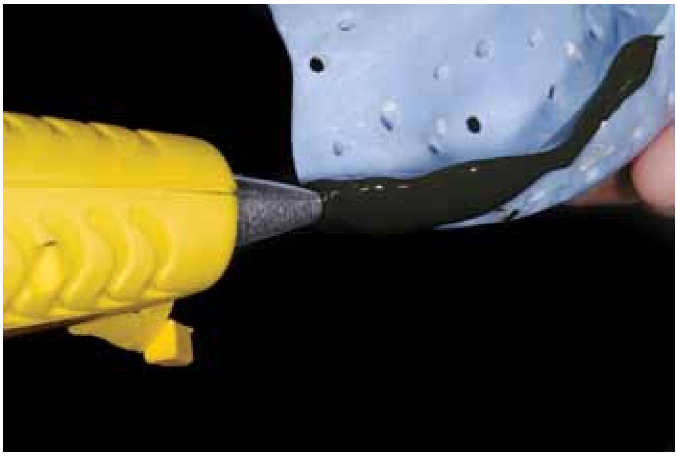
Modeling plastic impression compound (MPIC) is defined as a thermoplastic dental impression material composed of wax, rosin, resins, and colorants.[1] Low-fusing compound (type 1) is used for border molding and impressions. Flow and reproducibility of surface detail are important characteristics of these materials.[2] Border molding with MPIC can record accurate border detail; however, it can be difficult to use and messy when manipulated over a flame. Some techniques have been described to facilitate the use of MPIC by placing the compound in a syringe and heating it in a water bath.[3,4] Although these techniques may be helpful, waiting for the compound to melt is time consuming. Also, the syringes filled with compound must continually be reintroduced into the water after each use so that the compound does not solidify.

Hot glue guns are designed to melt a thermoplastic adhesive that comes in the form of sticks. A continuous duty heating element is used to melt the plastic glue sticks at a temperature of 120°C. Low-fusing compound has a melting temperature of 60°C, according to the manufacturer. Some hot glue guns use glue sticks that have a diameter of 7 mm, which is similar to the commercially available green stick modeling plastic impression compound (Impression Compound; Kerr Corp, Orange, Calif) (Fig. 1). A technique that uses a hot glue gun to deliver low-fusing MPIC is described.

PROCEDURE

1. Plug the glue gun (GR-10 Mini Hot Melt Glue Gun; Stanley-Bostich, East Greenwich, RI) into a light dimmer control (Dimmer Control; Westinghouse Lighting Corp, Philadelphia, Pa), and then plug the dimmer into an electrical outlet.
2. Load the hot glue gun with green stick MPIC (Impression Compound; Kerr Corp).
3. Set the dimmer to a low setting using the control knob, and verify the extrusion temperature of the MPIC with a digital thermometer (Good Cook Digital Thermometer; Bradshaw Intl, Rancho Cucamonga, Calif). Adjust the knob on the light dimmer control until a proper working temperature is achieved (60° to 76°C).
4. Mark the light dimmer control once the proper working temperature has been achieved, to ensure the reproduction of results with each use.
5. Apply MPIC directly to the tray to be used for border molding (Fig. 2). Verify the temperature of the impression compound periodically with a thermometer to ensure proper temperature for function and patient safety.
6. Temper the tray in a water bath before insertion intraorally, and border mold in the usual manner.
7. Always place the hot glue gun in an upright position on a level countertop between MPIC applications.

1 Hot glue stick (7 mm in diameter) and green stick compound with similar diameter.



2 Addition of impression compound onto custom impression tray using regulated hot glue gun.

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NOTEWORTHY ABSTRACTS OF THE CURRENT LITERATURE

Shear bond strengths between different zirconia cores and veneering ceramics and their susceptibility to thermocycling

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Objectives: The purpose of this study was to evaluate the shear bond strength between various commercial zirconia core and veneering ceramics, and to investigate the effect of thermocycling.

Methods: The Schmitz–Schulmeyer test method was used to evaluate the core–veneer shear bond strength (SBS) of three zirconia core ceramics (Cercon Base, Vita In-Ceram YZ Cubes, DC-Zirkon) and their manufacturer recommended veneering ceramics (Cercon Ceram S, Vita VM9, IPS e.max Ceram). A metal ceramic system (Degudent U94, Vita VM13) was used as a control group for the three all-ceramic test groups (n = 30 specimens/group). Half of each group (n = 15) was thermocycled (5–55 °C, 20,000 cycles). Subsequently, all specimens were subjected to shear force in a universal testing machine. Fractured specimens were evaluated microscopically to determine the failure mode.

Results: The initial mean SBS values in MPa ± S.D. were 12.5 ± 3.2 for Vita In-Ceram YZ Cubes/Vita VM9, 11.5 ± 3.4 for DC-Zirkon/IPS e.max Ceram, and 9.4 ± 3.2 for Cercon Base/Cercon Ceram S. After thermocycling mean SBS values of 11.5 ± 1.7 MPa for DC-Zirkon/IPS e.max Ceram, 9.7 ± 4.2 MPa for Vita In-Ceram YZ Cubes/Vita VM9, and 9.6 ± 4.2 MPa for Cercon Base/Cercon Ceram S were observed. Neither the differences between the SBS values of the all-ceramic test groups nor the influence of thermocycling on all groups were statistically significant. Irrespective of thermocycling the metal ceramic control group (27.6 ± 12.1 MPa, 26.4 ± 13.4 MPa) exhibited significantly higher mean SBS than all three all-ceramic groups tested. The all-ceramic groups showed combined failure modes as cohesive in the veneering ceramic and adhesive at the interface, whereas the metal ceramic group showed predominately cohesive fractures.

Significance: The results indicated that the SBS between zirconia core and veneering ceramics was not affected by thermocycling. None of the zirconia core and veneering ceramics could attain the high bond strength values of the metal ceramic combination.