

SIMPLIFYING ANTERIOR DIASTEMA CLOSURE WITH COMPOSITE RESIN

Daniel Vargas¹, Giselle S. Almeida¹, Eduardo Vargas da Silva¹, Eduardo Vargas², Felipe Vargas³, André Maia¹, Dayse Amaral¹

ABSTRACT

Objective: In order to solve multiple diastemas, the present clinical case describes a classic technique with a modification, allowing professionals to appropriately achieve width proportions based on a modified wax-up, transposing with a higher degree of assertiveness what was planned in the dental cast to the patients' mouth. **Methods:** After the patient's impression and the pouring of the dental cast, a silicone index based on a modified wax-up was done, replacing conventional wax by composite resin. **Results:** The modification of the conventional wax-up allowed for a more accurate final restoration, compared to the planned diagnostic cast, enabling the dentist to have a closer contact with all treatment steps — from planning to execution — and to practice the building of the composite resin before the execution itself. **Conclusions:** Teeth proportions, precisely reproducing the wax-up and technical difficulties due to lack of training with the material are the main related adversities when closing multiple diastemas with composite resin. The 2-year follow-up confirmed the validity of the proposed technique modification as, despite the presence of gingival inflammation due to obvious lack of hygiene, the composite resin restorations were intact, with no cracking, staining or color modification.

KEYWORDS: Resin composite. Diastema. Diagnoses.

1. Universidade do Grande Rio, Departamento de Dentística (Duque de Caxias/RJ, Brazil).
2. Universidade Federal do Rio de Janeiro, Faculdade de Odontologia, Departamento de Ortodontia e Odontopediatria (Rio de Janeiro/RJ, Brazil).
3. Private Office (Rio de Janeiro/RJ, Brazil).

DOI: <https://doi.org/10.14436/2447-911x.16.2.124-133.oar>

INTRODUCTION

The smile is one of the most important facial expressions for social interactions, as it depicts the persons' sympathy or bliss in a matter of seconds.^{1,2} Being able to perceive the factors that influence facial allurements is of extreme importance for dentists as aesthetics have acquired such an important place in modern dentistry.³ Midline diastemas have been reported as the malocclusion with higher negative impact on facial attractiveness by laypersons, even more than gummy smiles and other more common conditions.¹

Defined as a space wider than 0.5 mm between two or more consecutive teeth,⁴ diastemas can result in impaired speech and lip biting, in parallel with psychological effects due to unsatisfactory aesthetics.³ Determining the etiological factor is essential when treating the condition as it can be multifactorial, including teeth size and/or shape alterations, hereditary factors, abnormal labial frenum and even tongue habits.⁵

Several are the treatment options regarding diastemas closures, such as orthodontics, direct or indirect composite resin restorations, ceramic veneers and crowns or an association of them.⁶⁻⁸ Orthodontic adjustments pose as a conservative technique to ensure highly aesthetic results; how-

ever, apart from other treatments, they might not achieve ideal results when tooth discrepancies exist. Adhesive restorative procedures have had tremendous performances when elected as treatment option, with longevity and safeness. Furthermore, they are less time consuming and, depending on the material, can have great cost accessibility for patients.^{7,9}

The choice between the restorative materials available should be based on multiple elements, but mainly on cost, time availability and the professionals' personal skills.¹⁰ Despite the fact that ceramic veneers and crowns contribute to highly aesthetics and long-lasting results, tooth preparation is still required and its costs are notably not democratic as a laboratory is involved.¹¹ On the other hand, composite resin has had mechanical and optical improvements,¹² offering a possibility to accurately reproduce anatomic structures with minimal or inexistent preparation, reducing chair time — as it can be done in a single session — and reducing cost by not involving third parties, presenting longevity up to 10 years with high success rates.¹³

Nevertheless, closing diastemas with composite resin is knowingly related to technical difficulties. By correctly planning beforehand, all treatment steps can become easier. This article describes multiple diastemas closures guided by a silicone index, obtained from a simplified wax-up technique, replacing traditional wax for composite resin on a diagnostic cast, which helps to enhance the professionals' ability with the final restorative material — from modelling the composite to its finishing and polishing — and approaches the dentist to all restorative steps, from planning to execution.

CASE REPORT

A 19-year-old female patient presented to private office with concerns regarding the aesthetics of her smile, with multiple diastemas, and the evolution of her orthodontic treatment. Clinical examination displayed spaces measuring between 1-2 mm from the left upper canine to the right upper canine, confirming patients discourse. Moreover, stained and chipped composite restorations were present from previous restorative treatments, inferior brackets were still installed and, while examining the position, size and shape of the patients' teeth, it was clear that the etiological factor was the tooth/size discrepancies and, even though the orthodontic treatment was not ideal, adhesive restorations would be needed to correctly solve the case.

After a negative answer from the patient to re-installing brackets and better positioning her teeth, the option for a restorative treatment with composite resin was elected as it would reduce cost and need minimal tooth preparation, two major concerns of the patient. Initial photos were then taken from the patient's smile (Figs 1-3), followed by polyvinyl siloxane (Express, 3M ESPE, USA) impressions of the arches and pouring with die stone

(Fuji Rock, GC Corporation, Japan) (Fig 4). A simplified wax-up technique was then performed on the cast by carefully measuring all teeth width and length, and interdental spaces with a digital caliper (Absolute Digimatic Caliper 0-150mm / 0-6", Mitutoyo, Japan). The cast was then coated with light-polymerized adhesive (Adper Single Bond 2, 3M ESPE, USA) (Figure 5) and polymerized at 1000 mW/cm² (Valo, Ultradent, USA) for 20 seconds. After that, the left central incisor was built with composite resin (Z350 XT, 3M ESPE, USA) as it was the most labial positioned, guided by previous measurements, with consecutive finishing and polishing using burs (KG Sorensen, Brazil), discs (Sof-lex, 3M ESPE, USA) and silicon carbide brush (Astrobrush, Ivoclar Vivadent, Liechtenstein) (Fig 6). The additional teeth were then built, guided by the same protocol, one at a time, following the sequence: right central incisor, left lateral incisor, right lateral incisor, left canine and right canine, always observing the labial position of each tooth (Figs 7-9). In the end, a silicone index was made from the modified wax-up using the putty consistency of polyvinyl siloxane (Express, 3M ESPE, USA).

Figure 1:

Initial photo from the patient's smile.



Figure 2.

Lateral view from the patient's smile.

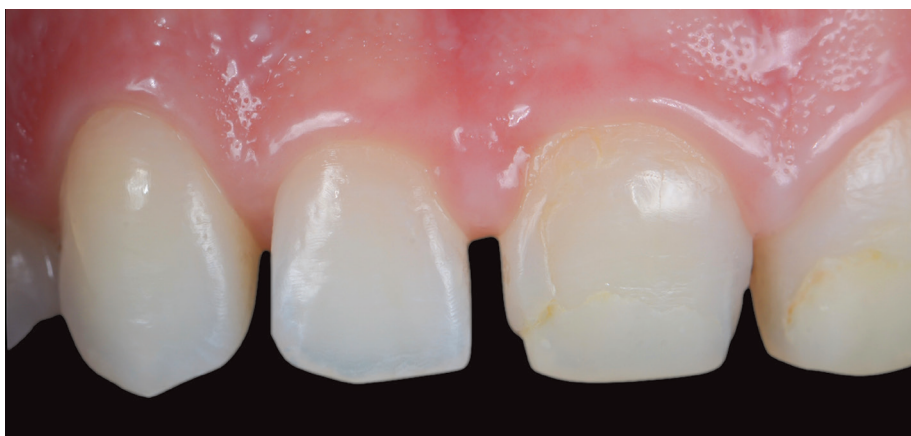


Figure 3.

Frontal photo in a closer view from the upper arch, presenting multiple diastemas.

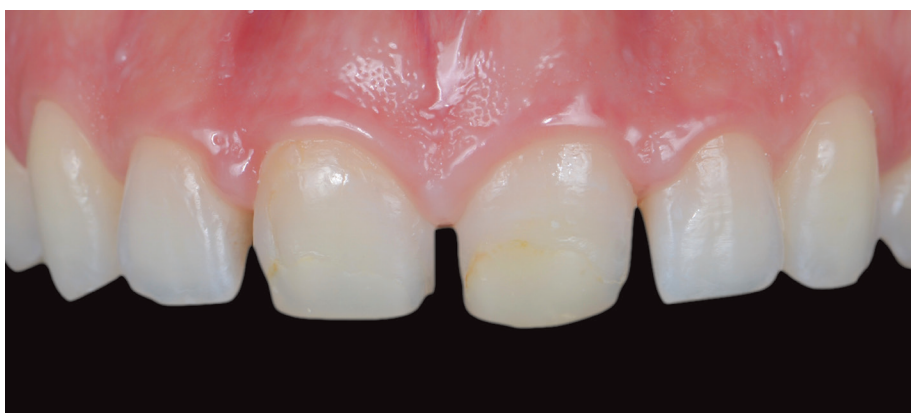




Figure 4:
Diagnostic Cast.

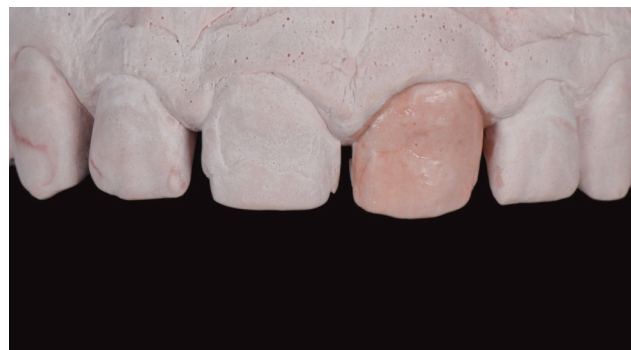


Figure 5:
Cast coated with adhesive.



Figure 6:
Central upper left incisive build on cast.

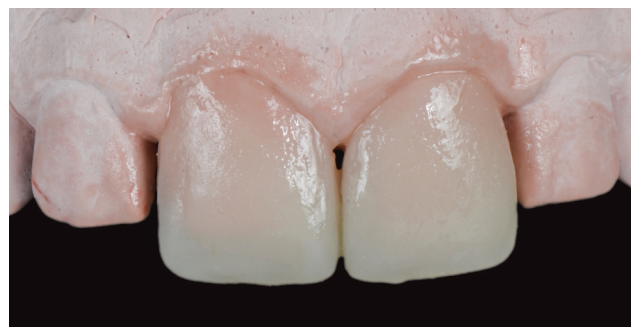


Figure 7:
The 2 upper central incisors built on cast.



Figure 8:
The 4 upper incisors built on cast.



Figure 9:
The 6 anterior teeth built on cast.

In the restorative treatment appointment, the brackets and previous composite resin restorations were removed under local anesthesia (Articaine 4%, Nova DFL, Brazil) and rubber dam isolation was installed (Fig 10), so the correct emergency profile and gingival retraction could be performed, providing longevity as no salivary fluids flow through the isolation. The teeth were etched with 35% phosphoric acid for 30 seconds — as there was only enamel —, rinsed and air-dried, then coated with adhesive (Adper Single Bond 2, 3M ESPE, USA) and light polymerized for 20 seconds at 1000 mW/cm² (Valo, Ultradent, USA). After that, the index was positioned on the palatal surfaces and the first tooth (left central incisor) was restored with solely two shades of composite resin (Z350XT in WB and WE shades, 3M ESPE, USA) (Figs 11 and 12). The restoration was then finished with a curved scalp blade (12D, Swann-Morton Limited, England), tapered bur (3195F, KG Sorensen, Brazil) and a finishing strip (Sof-Lex Finishing Strips, 3M ESPE, USA) was used on proximal areas in order to prevent the consecutive restorations from bonding one to another.



Figure 10:

Installing of rubber dam after previous restorations were removed.



Figure 11:

Index positioned and beginning of restoration building.



Figure 12:

Both upper central incisors restored and finished.

Following the same sequence as the planning step in the modified wax-up, the other teeth were restored guided by the same protocol as the first restoration. As an initial finishing and polishing had already been performed, the rubber dam was removed and all adjustments were done, reassuring the anterior guidance was present and correctly restored. A final polishing step was made using felt discs ((Renfert Dia-Finish, Ivoclar Vivadent, Liechtenstein) with polishing paste (Enamelize, Cosmedent, USA) and an impregnated felt disc (Diamond Flex, FGM, Brazil).

Despite the fact that the patients' oral hygiene was not ideal, with clear papillae inflammation between right upper lateral and central incisors, and left upper lateral incisor and canine, after a 2-year follow-up the patient's restorations were intact, with no chipping or staining, with a light color difference, probably related to the high ingestion of dark colored drinks (soft drinks, coffee) that the patient self-allegedly reported to consume. No repairs or polishing were needed.



Figure 13:
Final photo from patient's smile.



Figure 14.
Final photo in a closer view from the restored teeth.



Figure 15.
2-year follow-up with no chippings or stainings.

DISCUSSION

Being able to address conditions regarding aesthetics in the anterior maxillary teeth with a minimal or non-invasive approach should always be among the first option of treatment, especially on younger patients¹⁴. The constant evolution of technologies and techniques regarding composite resin have made this material capable of reproducing faithfully enamel and dentin, with safeness and longevity up to 10 years with little to no preparation.¹³⁻¹⁵

Using a rubber dam isolation is of extreme importance when restoring with adhesive materials. By avoiding moisture contamination, the longevity of the composite resin is reassured; moreover, gingival retraction is made possible and, consequently, the possibility to naturally restore enamels' emergency profile.¹⁰

Many are the techniques described to close diastemas, and the professional should always opt for the one he familiarizes the best. The use of 2 silicone indexes,⁹ one using only the putty base and the second with both light and putty bases can avoid invading the space of the second tooth to be restored by promoting a stop, guided by a previous wax-up. Still, when used with multiple diastemas, the technique can consume more chair time as many different indexes would have to be fabricated during the same clinical session. Other techniques, such as using posterior steel matrixes¹⁶ or Mylar strips with flowable resin⁷ can help creating a correct emergency profile and avoiding black spaces on the cervical area. However, they both fail to correctly perform multiple teeth with the correct width proportions.

The silicone index guide technique based on a wax-up still is the most reliable technique to properly restore anterior maxilla teeth, making it easier to build the final restoration guided by the previous made planning cast.¹⁷ A modification of this technique was implemented by replacing conventional wax for composite resin. The reason for that relies on the following facts: firstly, the wax, the material conventionally used, is used mainly by laboratory technicians and not by dentists, distancing the professional that will execute the treatment from all the planning steps and making it harder to reproduce the planned teeth. When composite resin is used instead, not only will the dentist be able to promptly plan his own cases, but also will he be able to practice all the steps in the confection of the restoration, reduce costs — by not involving the laboratory step — and, finally, to transpose with a higher degree of assertiveness what was planned in the cast to the patient's mouth.

CONCLUSION

Multiple diastemas are described as having one of the greatest negative influences in patient's smile. Many are the techniques and materials to solve this condition; however, composite resins present as a minimal or non-invasive alternative, which can mimic enamel and dentin with safeness and longevity. The present clinical case report a classic silicone index technique with a modification in the planning step, replacing traditionally used wax for composite resin, increasing the professionals practice with the final restorative material, reducing cost and sessions' chair time and approaching dentists to all treatments' steps, from planning to restoring.

REFERENCES

1. Malheiros AS, Brito AC, Gurgel JDA, Bandeca MC, Borges AH, Hayashida TMD, Filho EMM, Tavares RRDJ. Dentogingival alterations and their influence on facial and smile attractiveness. *J Contemp Dent Pract*. 2018;19(11):1322-8.
2. Nouredine A, Chabouis HF, Parenton S, Lasserre JF. Lay-persons' esthetic perception of various computer-generated diastemas: A pilot study. *J Prosthet Dent*. 2014;112:914-20.
3. Prasad KN, Sabrish S, Mathew S, Shivamurthy PG, Pattabiraman V, Sagarkar R. Comparison of the influence of dental and facial aesthetics in determining overall attractiveness. *Int Orthod*. 2018 Dec 1;16(4):684-97.
4. Baum AT. The midline diastema. *J Oral Med*. 1966;21(1):30-9.
5. Romero MF, Babb CS, Brenes C, Haddock FJ. A multidisciplinary approach to the management of a maxillary midline diastema: a clinical report. *J Prosthet Dent*. 2017;119:502-5.
6. Garcia-Baeza D, Saavedra C, Garcia-Adamez R. Indirect porcelain veneers in periodontally compromised teeth. The hybrid technique: a case report. *Int J Esthet Dent*. 2015;10(3):414-26.
7. Saratti CM, Krejci I, Rocca GT. Multiple diastema closure in periodontally compromised teeth: How to achieve an enamel-like emergence profile. *J Prosthet Dent*. 2016 Nov 1;116(5):642-6.
8. Calamia V, Pantzis A. Simple case treatment planning: diastemas closure. *Dent Clin North Am*. 2015;59(3):655-64.
9. Kabbach W, Sampaio CS, Hirata R. Diastema closures: A novel technique to ensure dental proportion. *J Esthet Restor Dent*. 2018 Jul;30(4):275-80.
10. Barros de Campos PR, Maia RR, Rodrigues de Menezes L, Barbosa IF, Carneiro da Cunha A, da Silveira Pereira GD. Rubber dam isolation—key to success in diastema closure technique with direct composite resin. *Int J Esthet Dent*. 2015;10(4): 564-74.
11. Ferracane JL. Resin-based composite performance: are there some things we can't predict? *Dent Mater*. 2013 Jan 1;29(1):51-8.
12. Edelhoff D, Sorensen JA. Tooth structure removal associated with various preparation designs for posterior teeth. *Int J Periodontics Restorative Dent*. 2002 Jun;22(3):241-9.
13. Lempel E, Lovász BV, Meszarics R, Jeges S, Tóth Á, Szalma J. Direct resin composite restorations for fractured maxillary teeth and diastema closure: A 7 years retrospective evaluation of survival and influencing factors. *Dent Mater*. 2017 Apr 1;33(4):467-76.
14. Faus-Matoses V, Faus-Matoses I, Jorques-Zafrilla A, Faus-Llácer VJ. Orthodontics and veneers to restore the anterior guidance. A minimally invasive approach. *J Clin Exp Dent*. 2017 Nov;9(11):1375-8.
15. 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 Nov 1;41(11):979-85.
16. Goyal A, Nikhil V, Singh R. Diastema closure in anterior teeth using a posterior matrix. *Case Rep Dent*. 2016;2538526.
17. De Araujo EM Jr, Fortkamp S, Barateri LN. Closure of diastema and gingival recontouring using direct adhesive restorations: a case report. *J Esthet Restor Dent*. 2009;21(4):229-40.

How to cite: Vargas D, Almeida GS, Silva EV, Vargas E, Vargas F, Maia A, Amaral D. Simplifying anterior diastema closure with composite resin. *J Clin Dent Res*. 2019 May-Aug;16(2):124-33.

Submitted: January 30, 2019 - Revised and accepted: March 13, 2019.

Contact address: Daniel Vargas
 Av. Ayrton Senna, 3383, Barra da Tijuca, Rio de Janeiro/RJ — CEP: 22.775-002
 E-mail: danieloavargas@gmail.com

» The authors report no commercial, proprietary or financial interest in the products or companies described in this article.

» Patients displayed in this article previously approved the use of their facial and intraoral photographs.
