

Aggressive Tooth Reduction to Satisfy The Patient's Esthetic Demands



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When new techniques emerge, the result can be a zealous paradigm shift that influences professional opinion. In time, the conscience of the profession steps in to remind us of its original purpose. This cycle was observed in medicine. There was a time when tonsils and adenoids were removed at the first sign of infection. The medical opinion then swung 180 degrees, and tonsils and adenoids were stubbornly maintained whatever the cost. In dentistry, there was a time when third molar extraction was decried except under justifiable circumstances vs their removal as almost a rite of passage into adulthood.

The coming of the adhesion age also had its controversies. In its infancy, etching dentin was heresy. Conclusive research now shows that etching dentin followed by the application of a dental primer and a bonding agent via the moist bond technique is mandatory to ensure a soundly sealed restoration, to prevent sensitivity, and contribute to the overall retentiveness of the filling.¹ Moreover, it is this ability to predictably bond to

ABSTRACT

The introduction of adhesion dentistry has opened a realm of treatment options. The ability to bond to enamel and dentin has led dentists to believe that placing porcelain as a restorative solution can solve all esthetic problems. Because patients are feeling more informed and entitled than ever before, they are increasingly taking control of treatment options and the ultimate outcome. Because the bar is continuously being raised, the path to perfection has many routes. Does a rapid restorative solution serve a truly informed patient's best interest? This article presents one such dilemma and demonstrates how the patient influenced its outcome.

LEARNING OBJECTIVES

After reading this article, the reader should be able to:

- recognize the need for a comprehensive examination before proceeding with treatment.
- use a non-invasive technique for gingival retraction as to minimize the possibility of recession.
- use a new technique for hard tissue anesthesia so that esthetic restorations can be properly evaluated.

dentin that dentists rely on to solve the majority of their esthetic dilemmas.²

Adhesion dentistry created a new controversy for those traditionalists opposed to the removal of sound tooth structure for the sake of esthetics.^{3,4} It is the author's opinion that, although there are technical guidelines as to which type of restoration is dictated according to the individ-

Although there are technical guidelines as to which type of restoration is dictated according to the individual case, each must be assessed on its own merit.

ual case, each must be assessed on its own merit. With so many avenues of treatment available, it simply is not possible to judge why certain cases were completed as they were unless all of the

parameters are known. In addition, this new area of dentistry brings increased awareness and demands from our patients. In an article by Ron Weintraub, DDS, the excessive demands and expectations that patients place on dental practices were described.⁵ It is this goal to satisfy the patients' demands of immediate gratification that often drives treatment decisions.

Adhesion dentistry is a powerful tool in the dentist's armamentarium.⁶ It helps to complete treatment that would have been concluded with a compromised result 20 years ago. When a

patient requests a major change in dental appearance, what is the dentist's obligation? It behooves dentists to ensure that the patient has been fully educated in all the drawbacks and benefits of the various treatment options. When completed, the dentist can only assume the position of a resource professional answering any questions the patient may have that will help to arrive at a decision that is right for that individual. If after being informed of the risks and alternatives of aggressive tooth reduction the patient still wishes to proceed, is a dentist harming the patient? A more conservative approach may be to provide the patient with a smile with properly aligned teeth. If the enamel is stained, pitted, discolored, and will not positively respond to a conventional tooth whitening technique, how successful will the result be?



Figure 1—
A preoperative full
face view
(1:10).



Figures 2A through 2C—A preoperative right, center, and left retracted view (1:2).

In the case presented in this article, the patient was informed of all of the treatment options and it was recommended that he consult an orthodontist. The patient found the treatment time of 12 to 18 months unacceptable and insisted on proceeding with the option of veneers and full crown coverage. Consequently, a mutual decision was made for aggressive selective tooth reduction to achieve the result the patient was seeking.

By visualizing the case on the existing preoperative models, the patient was able to begin with the end result in mind.

CASE STUDY

A healthy 33-year-old man presented for an esthetic consultation on the advice of another dental professional. The patient confided that he was not pleased with his smile and did not feel comfortable in social circumstances. This had been a great concern to the patient for a long time. On reviewing his social background and occupation, he explained that he, in partnership with his brother, built high-end custom homes that catered to the carriage trade in the Toronto, Canada area. The patient was interested in presenting a positive image that reflected the type of work of which their company was capable. His medical history was noncontributory. After the initial consultation, the patient returned for full diagnostic records including a clinical examination, preoperative diagnostic models,



Figure 3—A preoperative occlusal view (1:2).



Figures 4A and 4B—The preoperative and diagnostic wax-up.

radiographs, 35-mm photos, and digital photography.

Evaluation

To record the clinical examination and ensure that a comprehensive documentation of the existing condition was completed, the *Strategic Esthetic Planning Guide* was used. This four-page guide examines all of the parameters in smile design. When completed, an accurate charting was obtained.⁷ A review of the clinical and diagnostic records revealed the following:

- There was a poor existing crown on tooth No. 9.
- Teeth Nos. 6 and 11 were positioned toward the buccal (out of the contour of the arch).
- There was poor angulation of the maxillary anterior teeth.
- There was narrowing of the maxillary arch distal to teeth Nos. 6 and 11.
- The existing dentition exhibited poor color (Figures 1 through 3).

After considering the obstacles, a diagnostic wax-up was fabricated to help visualize the solution (Figures 4A and 4B). The assistance derived from this planning technique was instrumental to the outcome.⁸ By visualizing the case on the existing preoperative models, the patient was able to begin with the end result in mind.⁹ The final solution

After considering the obstacles, a diagnostic wax-up was fabricated to help visualize the solution.

was the placement of an all-ceramic restoration on tooth No. 9 with porcelain veneer restorations on teeth Nos. 4 through

13. To correct the alignment of the arch and retract the canines into a more favorable position, an aggressive buccal reduction



Figures 5A through 5C—Right, center, and left views of prepared teeth Nos. 4 through 13.



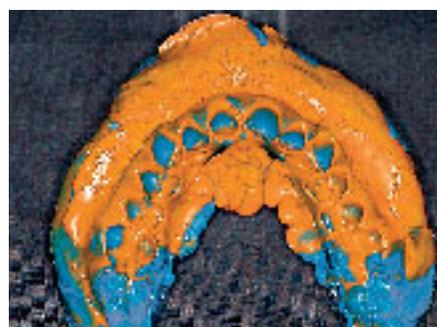
Figure 6—Occlusal view of prepared teeth Nos. 4 through 13.



Figure 7—Occlusal view of the preparations with the putty matrix of the diagnostic wax-up ensuring adequate tooth reduction.



Figures 8A through 8C—The placement and removal of Expa-syl™ to aid in the nonmechanical retraction of the sulcus before impression taking.



Figures 9A through 9C—The impression of the prepared teeth. A stream of air was used to blow the impression material into the sulcus. The result was a clear, accurate impression.

was required. To ensure that the final outcome was representative of the diagnostic wax-up, it was recommended that the patient receive prophylactic endodontic therapy on teeth Nos. 6 and 11. This position was adopted given the amount of buccal tooth structure that would be removed, the possibility of pulpal blush or exposure, and/or the likelihood of future pulpal degeneration that would require endodontic therapy (possibly under emergency conditions). In addition, it was decided that because only the buccal surface was aggressively prepared, a bonded retentive core was placed in the access hole with a porcelain veneer restoration on the buccal surface to provide support and esthetics.¹⁰ The treatment plan was put together in the form of an action plan so that the patient could understand the obstacles and visualize the solution. The

patient was informed of the reasons for the prophylactic root canals along with all the viable treatment options. Because the patient did not want the extended treatment time that orthodontics would have dictated, he requested to proceed with nine porcelain veneers and one all-ceramic restoration.

All esthetic cases should begin with a comprehensive sanative phase to ensure that the gingival integrity is not compromised.

Through the clinical evaluation, it was revealed that there were no periodontal concerns.

All esthetic cases should begin with a comprehensive sanative phase to ensure that the gingival integrity is not compromised. The patient then had endodontic therapy on teeth Nos. 6 and 11. After the endodontic treatment was completed, the patient was ready to proceed with the restorative phase of his treatment.

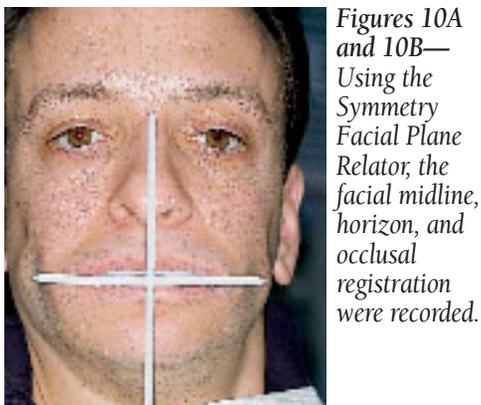
Restorative Phase

Treatment began with the removal of the existing all-ceramic restoration on tooth No. 9 followed by preparation and fabrication of a temporary crown. The remaining nine teeth were prepared for porcelain veneer coverage using the Strategic Esthetic Protocol for the Anterior Veneer Preparation Bur Kit (Braseler USA®). The kit is designed to assist the dentist with the necessary burs and polishers for veneer preparation and finishing. To accomplish this, there were

two depth cutters (0.3 mm and 0.5 mm) as well as complimentary two-grit round-end taper preparation burs (LVS4 and LVS3), each with a fine grit at the top for margin preparation. To assist with interproximal preparations, a mosquito bur is included. When the veneers were bonded, finishing was accomplished with a fine-tip carbide bur designed to not scorch the porcelain as well as a fine diamond football for lingual concavities. Before polishing the porcelain with a glazed paste, the porcelain was polished with medium, fine, and extrafine rubber wheels.

Special attention was given to the canines to achieve sufficient buccal preparation (Figures 5A through 5C). To ensure that adequate tooth reduction was accomplished, the preparations were viewed from the incisal edges (Figure 6). Working in conjunction with the laboratory technician, a putty matrix of the diagnostic wax-up was fabricated and placed over the prepared teeth to visualize sufficient tooth reduction for the new restorations (Figure 7). After the preparations were refined and examined for deficiencies, the sequence for impression taking began.

To minimize mechanical manipulation of the sulcus and therefore reduce the chance of



Figures 10A and 10B—Using the Symmetry Facial Plane Relator, the facial midline, horizon, and occlusal registration were recorded.

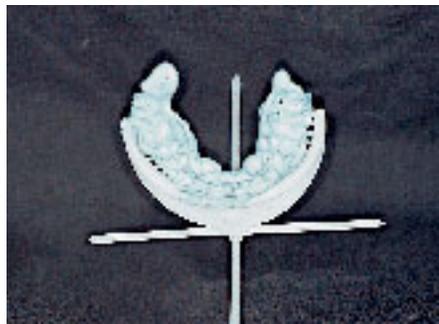


Figure 12—A retracted view of the completed provisional veneers (1:2).

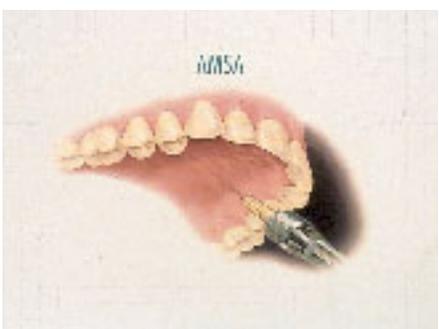


Figure 13—Diagrammatic illustration indicating the correct placement of the needle for the Anterior Middle Superior Alveolar Nerve injection.

gingival recession, Expa-syl™ (Kerr Corporation) was placed on the sulcus. Expa-syl™ is a blend of kaolin and aluminum chloride, which acts to gently retract the gingival tissues and expose the sulcus, as well as assist in moisture control.^{11,12} After 2 minutes, the Expa-syl™ was washed off and the preparations were air-dried (Figures 8A through 8C). The impression was taken with Take 1® (Kerr Corporation) polyvinyl siloxane light and regular body consistencies. To secure a sound impression, the light body was gently blown into the sulcus so that every detail of the margin was captured. When the impression was set, it was removed and examined to confirm its accuracy (Figures 9A through 9C). To complete the impression routine, a lower alginate was taken along with a bite registration that recorded the horizontal plane and the vertical midline of the face (Symmetry Facial Plane Realtor, Clinical Research Dental Supplies) (Figures 10A and 10B).

Before dismissing the patient, it was imperative that the preparations were temporized. This procedure allowed both the dentist and the patient to visualize an approximation of the final outcome. It also served to seal the

dentinal surfaces, reduce inter-operative sensitivity, and maintain gingival integrity at the margins. There are many different techniques for placing temporary veneers that have been used to successfully achieve the above goals on a short-term basis.¹³⁻¹⁵ To restore the patient on a temporary basis, the spot-etch technique described by Morley was used.¹⁶ A full-coverage temporary crown was fabricated for tooth No. 9 before the placement of the nine temporary veneers. To initiate the temporary veneer

By having the patients act as partners in exploring various treatments, a dentist will not merely meet their expectations, he or she will surpass them.

process, etch was placed in the center of the preparation staying clear of the margins (Figure 11). After 20 seconds, the etch was washed off and a small amount of filled bonding agent was placed over the etched area and



Figure 11—Except for tooth No. 9, which required full coverage, the spot-etch technique was used to create provisional veneers.

cured. Using a hybrid composite, a shade A1 Point 4™ (Kerr Corporation) was chosen because of its ability to combine high strength and outstanding esthetics. It was adapted to the tooth surface and light-cured when it was in the desired position. To aid in the retention of the temporaries and contribute to the overall strength, the temporaries were splinted together. When all of the prepared teeth had been temporized, they were shaped using Brasseler Finishing Burs (Brasseler USA®), adjusted for occlusion, and polished using Cosmedent Top Finishers (Cosmedent®, Inc) (Figure 12).

At this stage, there was a review to confirm that all of the gathered diagnostic information was given to the laboratory to aid in the fabrication of the restorations. At the initiation of this appointment, the color was selected and documented. The color was based on a number of criteria, that being the shade of the recently whitened lower arch, a shade that matched existing skin tone, and one that would look refreshing yet not artificial. In this case, the selected shade was 1M1 on the new Vitapan 3-D Master shade guide (Vident™). The laboratory prescription specified that the veneers should be fabricated out of IPS Empress® (Ivoclar Vivadent®, Inc) porcelain and the crown should be fabricated out of Procera® (Nobel Biocare™ USA Inc) with Vitadur Alpha porcelain (Vident™). Procera® was selected because it had a long track record of proven stability.¹⁷ The patient was then scheduled for the next phase.

Before the insertion, the final

models and restorations were examined to ensure the proper fit and contour of the porcelain veneers and that the laboratory technician delivered exactly what was requested. The insertion procedure was reviewed with the patient. When this author was confident the patient understood the sequence, the patient was anesthetized with The Wand™ (Milestone Scientific) using the Anterior Middle Superior Alveolar Nerve Injection. This injection was administered at the perpendicular junction of the midway point of the palatal midline and the gingival crest of the first and second premolars and the line bisecting the first and second premolars. The purpose of this injection was to anesthetize the maxillary teeth from Nos. 4 through 13 without anesthetizing the surrounding buccal soft tissue. The benefit to the dentist and the patient was that they could preview the final restorations in relation to the intra- and extraoral soft tissue (Figure 13).

When the patient was anesthetized, the temporary veneers were removed. By lifting an edge with a U15 scaler and peeling them off. The residual resin was removed with a fine diamond in light brush strokes being careful not to score the prepared enamel/dentin surface. When all of the existing temporaries were removed, the prepared surfaces were scrubbed with a pumice/sodium hypochlorite mixture to ensure removal of all trace imperfections. The veneers were then tried-in for the patient to approve. A nonpolymerizing try-in paste was used. The try-in paste was the same shade as the final luting resin. In most cases, the shade is neutral or clear because this author does not prefer to rely on the cement to influence the final color. When the patient approved of the appearance of the new restorations, they were removed and the bonding sequence began.

The insertion process was accomplished in the following manner: while the assistant removed the residual try-in paste from the veneer, re-etched the



Figures 14A through 14C—The retracted postoperative right, center, and left views (1:2).



Figure 15—The postoperative occlusal view of the case (1:2).



Figure 16—The postoperative photograph. The patient was more confident when he smiled.

veneer with porcelain etch so that any trace amount of try-in paste was removed, and applied silane and bond, the dentist removed the leftover try-in paste, etched the tooth surface, applied bond, and waited for the veneer to be delivered with a clear resin cement for placement on the tooth. The veneers were cemented with a premium cement (Nexus 2™ [Kerr Corporation] or RelyX™ [3M ESPE]) and light-cured according to the manufacturer's directions with an Optilux 501™ (Kerr Corporation) halogen lamp. The veneers were placed all at one time and light-cured for 5 seconds so that the gross excess of the luting agent could be removed and the contacts flossed. The all-ceramic crown was then cemented with RelyX™. After the all-ceramic crown on tooth No. 9 and the veneers on teeth Nos. 4 through 13 were placed, the excess resin and cement was removed from the margins using a No. 12 blade. The occlusion was assessed in maximum intercuspation, protrusive, and right and left lateral excursions to ensure there were no premature contacts. The restorations were then polished with Enamelize™ (Cosmedent®, Inc) diamond paste (Figures 14A through 14C and 15). The patient was instructed to return in 2 weeks for an evaluation (Figure 16).

CONCLUSION

Completion of this esthetic dilemma with a rapid restorative solution satisfied the patient's demands and he was pleased with the result. By using porcelain in a responsible manner, a substantial improvement was achieved quickly. It is imperative that dentists ensure that their patients are informed and are encouraged to complete due diligence before deciding on any treatment option. By having the patients act as partners in exploring various treatments, a dentist will not merely meet their expectations, he or she will surpass them. j

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Product References

Products: Strategic Esthetic Protocol for Anterior Veneer Preparation Bur Kit, Finishing Burs
Manufacturer: Brasseler USA®
Address: 1 Brasseler Boulevard Savannah, Georgia 31419
Phone: 800.841.4522
Fax: 912.927.8671

Products: Expa-syl™, Take 1®, Point 4™, Nexus 2™, Optilux 501™
Manufacturer: Kerr Corporation
Address: 1717 West Collins Avenue Orange, California 92867
Phone: 800.KERR.123
Fax: 800.KERR.345

Products: Symmetry Facial Plan Relator
Manufacturer: Clinical Research Dental Supplies
Address: 1535 North Routledge Park London, Ontario N6H 5L6 Canada
Phone: 519.641.3066
Fax: 519.641.3083

Products: Cosmedent Top Finishers, Enamelize™
Manufacturer: Cosmedent®, Inc
Address: 401 North Michigan Avenue Suite 2500 Chicago, Illinois 60611
Phone: 800.621.6729
Fax: 312.644.9751

Products: Vitapan 3D-Master shade guide, Vitadur Alpha porcelain
Manufacturer: Vident™
Address: 3150 East Birch Street Brea, California 92821
Phone: 800.828.3839
Fax: 800.848.2726

Products: IPS Empress®
Manufacturer: Ivoclar Vivadent®, Inc
Address: 175 Pineview Drive Amherst, New York 14228
Phone: 800.533.6825
Fax: 716.691.2285

Products: The Wand™
Manufacturer: Milestone Scientific
Address: 151 South Pfingsten Road Deerfield, Illinois 60015
Phone: 800.862.1125
Fax: 847.272.2584

Products: RelyX™
Manufacturer: 3M ESPE
Address: Bldg. 275-2SE-03 St. Paul, Minnesota 55144
Phone: 800.634.2249
Fax: 612.733.2481

Products: Procera®
Manufacturer: Nobel Biocare™ USA Inc
Address: 22715 Savi Ranch Parkway Yorba Linda, California 92887
Phone: 800.993.8100
Fax: 714.998.9236

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1. Etching dentin followed by the application of a dentinal primer and a bonding agent via the moist bond technique is mandatory to:
 - a. ensure a soundly sealed restoration.
 - b. prevent sensitivity.
 - c. contribute to the overall retentiveness of the filling.
 - d. all of the above.
2. The *Strategic Esthetic Planning Guide* examines:
 - a. the medical history.
 - b. the occlusal scheme.
 - c. periodontal health.
 - d. all of the parameters in smile design.

3. By visualizing the case on the existing preoperative models, the patient was able to:
 - a. decide on orthodontics.
 - b. decide on periodontal treatment.
 - c. begin with the end result in mind.
 - d. determine crown thickness.
4. What was recommended that the patient receive on teeth Nos. 6 and 11?
 - a. Prophylactic endodontic therapy
 - b. Osseous recontouring
 - c. Crown lengthening
 - d. Full-coverage crowns
5. The treatment plan was put together in the form of:
 - a. a video.
 - b. an action plan.
 - c. a computer presentation.
 - d. a prefunctional model.
6. To ensure that adequate tooth reduction was accomplished, the preparations were viewed from the:
 - a. buccal.
 - b. lingual.
 - c. incisal edges.
 - d. facial.
7. The purpose of the Anterior Middle Superior Alveolar Nerve Injection was to anesthetize the maxillary teeth from teeth Nos. 4 through 13:
 - a. without anesthetizing the surrounding buccal soft tissue.
 - b. completely.
 - c. only on the facial.
 - d. to allow for packing of the cord.
8. When all of the existing temporaries were removed, the prepared surfaces were scrubbed with:
 - a. pumice only.
 - b. hydrofluoric acid.
 - c. a pumice/sodium hypochlorite mixture.
 - d. silane.
9. The veneers were placed all at one time and light-cured for:
 - a. 5 seconds.
 - b. 15 seconds.
 - c. 30 seconds.
 - d. 45 seconds.
10. It is imperative that dentists ensure that their patients are informed and are encouraged to complete:
 - a. a medical release.
 - b. due diligence.
 - c. superb oral hygiene.
 - d. a postoperative survey.