



ESTHETIC VENEER TECHNIQUES SIMPLIFIED

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Fig 1. Preoperative medium smile and lip display, with square, yellow, short centrals and crooked lower lip due to fillers. **Fig 2.** Retracted view showing short, worn edges, black triangle between central incisors, and uneven gingival levels on the lateral incisors.

DIAGNOSIS & TREATMENT PLANNING

A 39-year-old female presented unhappy with her smile. Her concerns included: short, square, yellow front teeth; mis-shapened lateral incisors; worn, flat edges; and the lack of fullness on the sides of her mouth. She had been whitening her teeth for 15 years and was not satisfied with the results. She wanted veneers and a beautiful smile before her 40th birthday.

This e-learning article will show a step-by-step thought process and treatment sequence for restoring an 8-unit cosmetic reconstruction; a comprehensive dental exam, including medical and dental history, full-mouth radiographs, TMJ exam, periodontal charting, bite and functional analysis, and clinical photography was accomplished.

The photographic evaluation involved a detailed analysis of midlines, tissue display, lip asymmetry, length, and shape. A 10-unit restorative treatment plan was presented, but due to financial constraints, the patient chose eight maxillary porcelain restorations. She displayed a medium smile, which did not show the zeniths of her upper teeth. She did not feel the need to even up the gingival levels of her lateral incisors with a periodontal procedure. In order to guide the ceramist in fabricating the reconstruction, an 8-unit diagnostic wax up was accomplished.

TREATMENT PLANNING

A composite mockup with the proposed desired incisal edge and length of the left central incisor was created. The length was made intentionally longer than the anticipated final approved length. This gives the patient the ability to see, in the initial provisionals, what her smile would look like if the veneers were made too long. The patient helped design the shape, form, and length. The dentist can adjust contours and shorten the incisal edges during the provisional phase, until the patient approves.

An 8-unit diagnostic wax-up was obtained and a Sil-Tech putty matrix fabricated over the wax-up. The putty stint was loaded with a shade B1 bis-acryl provisional material (Pro-V C&B) and seated over

the maxillary arch. The patient previewed the shape and form, and upon approval these prototypes served as a preparation guide to ensure appropriate, but minimal reduction. Depth cuts were made over the provisionals using diamond burs, followed by refining of the preparations and retraction of the gingiva.

The following records were taken and sent to the dental laboratory team: face-bow, bites, PVS impressions, and photographs. The resulting provisionals were luted with a combination of spot etching and bonding in the center of the preparations using veneer cement (CHOICE 2 translucent light-cured veneer cement, BISCO Dental Products) and a temporary cement on the peripheries.



Fig 3. Mockup with incisal composite, guiding length for the diagnostic wax up; note lower crooked lip. **Fig 4.** 8-unit diagnostic wax-up. **Fig 5.** Depth cuts ensure minimal reduction. **Fig 6.** Shade tab photographs communicate stump shade to ceramist.

PROVISIONAL PHASE

One week later, the patient returned for an evaluation of the shape, form, color, and function of the provisionals. Shade tab photographs were taken in the same plane as the provisionals to document the color on that day. She was uncertain as to how white she desired her final porcelain color. The patient was asked to drink coffee, tea, and red wine for the next week. The provisional would stain, leading to a shade shift of between one-half to one shade darker. The patient could then evaluate the color as it darkens, and when the final color is chosen, a photograph with a matching shade tab against the provisional prototype is taken and sent to the ceramist.

Seven days later, reevaluation of the color with photography occurred. The provisionals had stained darker and matched perfectly with her existing dentition. By using this technique, she now knew she liked the earlier lighter shade and owned the final desired shade. The provisionals were polished, the staining removed.

An evaluation of buccal corridor development occurred, and the patient reinforced that she does not smile that widely. She signed off, and final shade photographs and impressions were taken and sent to the ceramist as a guide for the fabrication of the final restorations.

Fig 7. Provisionals with shade tab photographs to communicate desired shade to ceramist. **Fig 8.** Polished provisionals communicate desired shape to ceramist. **Fig 9.** Polished provisionals, medium smile showing buccal corridor development and tooth-to-lip relationship.



TRY-IN AND CEMENTATION

When the porcelain case arrived in the office for delivery, photographs were taken, verifying that the esthetic goals of the patient were met. The patient was anesthetized, followed by removal of the provisionals, and cleansing of the preparations with pumice on a rubber cup. The IPS e.max (Ivoclar Vivadent) restorations were placed intraorally for esthetic evaluation (shape, color, and length). The patient assessed the restorations in natural and fluorescent lighting. She approved them for placement both verbally and in writing. The ceramist etched the internal surface of the silica-based ceramics using 9.5% hydrofluoric acid for 20 seconds, before shipping the restorations. This step creates microscopic pits and valleys on the surface and aids in micromechanical retention.

After try-in, cleaning of the ceramics was accomplished by

applying 37% phosphoric acid to the internal surface of the porcelain for 30 seconds, followed by rinsing with water. Next, priming occurred by using silane (Bis-silane, a 2-part silane coupling agent) and allowing it to dwell on the internal surface for 30 seconds, then air dry. This step adds an organic molecule to the porcelain, which increases the adhesion by adding a chemical bond between the porcelain and resin cements.

The next step is preparing the tooth surface for cementation and involves isolation of the area. Evaluation of the remaining tooth structure revealed a ring of enamel. A selective-etch technique, applying etch only to the remaining enamel of the tooth structure and avoiding the etch touching the exposed dentin in the middle of the tooth, was chosen. This facilitates greater mechanical retention of the veneers.



Fig 10. IPS e.max lithium disilicate restorations on the model; note incisal translucency, characterization, and surface texture. **Fig 11.** Selective BAC etch technique, avoiding acid on the middle of the tooth where dentin is exposed in the preparation.

CEMENTATION CONTINUED

A high-viscosity etch that contains benzalkonium chloride (BAC) (Select HV Etch, BISCO) was placed on the enamel for 15 seconds, then rinsed with water. The high viscosity aids in less slumping of the etch and allows the placement to be confined on the enamel. The BAC assists in inactivating the matrix metalloproteinases (MMP). MMPs are believed to degrade the hybrid layer over time.* An ethanol based universal bonding agent (All-Bond Universal, BISCO) was applied to the teeth, scrubbed for 10-15 seconds, then air dried for 10 seconds, ensuring the appearance is glossy and immobile. The preparations were then light-cured for 10 seconds.

The veneers are ready to be luted into place with a light-cured resin cement (CHOICE 2 translucent light-cured veneer cement, BISCO). Sequencing is paramount to the success of this stage. The two central incisors are always cemented at the same time, which ensures predictability of the outcome. If the centrals have a mis-seat or have any errors in angles, the remaining lateral veneers will be misaligned, and the finished case, when evaluated, will feel like a failure. Placing the cement on the preparation allows the dentist to have more control when seating the veneer over the tooth, and less likelihood of trapping air between the tooth and the veneer.

*Tezvergil-Mutluay A, Mutluay MM, Gu L, et al. The anti-MMP activity of benzalkonium chloride. *J Dent*. 2011;39(1):10.1016



Fig. 12



Fig. 13

Fig 12. Universal bonding agent is applied to the preparations and are scrubbed, air dried, and ensuring a glossy and immobile surface followed by light curing. **Fig 13.** Placing cement on the preparation allows the dentist to have more control when seating the veneers.



Fig 14. Placement of the two centrals, verifying a positive seat before brushing excess cement away from the veneer margins. **Fig 15.** Followed by placement of the left lateral and canines in the same manner. **Fig 16.** Followed by placement of the right lateral and canines in the same manner. **Fig 17.** After brushing the cement away from the lingual chamfer margin, flowable composite is injected.

PLACEMENT PROTOCOLS

Placement was accomplished one central veneer at a time, followed by adjusting and slightly rotating the two veneers if needed, until a positive seat is accomplished. All marginal fits were verified to be flush with the margins of the preparation, the midline is concentric, and edges are parallel and even. A brush was used to remove the excess cement in a gentle swooping motion, away from the veneer margin toward the gingiva. Inspection from a frontal perspective verified perfect positioning before a spot cure was obtained by

placing the curing light at the contact between the two centrals. Next, the left lateral and canines were luted in the same manner, followed by the right side. A lingual chamfer wrap design was chosen to enhance the resistance form of the preparation, as well as to provide more enamel surface area for increased bond strength. After the cement was removed from the lingual chamfer by brushing away the excess, a highly filled flowable composite was applied to the lingual margins and light-cured.

FINAL STEPS

The next step is the cleanup and polishing phase. A fine football-shaped diamond was employed on the lingual margin to remove excess composite. This step aids in creating a smooth, seamless transition that passes the patient's tongue test.

There may be remnants of cement remaining at the margins or at the contacts of the cured restorations. A scaler is used to remove the cement by scaling it away from the restorative margin. An end cutting saw was used interproximally to remove cement, then a file was used to smooth all interproximal margins.

An occlusal equilibration was done with the patient closing into MIP until all posterior teeth displayed bilateral and simultaneous forces. The functional occlusion was evaluated with the patient sitting up in the chair and chewing on thick (200 μ m) horseshoe articulating paper, which simulates the chewing envelope, activating the closing muscles. All functional adjustments were made by recontouring the lingual or occlusal surface of the maxillary restoration's dentition. Essix retainers were fabricated, and the patient was instructed to wear the Essix retainers indefinitely at night to maintain the achieved results.



Fig 18. A fine football shaped diamond is employed on the lingual margin to remove excess composite and create a surface that passes the tongue test. **Fig 19.** An end cutting saw is used interproximally, then a file is used to smooth all interproximal margins.

RESULTS



Fig 20 and Fig 21. Preoperative and postoperative. Note medium smile, good buccal corridor development, perfect alignment of the incisal edges with the lower lip, and perfect length-to-width ratio, filling in the esthetic visual plane. **Fig 22 and 23.** Preoperative 1:1 and postoperative 1:1. Note the same width of teeth, but length corrected, and visually beautiful incisal translucency, color gradation, and surface texture.

Fig. 22

ABOUT THE AUTHOR

JOYCE BASSETT, DDS, FAACD, FAGD, practices comprehensive restorative and aesthetic dentistry in Scottsdale, Arizona. She is an Accredited Fellow of the American Academy of Cosmetic Dentistry and President 2015-2016. She is a Diplomate of the American Board of Aesthetic Dentistry, an Associate member of the American Academy of Esthetic Dentistry, a KOIS Clinical Instructor, an active member in the Academy of Fixed Prosthodontics, and a Fellow in the AGD. Dr. Bassett also serves as adjunct faculty, teaching the aesthetic continuum at the Arizona School of Dentistry. She is a member of the Catapult Group speakers bureau, evaluating new dental materials. Voted one of the top five female CE educators, Bassett is an international lecturer, published author, and member of the editorial board of several peer-reviewed publications. She is a recipient of the Lucy Hobbs award for Clinical Expertise, the AACD Evy Award for Excellence in Teaching Cosmetic Dentistry Education, the Volunteer Dentist of the Year award for Arizona CASS dental clinic, and she has received the Give Back a Smile volunteer service award twice.



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