ACCREDITATION review

by HUGH FLAX, DDS

Dr. Hugh Flax is a 1983 Phi Beta Kappa graduate of Emory University School of Dentistry. In 1984, he participated in a General Practice Residency at the Veteran's Administration Medical Center in New Orleans along with teaching and performing cosmetic material research at the Louisiana State University School of Dentistry. Dr. Flax established his current practice in Atlanta, Georgia in 1987.

Creating An Attractive Smile Through Minimally Invasive Care **Case Report # 3**

EIGHT INDIRECT VENEERS

Porcelain veneers have been established as "the ultimate conservative anterior esthetic restoration."[1] They symbolize the progress of several decades of research from Dr. Charles Pincus' Hollywood veneers of the 1930's to Dr. Frank Faunce's prefabricated acrylic version in the 1970's to the work of Simonsen, Calamia, Goldstein, Garber, Feinman and others with etched feldspathic porcelain in the 1980's.[2] In the 1990's, we have benefited from an explosion in reinforced ceramic and resin technology that improves on porcelain's well-known advantages of abrasion resistance, color, stability, compatibility, precise fit, conservatism, color gradience, and anatomical texturing. They surpass any direct or indirect technique available.[3]

In this case, etched porcelain veneers were used to replace poorly shaped resins that had been used to close spaces between malposed and morphologically deficient teeth. This patient (and her parents) wanted a natural, long-lasting, nonorthodontic enhancement of her upper front teeth.

Figure 1: Irregular smile lines and poor bonding were a detriment to this young woman's smile prior to treatment.

HISTORY

The patient was a healthy, 18-year-old female. Previous dental care mostly involved regular dental prophylaxis, radiographs, and exams. Furthermore, resin bonding had been attempted four years ago to close diastemata between the four upper incisors. Orthodontic care was not attempted. All four wisdom teeth had never developed.

This patient wanted a natural, long-lasting, nonorthodontic enhancement of her upper front teeth.

This young woman and her parents desired a cosmetic change in her smile. She was unhappy that the previous bonding had chipped and stained, as well as continually catching food debris between the teeth. She had become quite self conscious about it and wanted it corrected before her prom and graduation this spring. She also mentioned she had no stain-producing habits like drinking coffee or tea or smoking cigarettes.

CLINICAL DATA

During a comprehensive new patient examination, no signs of oral cancer were observed. Panoramic and vertical bitewing radiographs showed no osseous breakdown or wisdom teeth.

Voice activated periodontal charting demonstrated no gingival pocketing, recession, or bleeding. Home care was excellent in spite of existing overhanging composites on teeth #'s 7-10.

Occlusion was Class I with upper/lower midlines coincident. TMJ load testing and occlusal examination were normal showing no evidence of parafunction and excellent canine guided protection.

Staining existed in the occlusal grooves of teeth #'s 3, 14, 19, and 30 but were not cavitated. The overhanging upper anterior composite of the mesial of #7 showed stain as well.

Smile analysis with a cosmetic imager and mounted study models with waxups demonstrated the following:

1. Poorly shaped composites closing the diastemata #'s 7–10.
2. Although the upper central incisors had a good 80% width/length ratio, the dimensional relationships between centrals, laterals, and canines were not pleasing to the eye because the laterals were too small and the canines looked triangular (especially #6).
3. The midline was correct and the occlusal plane matched the interpupillary plane.
4. Axial inclination was proper.
5. The incisal edges were not harmonious with the lower lip line due to the shortened lateral incisors.
6. Arch form looked good but the transition from the anteriors to posteriors was not proper due to canine/premolar diastemata, as well as the aforementioned triangular canine shapes.
7. Gingival display was minimal with some slight asymmetry in height only during retraction.[2]
8. Natural tooth characterizations included gingival white hypocalcifications and white vertical check lines. Greyish incisal edges outlined the dentinal mammelons on the incisors. The latter was deemed excessive and unpleasant by the patient.
9. Diagnostic waxups to create better harmony made obvious that the lower cuspids and first bicuspids were above the desired occlusal plane to augment #'s 6–11. Furthermore, to create proper mesiodistal proportions, the bicuspids would also need augmentation if a pleasing smile was to be achieved.
10. The overall color of the teeth was too orange (about shade A2.5).

Figure 2: Three dimensional enamel qualities (hypocalcification; incisal translucency) were important to duplicate for a natural apperance.

Figure 3: Supraerupted lower teeth affected the plan to enhance the lateral incisors and canines.

The poorly placed bonding was uncosmetic but also created iatrogenic gingival irritation and redecay.

DIAGNOSIS

A lack of tooth structure and some unevenness of the anterior occlusal plane contributed to the esthetic disharmonies noted above. The poorly placed bonding certainly was uncosmetic but also potentially created iatrogenic gingival irritation and redecay.

TREATMENT PLAN

To create a durable and natural enhancement of this patient's smile, bonded porcelain veneers were the recommended treatment. The material utilized was the IPS Empress system because of its outstanding esthetics, excellent marginal fit, great strength, natural wear character, and biocompatibility.

The preparation plan to achieve optimum results would involve reducing the length of #'s 21, 22, 27, and 28 to create material thickness of porcelain for lengthening #'s 7 and 10 which would be reduced incisally for sufficient bulk and then extended lingually to provide added support and resistance form to prevent fracture and/or debonding. Furthermore, for naturalness in appearance, all eight teeth would be prepared in a controlled manner to allow for optimum color layering via the "stratification method".[1]

Prior to beginning veneer treatment, the following were performed:

1. Pretreatment slides taken for documentation, as well as patient and laboratory communication.
2. Home whitening for four hours each day for two weeks using Opalescence (Ultradent). This would allow decreased chroma and increased value of the surrounding teeth and ultimately the teeth to be treated.
3. The lower occlusal plane was evened at teeth #'s 21, 22, 27 and 28.

ARMAMENTARIUM:

1. Designs for Vision 2.5X Surgical Loupes
2. Brasseler Laminate Veneer System (LVS) Kit
3. Brasseler Gateway Strips (Coarse and Fine) Narrow Width
4. Unitek Retractors
5. Ultrapak #000 (Ultradent)
6. Astringedent (Ultradent)
7. Brasseler Dialite Point
8. Cadco alginate
9. Coltene President Putty and Micro (Medium Body)
10. Denar Earbow
11. Herculite XRV (Shade A1 Enamel)
12. 38% Phosphoric Acid Gel (Pulpdent)
13. Bisco Dentin Enamel Resin
14. Brasseler Carbide ET Kit (12 fluted) and Diamond Burs (DOSI, DOSIEF, DOSIUF)
15. Cosmedent Flexidiscs
16. Enamelite (Cosmedent)
17. IPC instrument (Hu Friedy)
18. Bard Parker # 12 Blade
19. Variolink Tryin Paste (Ivoclar)
20. Variolink Cementation Kit (Ivoclar)
21. Dead Soft Matrix Material (Denmat)
22. Consepsis (Ultradent)
23. Denmat Veneer Holder
24. Denmat Shure 349 instrument
25. Cosmedent Flexistrips
26. Brasseler Porcelain Polishing Kit
27. Porcelite Polishing Paste (Cosmedent)
28. Ivoclar Shade Map
29. Caulk Max Curing Light (2 mm and 12 mm tips)

Figure 4: With a more even lower occusal plane, a harmonious smile was achievable.

PREPARATION

Two weeks after the final whitening checkup, shade mapping was done prior to tooth preparation.

It was agreed that Vita A1 would be an excellent body shade with a very light hint of orange and random white speckling at the gingival one-third and very faint thin vertical white crack lines for natural characterization. This was drawn on an Ivoclar Shade Map.

Following anesthesia, preparation began on all eight teeth by placing three depth cuts of .3 mm labially using a Brasseler LVS-2 bur and followed by the LVS-1 to increase the depth of the midfacial and incisal cuts to .5 mm. This was a slight modification of Garber, Goldstein, and Feinman's technique but in line with Nixon's stratification method.[2,3] Also to enhance visualization, the teeth were prepared dry with intermittent water spray to wash away debris.

After depth cuts were placed, an LVS-3 two grit diamond that has a round end was used to define the cervical and proximal finish lines creating a definitive chamfer at the crest of the gingival margin. The key for an esthetic result was to finish the proximals as lingually as possible to hide the margin. In this case, it was also important to eliminate or cover any remaining interproximal composite. To eliminate undercuts in our final path of insertion, the diastemata were opened a little more, as well as linguoproximal finish line being finished as a long bevel.[3]

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Facial preparation was simply done with the LVS-3 by preparing the surface until the depth cuts disappeared. This helped avoid over-reduction or under-reduction and blended into the gingival chamfer. Since there would be no change in their length, incisal labial preparation of the centrals and cuspids were prepared as a "window" by inverting the tip of the LVS-3 toward the incisal staying within the periphery of the incisal outline. The lateral incisals to be lengthened were "wrapped" by reducing the incisal edge about 1 mm, tilting the bur and the edge toward the lingual for porcelain bulk and then creating a lingual chamfer parallel to the angle of mandibular protrusive function with the finish line above or below centric contacts. On the bicuspids, the occlusal finish line extended 2 mm onto the buccal cusp to create a "hood" for preventing shear fracture.[3]

After most of the preparation was completed, Ultrapak #000 cords were placed gently into the gingival sulci in a lateral direction. Final finishing of the preparations was done with interproximal refining with a coarse Gateway finishing strip and eliminating bulges or sharp angles with a coarse Flexidisc. The preps were carefully inspected for even, adequate reduction, smooth definite finish lines that were cosmetically well hidden but easily visualized by our ceramist. Any small refinements were done with the tip of the two grit diamond.

An impression of the preparation was taken after rinsing and drying the preparations carefully. The author has found that President soft putty in a stock tray seated over a wash of injected medium viscosity President Micro impression material has worked well to give accuracy and tear resistance of the impression. The tray was held in place for seven minutes and removed, rinsed, and carefully examined. A stump prep shade of St 9 from the Chromoscope shade guide was taken with a 35 mm photo for lab communication.

Provisionalization is a regular service we provide our patients so that they can feel a sense of improvement (and security) after this visit, and gave her a chance to "test drive" the new contours. It is also a great communication tool for the laboratory technician as well. The method used was the "freehand technique" taught to me by Dr. Ross Nash.[4] The teeth were "spot etched" about 2–3 mm in the center of the facial surface away from the margins using a thick gel-like Pulpdent 38% phosphoric acid. After the etchant was rinsed off and dried, each tooth was painted with a thin coat of dentin enamel resin and cured for 20 seconds. With no ambient light on the teeth and an IPC instrument, a ball of Herculite XRV (A1 was used here) was placed on the facial of the left central, shaped and very thinly sculpted as a direct veneer at the gingival area. This was cured for 40 seconds with a 12 mm curing tip. The teeth were all individually treated this way keeping in mind the shapes eventually to be created. The provisionals were then contoured and finished with a carbide ET9 Cosmedent disc and #12 Bard Parker

Figure 5: The laboratory carefully followed our guidelines for enamel characterization (Note the tissue health as well).

blade so that no bulk would irritate the lips or gingiva. By having the veneers bonded together, retention was greatly increased. The cords were removed. Home care instructions were to use a rubber tip stimulator and scrupulous tooth brushing to create a favorable gingival response.

Irreversible hydrocolloid impressions were taken of the provisionalized and the lower teeth with Cadco alginate mixed in an alginator to minimize bubbles. A centric occlusion bite registration was made in Correctabite and the Denar earbow was used to orient the models for the lab for determining midline and interpupillary planes for construction of the veneers. The patient was given Advil to reduce any tenderness and then dismissed.

Laboratory Instructions

A detailed laboratory prescription (including Dr. Peter Dawson's Esthetic Guideline Sheet[5] and Ivoclar's Shade Map) was sent to the lab along with mounted models of the provisionals. Pre-op 35 mm slides with and without shade tabs were also included. Furthermore, a soft tissue model incisal guide table and labioincisal matrix were requested to duplicate contours precisely. On the prescription, specific guidelines and measurements were noted for each tooth, as well as a desire to transition body color from A1 on the incisors to more A2 in the cuspid/bicuspid region for a more natural appearance. Lastly, a medium lustre was noted for maintaining texture.

Placement and Finishing

The veneers were returned from the lab and checked on a solid model for fit (individually and collectively), closure of spaces, and dimensional size. Also, the internal surfaces were checked for etching by looking for a uniform frosty appearance which all of them had. All requirements were fulfilled and we were ready for tryin with the patient.

The patient was anesthetized and the provisionals were removed using a spoon and scaler. The bonded remnant was removed by spot grinding with a coarse Flexidisc. The surfaces were then cleaned with Consepsis and flossed with Dentotape. To prevent contamination of the veneers, Ultrapak #000 was gently placed in each gingival sulcus.

After placement of Unitek retractors, each veneer was tried in individually dry and collectively with glycerin to check not only the contacts but also for the patient to see the veneers as a group. The patient was very pleased with the outline and contour but wanted the teeth to look slightly whiter. Variolink Shade 100 try-in paste was placed into #'s 7 and 8 veneers and compared to #'s 9 and 10. She preferred the whiter color, and, fortunately, it did not whiten out the characterizations the lab meticulously placed in the veneers.

The veneers were removed, cleaned off with water and dried. They were internally silanated with Monobond S and air dried for 60 seconds. Heliobond unfilled resin was painted thinly and the veneers were placed in the light protected Denmat Veneer Holder to eventually be loaded with Variolink base (light cured only) paste to minimize any color change described by Nixon.[3]

The sequence of placement used was similar to Nixon's beginning at the paired centrals and working distally.[3] This method allowed better control of the focal point of the patient's smile preventing midline diastema opening, as well as excellent orientation for the subsequent veneers which would be placed in similar pairs —the laterals, the cuspids, and, lastly, the premolars *after* the preceding pair was inserted and finished. The following sequence was used for each pair.

After the two preps were scrubbed with Consepsis and washed, dead soft matrix material was placed mesial and distally to protect the adjacent teeth. The teeth were etched with 38% phosphoric acid gel for 15 seconds, then rinsed for 20 seconds and dried. Syntac primer was applied for 15 seconds and dried, followed by Syntac adhesive and

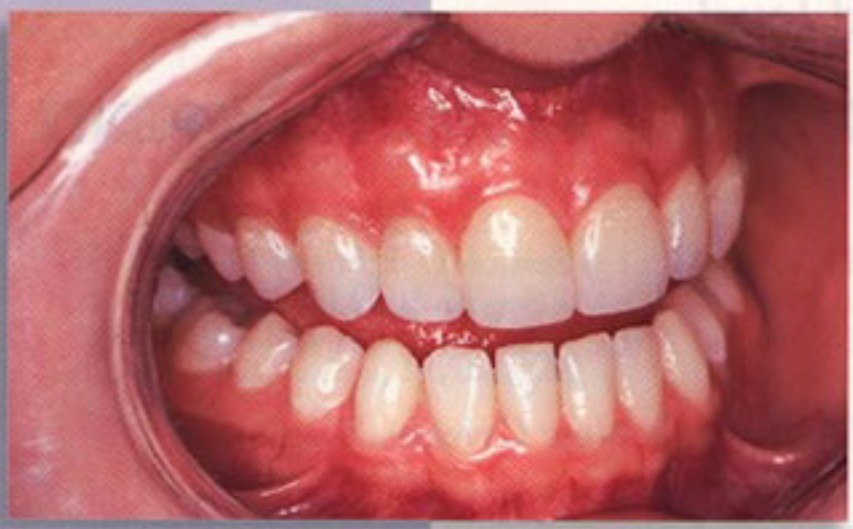

Figure 6: Careful planning of both occlusion and esthetics orchestrated form to follow function.

it too dried. Heliobond unfilled resin was thinly coated on the preparation and left protected from operating light.

The central veneers were filled with resin cement up to the level of the edges. The two veneers were seated with an incisofacial "pivot" with the prep's incisal edge as a vertical stop and the veneers seated proximally and cervically with finger pressure. The bulk of excess cement was removed with a Bendabrush. The mesial strip was pulled lingually to remove most of the gross interproximal excess mesially. A critical point was to use finger pressure on the distal towards the midline to enhance the contact. Any further cement on the mesial was removed by pulling the strip out completely. The veneers were each tacked in place by curing the mesioincisal area for 20 seconds while holding the veneers with finger pressure and Denmat's Sure 349 instrument at the gingival. A Caulk Max light with 2 mm curing tip was used. At this point, the veneer was not easily movable and the distal strip could be partially pulled out lingually. The thin resin coated margins were coated with Liquid Strip glycerin to cover the air inhibited layer, and to assure no voids at the margin, the veneers were cured completely for 60 seconds with a 12 mm curing tip on the buccal and lingual.

The two bonded veneers were grossly finished cervically and interproximally using ET3 carbides followed by a #12 Bard Parker blade. A narrow, fine Gateway strip followed by Cosmedent's Narrow Flexistrip series. Facial, proximal and cervical smoothness were checked with an explorer tip and dental floss. Now that the proximal areas were smooth and free of excess resin, the next pair, the lateral veneers, were seated in the same fashion followed by #'s 6 and 11, and eventually #'s 5 and 12.

Once all the veneers were cemented, occlusion was adjusted in centric and then excursively with Accufilm and OS1 diamonds. The gross changes were made with a fine grit bur. Final adjustments and polishing were done with extrafine and ultrafine burs respectively. All fremitus was eliminated.

Final polishing of porcelain was accomplished using Brasseler intraoral kit of gray, pink, and Dialite cups and points in consecutive order with rinsing and drying in between. Lastly, the veneers were polished with Porcelize pastes using a non-webbed cup and Dentotape.

All the cords were removed. The patient was astounded by the results. Advil was recommended for soreness and written, home care instruction was given to the patient.

The patient returned in two weeks for some touchup occlusally and final photos. Future hygiene visits will involve very careful instrumentation and avoidance of the Prophy jet (prophy paste) and APF and stannous fluorides. Furthermore, only Rembrandt toothpaste and/or Porcelize will be used to polish. In addition, the four occlusally-stained molars are to be sealed at the next hygiene appointment.

Figure 7: The patient's smile has become a beautiful centerpiece to her dentofacial image.

Summary and Conclusion

It was truly exciting to be able to create this healthy, beautiful and believable smile. Transforming this young woman's self image should greatly impact her future experiences which is something that all of us feel a great sense of contribution and pride. We hope this plays a part in a winning competitive edge.

The author would like to thank his staff and Phillip Gold of Oral Arts Dental Lab for their teamwork and dedication to creating this and many other beautiful smiles. Also, he would like to acknowledge his wife and daughter for their sharing his vision and, most of all, his time.

Case #3

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CONGRATULATIONS

newly accredited members

Nicholas C. Davis, D.D.S.

Dr. Nicholas Davis graduated in 1973 from Loma Linda University and has been in practice in Newport Beach, CA for 24 years. He has received several dental awards including a 1973 periodontal award from Loma Linda University, 1983 special recognition from the ADA Council on International Relations, and Masters from the AGD in 1990. Dr. Davis is a lecturer and published author, and has produced 26 half-hour television programs on dental health. In his spare time, he enjoys photography and travel. He and his wife, Kiki, have two teenagers.

Hugh Flax, D.D.S.

Dr. Hugh Flax is a 1983 Phi Beta Kappa graduate of Emory University School of Dentistry. In 1984, he participated in a General Practice Residency at the Veteran's Administration Medical Center in New Orleans along with teaching and performing cosmetic material research at the Louisiana State University School of Dentistry. Dr. Flax established his current practice in Atlanta, Georgia in 1987. He is a member of numerous dental organizations and stays active in community work through his work with Big Brothers. Hugh and his wife, Robyn, have one daughter. In his off hours he enjoys golf, scuba diving and music (*especially the blues*).

Timothy Mahoney, D.D.S.

Dr. Timothy Mahoney graduated in 1983 from the University of Alberta and has been practicing for the last 14 years in Wetaskiwin, Alberta (just south of Edmonton). Dr. Mahoney, his wife, Laura, and their three boys enjoy waterskiing and snowskiing. Tim is also an avid practitioner of Aikido and enjoys scuba diving. He credits Dr. Jim Elias as the person who initially provided the inspiration to achieve Accreditation with the American Academy of Cosmetic Dentistry.

Arthur Z. Weiss, D.M.D.

Dr. Arthur Weiss graduated from the University of Pennsylvania in 1975 and attended post graduate G.P.R. in 1976 at Albert Einstein Medical Center. Dr. Weiss has been in practice in Rockville, MD for 20 years and is affiliated with Shady Grove Adventist Hospital. In his spare time, Dr. Weiss and his wife, Rachel, enjoy skiing, backpacking, and bicycling.

Martin Zase, D.M.D.

Dr. Martin Zase graduated from Tufts University School of Dental Medicine in 1971 and has been in practice in Colchester, CT for the past 26 years. A published author, Dr. Zase has been a clinical instructor in restorative dentistry at Tufts University School of Dental Medicine and is a Fellow in the AGD. Dr. Zase has numerous hobbies including photography, golf, collecting outrageous Hawaiian shirts and is an instrument pilot.