



ESTHETIC, OCCLUSAL, AND PERIODONTAL REHABILITATION OF ANTERIOR TEETH WITH MINIMUM THICKNESS PORCELAIN LAMINATE VENEERS

Leonardo Fernandes da Cunha, DDS, MSc, PhD,^a

Lorena Oliveira Pedroche, DDS, MSc,^b

Carla Castiglia Gonzaga, DDS, PhD,^c and

Adilson Yoshio Furuse, DDS, MSc, PhD^d

Positivo University, Curitiba, Brazil; Bauru School of Dentistry, University of São Paulo, Brazil

Ceramic veneers of minimum thickness provide satisfactory esthetic outcomes while preserving the dental structure. Dental ceramics can both improve the esthetic appearance and reestablish the strength and function of teeth. In worn anterior teeth, functional surfaces, for example, anterior and lateral guidance, can be restored effectively. The characteristics of dental ceramics, such as color stability and mechanical and optical properties, make this material a good choice for indirect restorations, especially when optimum function and esthetics are required. This clinical report presents an occlusal, periodontal, and restorative solution with minimum thickness glass ceramic veneers for worn anterior teeth with multiple diastemas. (J Prosthet Dent 2014;■:■-■)

With the improvement of dental ceramics and adhesive systems, minimum thickness laminate veneers are a useful treatment option. They may be indicated when there is adequate remaining sound dental structure, such as with patients with worn anterior teeth and/or diastemas. In these situations, although little or no tooth preparation is required, the longevity of the adhesion to enamel^{1,2} and the mechanical properties, biocompatibility, and esthetics of the ceramics are well documented.³ The rehabilitation should include anterior and lateral guidance. Before the placement of bonded definitive restorations, incisal lengthening should be considered. The trial restoration technique is recommended to diagnose, communicate, and evaluate the required space for minimally invasive veneers and to evaluate the restoration of the anterior guidance.^{4,5} In such an analysis, the dentist should evaluate both static and dynamic occlusal relationships and consider

how well the patient adapts to the current occlusal pattern and whether there is any discrepancy from the ideal occlusion that should be treated.

Each time esthetic procedures are considered, gingival health should also be evaluated. Initially, dental prophylaxis and periodontal treatment, including scaling and root planing, should be performed. Indirect restorations such as ceramic veneers maintain a proper emergence profile and adequate gingival margins, and lower the incidence of plaque retention, thus contributing to the maintenance of periodontal health.⁶ Currently, for esthetic veneers, leucite-reinforced and lithium disilicate ceramics are commonly recommended because of their optical properties and their ability to be acid etched.⁷ Both are fabricated with the heat-pressed technique and can be used with characterization or as core materials with subsequent veneering with feldspathic ceramics.⁸⁻¹⁰ These aspects can help dentists and

laboratory technicians achieve higher clinical success rates in the restoration of form, color, and opalescence. This article describes minimum thickness glass ceramic laminate veneers as part of a functional and/or esthetic treatment to improve the occlusal, periodontal, and esthetic situation of a patient with a worn anterior dentition.

CLINICAL REPORT

A 25-year-old woman was referred for dental esthetic treatment because she was dissatisfied with the composite resin restorations on her maxillary anterior incisors. Diastemas and composite resin restorations associated with marginal inflammation, excessive gingival contours, and placement of subgingival margins were observed (Fig. 1). The composite resin restorations also were not maintaining adequate lateral guidance, with group function occlusion occurring at the canine and lateral incisor (Fig. 2). After

^aPrivate Practice and Hospital Odontológico Jório da Escóssia, Fortaleza, Ceará, Brazil.

^bGraduate student, Master of Science Program in Clinical Dentistry, Positivo University.

^cProfessor, Graduate Program of Dentistry, Positivo University.

^dProfessor, Department of Operative Dentistry, Endodontics, and Dental Materials, Bauru School of Dentistry, University of São Paulo.





1 A, Preoperative view of patient's smile; note negative effect of wear of incisal edges on smile. B, Close-up view of maxillary anterior teeth; note compromised esthetics due to anatomic discrepancies of form, shape, and color of composite resin restorations and degree and extent of marginal inflammation.



2 View of canine-guided occlusion reduced by dental restoration wear and group function occlusion (canine and lateral incisor).



3 Trial restoration used for diagnosis, esthetic design, and interim restoration fabrication. Half of trial restoration was removed to compare difference of shape and form.

dental prophylaxis and oral hygiene instruction, diagnostic casts and restorations waxed to define shape and form were obtained (Fig. 3). Ceramic laminate veneers of minimum thickness were indicated for the 6 maxillary anterior teeth. After 1 week, the shade was selected and trial restorations were placed for diagnosis and treatment planning. Composite resin was removed with aluminum oxide disks (Soft-Lex; 3M ESPE) (Fig. 4). No preparation with diamond rotary instruments was conducted. An impression was made with displacement cord (Ultrapak Cord no. 000; Ultradent Products) and polyvinyl siloxane material (Express XT; 3M ESPE).

Lithium disilicate glass-ceramic (IPS e.max Press; Ivoclar Vivadent) laminate

veneers were fabricated with the heat-press technique. They were veneered with a layering ceramic (IPS e.max Ceram) to improve the appearance of the incisal edge (Fig. 5). The veneers were all placed on the teeth (Fig. 6) to evaluate the adaptation and color. The intaglios were etched with 10% hydrofluoric acid (Porcelain Etchant; FGM Produtos Odontológicos) for 20 seconds, washed, dried, and primed (Silane; Kerr Corp). One thin coat of the hydrophobic resin (Adper ScotchBond Multi-Purpose; 3M ESPE) was applied and polymerized. The same material was applied on the tooth surface. The veneers were bonded with a light-polymerizing resin cement (Nexus 3; Kerr Corp). Gingival and proximal excesses of cement were removed with

an explorer and dental floss. The light polymerization was performed with a light-emitting diode device (Radium-cal; SDI Ltd) for 120 seconds at the buccal (incisal, cervical, and central), mesial, distal, and palatal aspects of each tooth. Restorations were then checked for occlusal interferences (Fig. 7). After 24 hours, subgingival excess was removed with no. 12 surgical blades, and the marginal areas were polished with a silicone rubber polisher (Dedeco) (Fig. 8).

DISCUSSION

Ceramic veneers offer a predictable and successful restoration with an estimated survival of more than 10 years.¹¹ In the presented situation, a heat-pressed glass ceramic was used. For esthetic



4 A and B, No preparations were performed, except for removal of restorations with Sof-Lex Pop-on (3M ESPE).



5 Heat-pressed glass ceramic core coated with veneering ceramics.



6 Anterior teeth after placing veneers on left.



7 Canine-guided occlusion after cementation.

veneers, leucite-reinforced and lithium disilicate glass ceramics are commonly selected because of their optical properties and good adhesion to tooth structure.⁷ They are less porous and can have a higher crystalline content than other ceramics.¹² These properties provided

adequate resistance to support anterior and lateral guidance in this situation. Because of the relatively low refractive index of leucite and lithium disilicate, even with a relatively high crystalline content, these materials are still sufficiently translucent to restore the incisal edge. Finally,

these ceramics are biocompatible restorative materials, which improve the long-term gingival health.

An additive trial restoration could be used as an aid to diagnosis, for esthetic design, for tooth preparation, and for interim restoration.⁵ In the present clinical situation, the trial restoration was used to facilitate communication with the patient in the diagnostic phase⁵ and to demonstrate the esthetic design of the new emergence profile to improve the esthetics. The esthetic design of the incisal lengthening with lips, central dominance, and regressive proportion and anterior and lateral guidance also was found by using the trial restoration.¹³ Periodontal health before any restorative treatment is important.¹⁴ For this reason, oral instruction and prophylaxis were performed before the restorative



8 A, After 1 week, improvement of gingival responses and soft tissue morphology. B, Note that incisal edges of maxillary anterior teeth follows upper border of lower lip.

protocol. This sequence facilitates the impression procedure, the provisional phase, and the cementation protocol. In the situation presented, periodontal health before the thin porcelain laminate veneers was much improved.

The dental preparation was restricted to the enamel. As a result, improved bonding may be acquired. However, the clinician must have a good understanding of the ceramic type to establish the appropriate cementation procedure.¹⁵ A light-polymerized resin-based cement is preferred for thin laminate veneers because of the increased working time. With veneers thicker than 1.5 mm, the polymerization of light-polymerized cements may be jeopardized, depending on the type and opacity of the ceramic.¹⁶ The final success of functional and/or esthetic treatments is only achieved when the patient is well informed and motivated to maintain oral health. Patient contribution and periodic control by the dentist is essential to the long-term success of the rehabilitation.

REFERENCES

- Li Z, Yang Z, Zuo L, Meng Y. A three-dimensional finite element study on anterior laminate veneers with different incisal preparations. *J Prosthet Dent* 2014;112:325-33.
- Ge C, Green CC, Sederstrom D, McLaren EA, White SN. Effect of porcelain and enamel thickness on porcelain veneer failure loads in vitro. *J Prosthet Dent* 2014;111:380-7.
- Gurel G, Sesma N, Calamita MA, Coachman C, Morimoto S. Influence of enamel preservation on failure rates of porcelain laminate veneers. *Int J Periodontics Restorative Dent* 2013;33:31-9.
- Gresnigt M, Ozcan M, Kalk W. Esthetic rehabilitation of worn anterior teeth with thin porcelain laminate veneers. *Eur J Esthet Dent* 2011;111:298-313.
- Gurel G, Morimoto S, Calamita MA, Coachman C, Sesma N. Clinical performance of porcelain laminate veneers: outcomes of the aesthetic pre-evaluative temporary (APT) technique. *Int J Periodontics Restorative Dent* 2012;32:625-35.
- Reeves WG. Restorative margin placement and periodontal health. *J Prosthet Dent* 1991;66:733-6.
- Bona AD. Bonding to ceramics: scientific evidences for clinical dentistry. São Paulo: Artes Médicas; 2009. p. 91-132.
- Kelly JR, Benetti P. Ceramic materials in dentistry: historical evolution and current practice. *Aust Dent J* 2011;56:84-96.
- Giordano R, McLaren EA. Ceramics overview: classification by microstructure and processing methods. *Compend Contin Educ Dent* 2010;31:682-8.
- Pini NP, Aguiar FH, Lima DA, Lovadino JR, Terada RS, Pascotto RC. Advances in dental veneers: materials, applications, and techniques. *Clin Cosmet Investig Dent* 2012;4:9-16.
- Beier US, Kapferer I, Burtscher D, Dumfahrt H. Clinical performance of porcelain laminate veneers for up to 20 years. *Int J Prosthodont* 25:79-85.
- Griggs JA. Recent advances in materials for all-ceramic restorations. *Dent Clin North Am* 2007;51:713-27.
- Abduo J, Tennant M, McGeachie J. Lateral occlusion schemes in natural and minimally restored permanent dentition: a systematic review. *J Oral Rehabil* 2013;40:788-802.
- Knoernschild KL, Campbell SD. Periodontal tissue responses after insertion of artificial crowns and fixed partial dentures. *J Prosthet Dent* 2000;84:492-8.
- Vargas MA, Bergeron C, Diaz-Arnold A. Cementing all-ceramic restorations: recommendations for success. *J Am Dent Assoc* 2011;142:20S-4S.
- Runnacles P, Correr GM, Baratto Filho F, Gonzaga CC, Furuse AY. Degree of conversion of a resin cement light-cured through ceramic veneers of different thicknesses and types. *Braz Dent J* 2014;25:38-42.

Corresponding author:

Dr Leonardo Fernandes da Cunha
Positivo University
Rua Professor Pedro Viriato Parigot de Souza, 5300
BRAZIL
E-mail: cunha_leo@me.com

Copyright © 2014 by the Editorial Council for
The Journal of Prosthetic Dentistry.