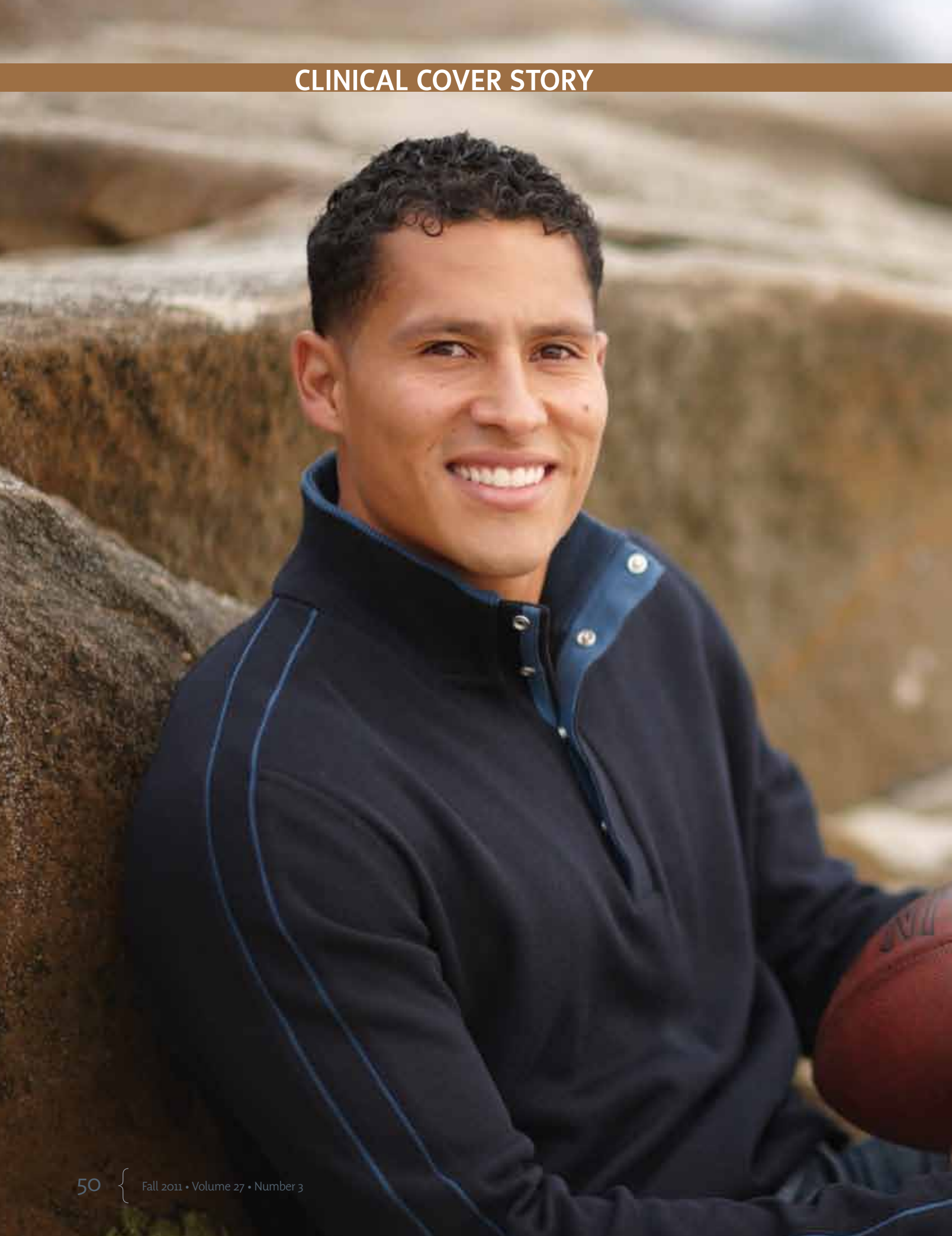

Conservative, Simple, Efficient!

No-Prep Smile Design, Using a Single Shade, Modern, Direct Material

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Introduction

The ability to restoratively correct minor spacing and wear issues in an otherwise healthy dentition can be one of the bigger challenges in cosmetic dentistry. Sometimes a smaller correction requires a greater, more delicate effort to achieve success. To create natural contours and undetectable restorations, each case requires precise planning, accurate manipulation of materials, and proper clinical training. In any case, if a restorative option is selected, it should be with the understanding that permanent changes will be made to natural teeth to properly correct the problem. As restorative dentists, our goal should always be to conserve as much tooth structure as possible while still achieving the intended outcome.

To this end, conservative "no-prep" laminate porcelain veneers and direct composite veneers can be placed to achieve functional and esthetic objectives. However, porcelain laminate veneers cannot always be placed ideally without some tooth structure removal, and parameters to ensure longevity and esthetic success include required material thickness, tooth substrate (i.e., enamel or dentin), tooth position, and angulation.[1-4] Additionally, other esthetic and functional considerations, including tooth color, occlusal relationships, and patient expectations, may also dictate the appropriateness of the porcelain laminate veneer option.[1-5]

Figure 1: Note the high luster, finish, and polish of the single shade nano-composite.

Composite Properties

In certain cases, direct composite veneers are among the options for minimally invasive treatments when altering the appearance of a patient's smile as well as restoring function and improving occlusal relationships.[5,6] When selecting a composite restorative material, it is important to understand its properties to determine its suitability for a case. Ideally, a material should demonstrate wear resistance, polishability, and strength in order to provide maximum value to the patient.

In the past, microfill composites were typically used for anterior restorative applications because they are known to demonstrate high polish and good wear properties. The drawback with these materials, however, is their strength. Microfill composites often fracture on lines between the resin matrix and the pre-polymerized particles of organic filler.[6-8] Although they may enable dentists to replicate the color, translucency, polishability, and wear resistance of natural teeth, they are not sufficiently strong for some functional requirements and may be excessively translucent.[9,10]

Nano-composites, however, demonstrate recent advances in wear properties and polishability that make them suitable for esthetic restorative dentistry (e.g., Filtek Ultra, 3M ESPE; St. Paul, MN). This material combines individual spherical nano-particles with clusters of nano-particles and the nano-clusters are lightly sintered before being blended into the composite. This sintering allows the particles to break apart during the wear process, preventing the loss of large particles and enabling the material to maintain a strong polish over time and still exhibit good strength **(Fig 1)**.[11] Some nano-filled composites (e.g., Venus Diamond, Heraeus; South Bend, IN), in addition to utilizing nano-technology for strength and polishability, demonstrate ideal natural tooth optical properties, such as opacity and translucency.[12,13]

Current trends in dental materials suggest that nano-composites are emerging as a popular choice for anterior direct restorations.[11,13,14] Although no one material or restorative option is ideal for every clinical situation, trends suggest that today's available composite materials are of high quality and, when appropriately applied into carefully selected treatments, can deliver predictable and long-term results.[15]

The case discussed here is an excellent example of how modern direct materials can provide a conservative alternative for meeting a patient's esthetic and functional goals in consideration of the time and economic constraints presented.

Patient History and Findings

The 29-year-old patient wanted his smile enhanced for his upcoming wedding. A professional athlete and model, he was aware that his smile could be improved. Clinical and radiographic examination revealed a healthy soft tissue interface. However, hard tissue and temporomandibular joint examinations revealed incisal wear and nocturnal bruxism **(Figs 2-4)**. The patient was previously treated by an orthodontist and was informed there was an arch/tooth width discrepancy.

It was agreed that placement of direct materials to close diastemas, lengthen the teeth, and rebuild anterior guidance would satisfy the esthetic goals and time constraints. When patients understand the necessity for proper maintenance, modern direct materials are a viable, long-term anterior restorative option.

Records and Smile Design

A complete AACD series of photographs was digitally recorded, including additional photographs of the lips in repose and shade reference. Maxillary and mandibular preoperative impressions were made, along with a facebow using a SAM 3 articulator (Great Lakes Orthodontics; Tonawanda, NY). Study casts were mounted with a passively obtained open bite centric relation (CR) record using an anterior deprogrammer. The mounted models were studied to determine whether any

Figure 2: Preoperative smile shows lack of balance and harmony.

Figure 3: Note incisal wear, diastemas, and improper proportions.

Figure 4: Note abraided surfaces from previous orthodontic treatment.

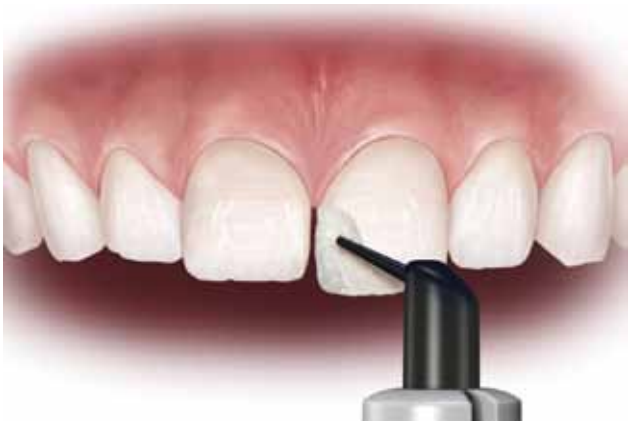

Figure 5: Flowable composite was used to improve the proportions of the incisors by adding length and closing the diastemas.

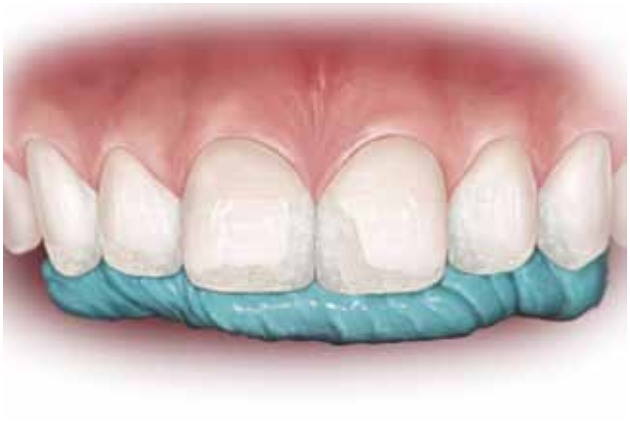

Figure 6: Lingual and incisal edge guides/matrices and buccal contour guides/matrices were created using injectable putty.

Figure 7: Note the retruded positioning of the incisal edges, which facilitated a "no-prep" additive process.

Figure 8: Note the negative space at the incisal edges compared to the lower lip, which enabled the creation of additional length for the incisors.

Figure 9: The longer canines and incisors improved functional guidance.

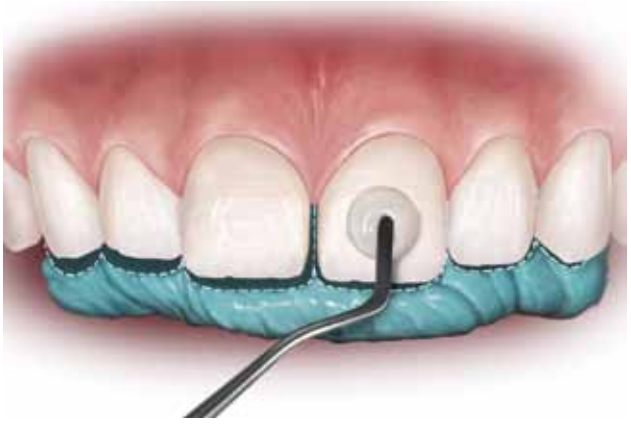

Figure 10: A single shade of composite (compressed into a ball to reduce air bubbles) was placed on the facial surface of one tooth at a time and gently spread out using an interproximal carver.

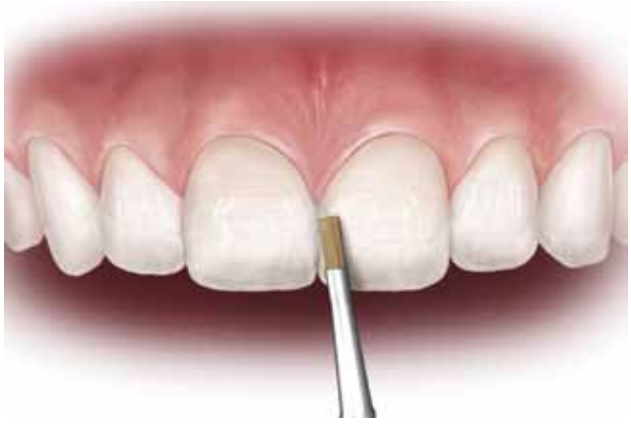

Figure 11: A flat brush was used to blend, contour, and shape the line angles.

Figure 12: Proper facial embrasures were created.

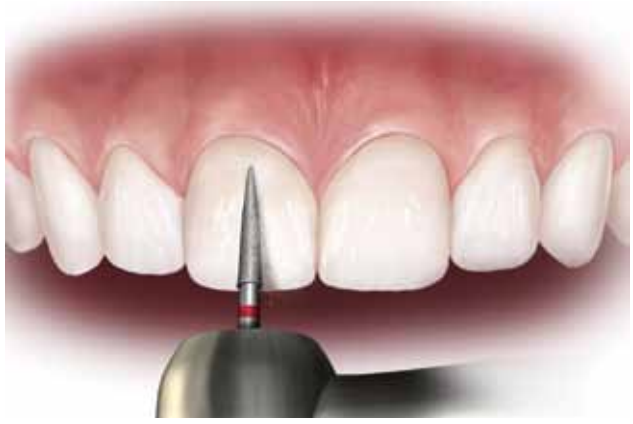

Figure 13: Basic contouring was completed using a red stripe flame-shaped diamond to create a smooth satiny contour; alternating between wet and dry helps to visualize the anatomy.

Sometimes a smaller correction requires a greater, more delicate effort to achieve success.

occlusal disharmonies existed. It was determined that CR and centric occlusion were compatible, and no posterior occlusal treatment was indicated.[16]

The teeth were dried and a lip retractor placed for smile design and intraoral mock-up. Intraoral smile design was utilized to visualize the case and develop contours with proper anterior guidance. The composite mock-up was a valuable tool not only for the clinician, but also to demonstrate to the patient what could be accomplished. The intraoral mock-up was completed using flowable composite while following basic smile design principles **(Fig 5)**.[17]

The mock-up was contoured with a fine diamond, and photographs were used to compare with the preoperative condition. After minor corrections to the bite and approval from the patient, an incisal edge guide and facial contour guides were made using Blu-Mousse (Parkell; Englewood, NY) prior to removing any of the mock-up **(Fig 6)**. These guides were used as a reference for final composite placement.

Treatment

The retracted angle and spacing of the anterior teeth enabled treatment using a completely "no-prep" procedure, which enhances bonding strength due to 100% enamel bonding **(Figs 7 & 8)**. This also satisfied the patient's desire to conserve tooth structure.

Direct Freehand Bonding

When utilizing no-prep procedures, several basic concepts must be followed, since not every case can be completed without preparation and still achieve the desired outcomes. Lingually inclined teeth, while simultaneously closing spaces, are ideal because they facilitate a completely additive-type procedure. It is also important to understand the limits regarding the amount of additional restorative material patients will tolerate on the facial surfaces of teeth. An increase of approximately .5 mm to the facial surfaces is generally an acceptable limit; this case allowed us to make the necessary changes while staying within those parameters.

After cleaning with a rubber cup and pumice, the teeth were etched with 35% phosphoric acid and an adhesive (Adper Single Bond Plus Adhesive, 3M ESPE) was placed and cured.

The incisal edge matrix from the mock-up was placed intraorally, and the nano-composite (Filtek Ultra, White Enamel) was placed, beginning with the central incisors.[18] The goal was to keep the case as simple as possible using a single shade and single layer

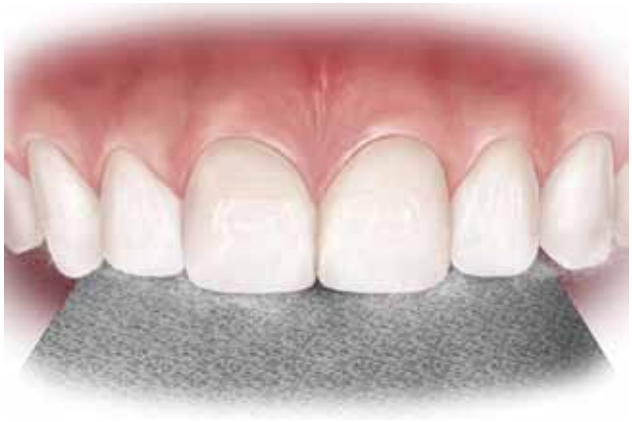

Figure 14: A cuticle file was used to accurately level the edges of #8 and #9.

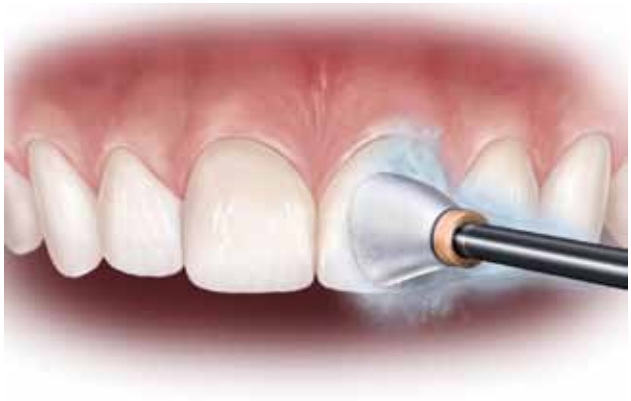

Figure 15: Polishing was accomplished using a medium sand paper disc followed by pumice and Enamelize.

of composite with final focus on contours and surface luster. The ultimate goal was to close spaces and add length to improve esthetics and function **(Fig 9)**.[19]

To reduce the chance of creating voids, a single increment of composite was compressed into a ball to reduce air bubbles, placed on the facial surface of one tooth at a time, and gently spread out using an interproximal carver **(Fig 10)**. The increment was manipulated with a flat brush to ensure optimal contour, width, and line angles **(Fig 11)**. The matrix was used as a reference throughout the process by condensing the material gently into the guide and removing after curing. The restorations were completed individually and sculpted as close to ideal as possible prior to curing for 40 seconds each, using an LED curing light (Elipar S10, 3M ESPE). The selected enamel shade imparted a natural chroma and value while retaining depth and translucency.[20]

Once the composite application was completed and fully cured on all teeth, a flame-shaped diamond (Brasseler USA; Savannah, GA) was used to contour, shape, and refine the facial surfaces, refining proper line angles, embrasures, and macro anatomy **(Figs 12 & 13)**. Alternating between wet and dry modes on the electric handpiece helped to visualize the anatomy.

Occlusion was verified and lingual surfaces polished with a fine football-shaped diamond (Brasseler) and rubber points (Shofu Dental; San Marcos, CA). A 180-grit emery board was used to level the incisal edges of #8 and #9 and ensure that the laterals were .5 mm shorter than the centrals. The "nail file" emery board was wide enough to simultaneously draw along the incisal edges of #8 and #9, creating perfect alignment of the central incisal edges as it was gently pulled over the surfaces **(Fig 14)**.

Finishing was completed using a medium-grit, extra-thin disc (Sof-Lex, 3M ESPE) and water. Polishing was initiated using flour pumice and a soft rubber cup, followed by a rubber cup (Politip, Ivoclar Vivadent; Amherst, NY) **(Fig 15)** and completed with Enamelize (Cosmedent; Chicago, IL) and a purple felt wheel. Incisal embrasures were refined with a diamond disc (Brasseler). An extra-fine "yellow" perforated diamond finishing strip (Brasseler) was used between the teeth, gingival to the contact points, to complete the interproximal finishing **(Fig 16)**.

Figure 16: Note the proper placement of contacts and incisal embrasures.

Conclusion

The final result was a more natural and esthetic smile line that "fits" the patient's face. The diastemas were closed with ideal line angles and anatomy that properly supports the tissue.[21] The unique properties of this new-generation composite material were particularly useful in this case, enabling the predictable application of a single shade and thin layer of material to create the anticipated result. The nano-composite demonstrated a high-quality luster and surface polish, and the restorations blended well with the existing dentition.[22] The restorations achieved the established goals for shade, contour, and smile design **(Figs 17 & 18)**. Occlusal protection was provided via fabrication of a flat plane splint occlusal nightguard.[23]

It is the author's opinion that cases should always be designed to achieve desired restorative corrections by altering the fewest number of teeth possible; that was accomplished in this case. Educating patients about what constitutes "esthetics" is an important factor, remembering that subtle randomness in shape and contours of hard and soft tissue can help to create balance and harmony in the smile.[24] The results were dramatic for this patient, and he was exceptionally pleased with his improved smile.[25]

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Ideally, a material should demonstrate wear resistance, polishability, and strength in order to provide maximum value to the patient.

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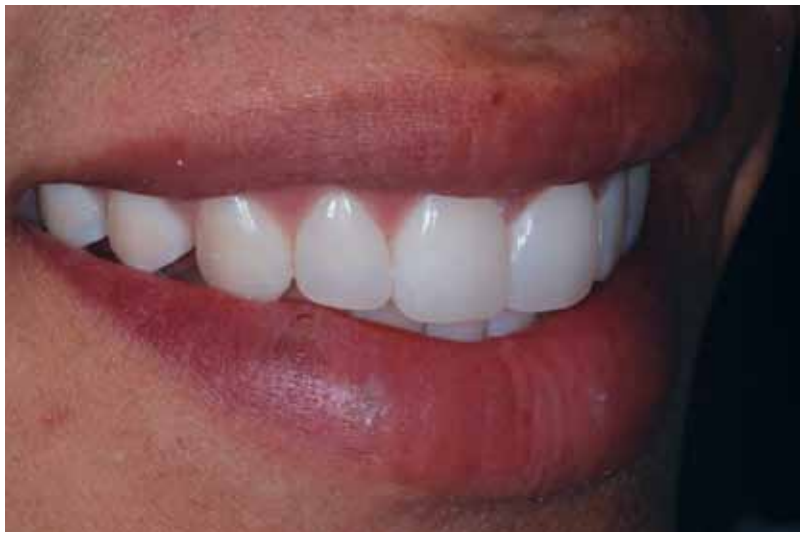

Figure 17: The longer incisors decrease negative space by following the curve of the lower lip.

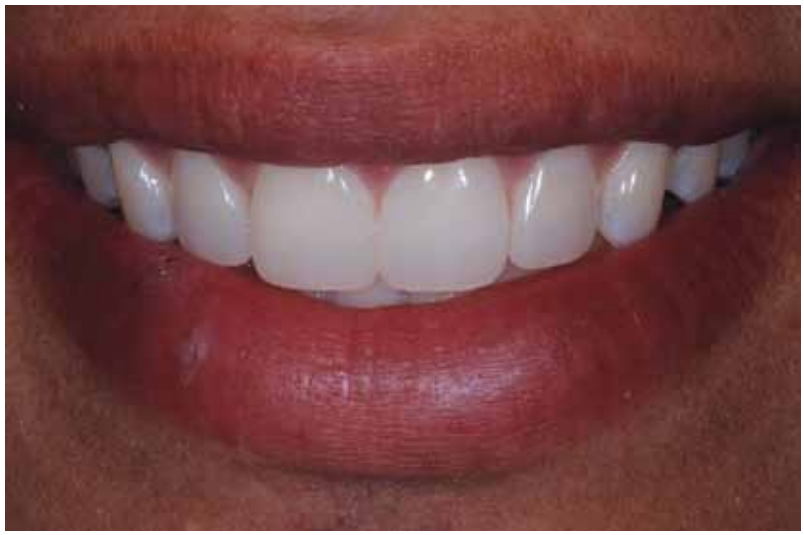

Figure 18: Note the improved balance and harmony of the new smile.

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