

## Case Report Article

# Multiple diastemas closure with minimally invasive veneers: a 12-month follow-up

Sérgio Kiyoshi Ishikiriyama<sup>1</sup>  
Karin Cristina da Silva Modena<sup>2</sup>  
Rafael Massunari Maenosono<sup>3</sup>  
Bella Luna Colombini Ishikiriyama<sup>4</sup>  
Adilson Yoshio Furuse<sup>1</sup>  
Constantino Fernandes Neto<sup>1</sup>

### Corresponding author:

Constantino Fernandes Neto  
Al. Dr. Octávio Pinheiro Brisolla, 9-75 – Vila Universitária  
CEP 17012-901 – Bauru – SP – Brasil  
E-mail: constantino.neto@usp.br

<sup>1</sup> Department of Operative Dentistry, Endodontics and Dental Materials, Bauru School of Dentistry, University of São Paulo – Bauru – SP – Brazil.

<sup>2</sup> School of Dentistry, Centro Universitário Sagrado Coração – Bauru – SP – Brazil.

<sup>3</sup> School of Dentistry, Centro Universitário de Santa Fé do Sul – Santa Fé do Sul – SP – Brazil.

<sup>4</sup> Department of Biological Sciences, Bauru School of Dentistry, University of São Paulo – Bauru – SP – Brazil.

*Received for publication: February 8, 2022. Accepted for publication: August 19, 2023.*

### Keywords:

esthetics; diastema;  
periodontics; veneers.

## Abstract

**Introduction:** Multiple diastemas commonly cause esthetical complaints, especially in high demanding patients that frequently have sound teeth. **Objective:** The aim of the present clinical report is to describe the treatment of multiple diastemas with surgical crown lengthening and minimally invasive lithium disilicate veneers. **Case report:** During clinical evaluation, it was observed multiple well distributed diastemas in anterior superior teeth and a reduced length of the central incisors. Initially, crown lengthening surgery was performed to restore adequate width-to-length ratio to central incisors. After healing, impressions were taken, and study cast models revealed the need for slight reduction of proximal surfaces to remove retentive areas and provide good adaptation for laminate veneers. After a conservative preparation, impressions were taken with addition silicone and cast models were sent to a laboratory. Lithium disilicate laminate veneers were fabricated by the heat press technique. Cementation protocol was performed with light-activated resin-cement, which was carefully chosen in terms of color and fluorescence. **Conclusion:** Multiple diastemas can be successfully treated with minimal restorative interventions involving little or no preparation; however, a careful evaluation must be conducted in order to remove retentive areas. Furthermore, teeth width-length ratio must also be considered when planning such esthetic restorations.

## Introduction

Nowadays, operative dentistry is based on two distinct philosophies that do not always lead to the same direction: the need for optimal esthetics [14] and the minimal interventional approach [12]. In some cases, when conventional ceramic veneers are the treatment of choice, esthetic outcomes are only obtained through dental wear during preparation. However, minimally invasive techniques require that the dental preparation must be kept to a minimum.

With the development of restorative materials with outstanding properties such as dental ceramics, reports of both esthetical and conservative approaches have been published [2]. Among these materials, lithium disilicate-reinforced glass-ceramics provide suitable mechanical properties [8], ability to adhere to dental structures through resin cements [11], pronounced esthetical outcomes [12], and satisfactory short- and medium-term longevity [3]. However, obtaining esthetical results with minimally invasive approaches requires a careful evaluating of the sound dental structure to determine if any wear is necessary to provide enough thickness and insertion path to the ceramic restoration [7]. The insertion path is especially important in the case of multiple diastemas closure with ceramic veneers, as the interproximal areas, if not properly evaluated, may jeopardize not only the adaptation of the ceramic but the periodontal health as well.

Whenever the treatment of maxillary anterior teeth is considered, not only the periodontal health is a paramount aspect but also the esthetics of the periodontium and its relation to the width-to-height ratio of the crowns should be carefully evaluated [10]. While ceramic materials help maintaining a proper emergence profile, they also present reduced plaque retention what helps obtaining more suitable gingival margins [15] when compared to resin composite restorations.

Since novel materials are available, innovative techniques should be adapted to obtain esthetical outcomes with a minimal invasive approach. The aim of this clinical report is to describe the treatment of multiple diastemas in the maxillary anterior region, treated with lithium disilicate veneers that required only a conservative dental preparation. Additionally, the manuscript addresses how to properly evaluate the interproximal areas to provide a better insertion path to the ceramic veneers.

## Case report

An 18-years-old woman sought dental treatment complaining about the appearance of her smile. After clinical evaluation, it was observed that the patient presented well-distributed multiple diastemas in the maxillary anterior region. In a close-up view (figure 1) it was also possible to observe that an unsuitable width-to-height ratio was present in the central incisors, which would become even worse after the diastema closure. Therefore, the first step was a periodontal surgery for tooth lengthening. This surgery was conducted by removing alveolar bone to promote increases in crowns heights and provide better width-to-height ratios for restorative procedures (figure 2).

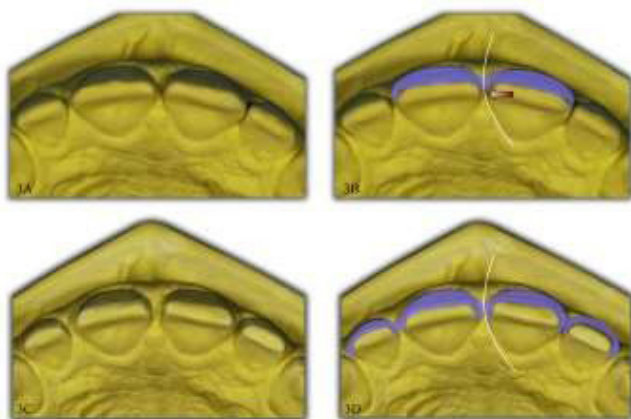


**Figure 1** - Intraoral view of a female patient presenting multiple diastemas at the maxillary anterior teeth with unsuitable width-to-height ratio



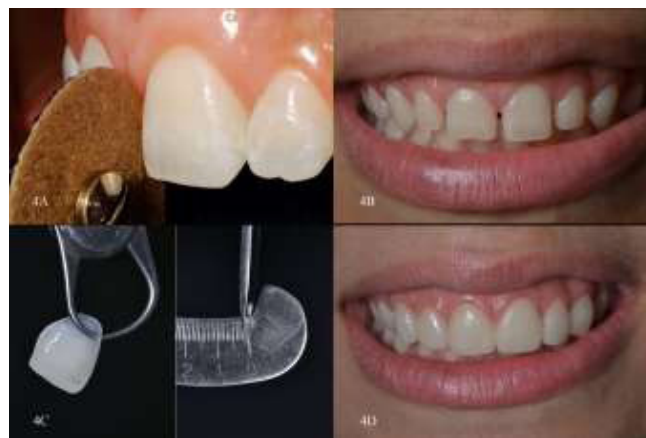
**Figure 2** - Periodontal surgery for clinical crown lengthening was performed to increase teeth's visual height and to determine a better width-to-height ratio

After 60 days of periodontal healing, the next step was to determine if some tooth reduction was needed to perform minimal invasive veneers. Analyzing the patient's study cast, it was possible to detect some retentive areas in the interproximal region where the veneers would not adapt if no teeth preparation were performed (figure 3A). These areas might cause plaque retention since neither flossing nor toothbrushing would perform an efficiently hygiene after the cementation of the veneers (figure 3B). A minimum reduction of the interproximal areas was performed in the study cast (figure 3C). A better-positioned margin was achieved after the minimal reduction at the line angles, as shown in figure 3D.



**Figure 3** - A) Patient's study cast after periodontal healing. B) Plaque-retentive areas where good oral hygiene may be difficult. C) A minimum reduction at the interproximal areas was performed in the study cast. D) A better-positioned margin may be achieved after the minimal reduction at the interproximal line angles

In order to remove retentive areas, a minimal preparation was performed with abrasive discs (TDV, Pomerode, SC, Brazil) at the line angles of all interproximal areas, allowing the veneers to reach the lingual surface (figure 4A). No preparation of the buccal surface was performed, since the buccal contour needed to be increased. The amount of buccal increase was defined with the aid of a waxed-up cast. The final preparation was considered quite conservative, without any dentin exposure and no need for provisional restoration (figure 4B).



**Figure 4** - A) Minimum preparation performed with abrasive discs at the interproximal areas. B) Teeth after minimum preparation. C) Lithium disilicate reinforced veneer prepared in the shade A1 HT. Note the very thin area at the cervical region. D) One-year follow-up

Afterwards, an impression with addition silicone was obtained and sent to the laboratory in addition with digital images of the color selection. Thin minimal invasive veneers (figure 4C) were fabricated with lithium disilicate ingots using a heat press technique (IPS e.max Press, Ivoclar Vivadent AG, Schann, Liechtenstein). After evaluating the adaption to the teeth and selecting the shade of the cement with the aid of try-in pastes (Allcem Veneer APS Try-in, FGM Dental Group, Joinville, SC, Brazil), veneers were etched with 10% hydrofluoric acid for 20s (Condac Porcelana, FGM Dental Group, Joinville, SC, Brazil), and rinsed for 1 min. The silane agent (Prosil, FGM Dental Group, Joinville, SC, Brazil) was applied in a thin layer. After that an adhesive was applied (Ambar Universal APS, FGM Dental Group, Joinville, SC, Brazil), air-thinned and light cured for 20 s. Enamel was etched with 37% phosphoric acid (Condac 37, FGM Dental Group, Joinville, SC, Brazil) for 30 s and rinsed for 20 s. The same adhesive was applied, air-thinned and light cured for 20 s. Cementation was performed with a light-activated resin-cement (Allcem Veneer APS, FGM Dental Group, Joinville, SC, Brazil), which was light cured for 40 s. Fluorescence was also considered satisfactory when checked by a UV light. No caries lesions, periodontal inflammation, ceramic chipping or cracks were observed in one-year follow-up (figure 4D).

## Discussion

Multiple diastemas have been classically treated with either resin composite restorations or ceramic veneers. Although in the case of conventional indirect veneers good esthetical results may be obtained and the ceramic material present well-known and extensively described characteristics such as great color stability, excellent optical properties, and high mechanical strength, this approach demands significant dental wear. The minimal invasive preparation for lithium disilicate veneers is an interesting technique to achieve esthetical outcomes in a very conservative approach. However, there is still some concern regarding the thin ceramics layer obtained due to the minimal preparation. Few case reports have already been published with this type of preparation, and most of them do not report long-term evaluations [2]. Hence, further evidence is necessary to confirm the long-term behavior of this kind of minimally invasive preparation for thin veneers. On the other hand, the high flexural strength obtained by lithium disilicate [9], associated to the well-known good adhesion to enamel and noticeable esthetics may justify the conservative restorations performed with this material [4].

Another technique to solve multiple diastemas is the use of direct resin composite restorations, which is also a conservative approach that can be performed at low costs [13]. However, the present case report focused on two main advantages of ceramic laminate veneers for selecting such plan of treatment: 1) the better esthetical outcomes that can be achieved at laboratories rather than in direct clinical practice, and 2) the higher longevity of ceramics regarding the polishing and color maintenance [1].

Despite the great results that can be immediately obtained by resin composites, after some years, this material commonly requires repolishing or even repairing of the restorations [5].

When multiple diastemas are closed, the distribution of spaces should be evaluated. The evaluation of the space distribution may be conducted by means of the Golden Proportion. The Golden Proportion is an interesting parameter for the initial evaluation and may result in an attractive and harmonic proportion of appearance for the anterior teeth [6]. According to this principle, the central incisor is proportional to the lateral incisor (1.618:1.0), in the same way the lateral is proportional to the canine (1.0:0.618). If the spaces between teeth are not harmoniously distributed, an orthodontic treatment should be indicated.

In the present case report, a periodontal surgery for crown lengthening was performed by removing a small band of alveolar bone to increase teeth length, in order to establish a better width-to-height ratio [9]. It is important to highlight that when a gingival excess is present, the crown lengthening can be achieved without bone removal [12]. However, in the presented clinical situation it was not possible to be as conservative, since a shallow probing depth was found around all teeth involved. Therefore, 2 mm of alveolar bone was removed, determining a better width-to-height ratio without compromising teeth stability.

As regards teeth preparation, the authors believe that a minimal wear is needed in two situations: when the buccal contour should not be increased due to esthetical outcomes, and when the laminate veneer margin could not reach lingual surface due to the proximal convexity. The latter may increase plaque retention since an efficient hygiene in this area cannot be performed, and therefore there is a risk of class III caries cavities.

The minimal invasive preparation for laminate veneers still has many issues that must be studied; however, the immediate and short-term results can be considered quite satisfactory and may stimulate authors to conduct further research in this field. Regardless of the limitations of a clinical report, it is possible to conclude that the use of lithium disilicate veneers with minimal preparation is a promising technique to achieve pronounced esthetical results with a conservative approach. Additionally, interdisciplinary dentistry is required to achieve better results in several clinical situations.

## Acknowledgements

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (Capes) – Finance Code 001.

## References

1. Beier US, Kapferer I, Burtscher D, Dumfahrt H. Clinical performance of porcelain laminate veneers for up to 20 years. *Int J Prosthodont.* 2012;25(1): 79-85.
2. Cunha LF, Pedroche LO, Gonzaga CC, Furuse AY. Esthetic, occlusal, and periodontal rehabilitation of anterior teeth with minimum thickness porcelain laminate veneers. *J Prosthet Dent.* 2014;112(6):1315-8. doi: <https://doi.org/10.1016/j.prosdent.2014.05.028>.

3. Fabbri G, Zarone F, Dellificorelli G, Cannistraro G, Lorenzi M, Mosca A et al. Clinical evaluation of 860 anterior and posterior lithium disilicate restorations: retrospective study with a mean follow-up of 3 years and a maximum observational period of 6 years. *Int J Periodontics Restorative Dent.* 2014;34(2):165-77. doi: <https://doi.org/10.11607/prd.1769>.
4. Farias-Neto A, Medeiros FCD, Vilanova L, Chaves MS, Araújo J. Tooth preparation for ceramic veneers: when less is more. *Int J Esthet Dent.* 2019;14(2):156-64.
5. Frese C, Schiller P, Staehle HJ, Wolff D. Recontouring teeth and closing diastemas with direct composite buildups: a 5-year follow-up. *J Dent.* 2013;41(11):979-85. doi: <https://doi.org/10.1016/j.jdent.2013.08.009>.
6. Furuse AY, Herkrath FJ, Franco EJ, Benetti AR, Mondelli J. Multidisciplinary management of anterior diastemata: clinical procedures. *Pract Proced Aesthet Dent.* 2007;19(3):185-91; quiz 92.
7. Furuse AY, Soares JV, Cunali RS, Gonzaga CC. Minimum intervention in restorative dentistry with V-shaped facial and palatal ceramic veneers: a clinical report. *J Prosthet Dent.* 2016;115(5):527-30. doi: <https://doi.org/10.1016/j.prosdent.2015.10.012>.
8. Guazzato M, Albakry M, Ringer SP, Swain MV. Strength, fracture toughness and microstructure of a selection of all-ceramic materials. Part II. Zirconia-based dental ceramics. *Dent Mater.* 2004;20(5):449-56. doi: <https://doi.org/10.1016/j.dental.2003.05.002>.
9. Javaheri D. Considerations for planning esthetic treatment with veneers involving no or minimal preparation. *J Am Dent Assoc.* 2007;138(3):331-7. doi: <https://doi.org/10.14219/jada.archive.2007.0165>.
10. Morita R, Hayashida M, Pupo Y, Berger G, Reggiani R, Betiol E. Minimally invasive laminate veneers: clinical aspects in treatment planning and cementation procedures. *Case Rep Dent.* 2016;2016. doi: <https://doi.org/10.1155/2016/1839793>.
11. Nagai T, Kawamoto Y, Kakehashi Y, Matsumura H. Adhesive bonding of alithium disilicate ceramic material with resin-based luting agents. *J Oral Rehabil.* 2005;32(8):598-605. doi: <https://doi.org/10.1111/j.1365-2842.2005.01464.x>.
12. Nahas de Castro Pinto RC, Chambrone L, Colombini BL, Ishikiriama SK, Britto IM, Romito GA. Minimally invasive esthetic therapy: a case report describing the advantages of a multidisciplinary approach. *Quint Int.* 2013;44(5). doi: <https://doi.org/10.3290/j.qi.a29147>.
13. Prieto LT, Araujo C, Oliveira D, Azevedo Vaz SL, D'Arce M, Paulillo L. Minimally invasive cosmetic dentistry: smile reconstruction using direct resin bonding. *Gen Dent.* 2014;62(1):28-31.
14. Raj V. Esthetic paradigms in the interdisciplinary management of maxillary anterior dentition – a review. *J Esthet Restor Dent.* 2013;25(5):295-304. doi: <https://doi.org/10.1111/jerd.12028>
15. Reeves WG. Restorative margin placement and periodontal health. *J Prosthet Dent.* 1991;66(6):733-6. doi: [https://doi.org/10.1016/0022-3913\(91\)90405-1](https://doi.org/10.1016/0022-3913(91)90405-1).