RSBO

ISSN:
Electronic version: 1984-5685
RSBO. 2025 Jul-Dec;22(2):322-9

Case Report Article

Reanatomization with the use of custom esthetic matrix: case report

Fernanda Pinheiro Machado Wailler[1]
Fabiano de Oliveira Araujo[2]
Paulo Augusto Pires Milani[2]
Thalita de Paris Matos[2]
William Fernandes Lacerda[3]
Yasmine Mendes Pupo[4]

Corresponding author:
Yasmine Mendes Pupo
Universidade Federal do Paraná, Departamento de Odontologia Restauradora
Av. Prefeito Lothário Meissner, n. 632 – Jardim Botânico
CEP 80210-170 – Curitiba – PR – Brasil
E-mail: yasmine.pupo@ufpr.br

[1] Postgraduate Program in Restorative Dentistry, Tuiuti University of Paraná – Curitiba – PR – Brazil.
[2] Department of Dentistry, Tuiuti University of Paraná – Curitiba – PR – Brazil.
[3] Postgraduate Program in Dentistry, Federal University of Paraná – Curitiba – PR – Brazil.
[4] Department of Restorative Dentistry, Federal University of Paraná – Curitiba – PR – Brazil.

Received for publication: February 13, 2025. Accepted for publication: May 9, 2025.

Keywords:
dental esthetics;
composite resins;
dental veneers.

Abstract

Introduction: Dental changes directly interfere with the esthetics of the smile, which can affect socially and psychologically the individual. Composite resins play an important role in treatment options and have become the first choice in restoring anterior teeth, especially when involving healthy teeth requiring minimal intervention. **Objective:** Demonstrate the cosmetic reanatomization and closure of multiple diastemas in the maxillary teeth, using composite resins to make semi-direct veneers, using the ultraconservative technique known as the Custom Esthetic Matrix. **Material and methods:** A 20-year-old male sought treatment for diastema and small teeth. The custom esthetic matrix (CEM) technique was chosen for a conservative and aesthetic restoration. After a diagnostic wax-up and shade selection, semi-direct resin veneers were fabricated and cemented. The restorations were polished and finished, achieving natural symmetry and esthetics. **Results:** The treatment successfully restored the patient's smile, closing the diastema and improving tooth proportions with the CEM technique. The final restorations exhibited natural esthetics, symmetry, and proper integration with the surrounding teeth, gums, and lips. **Conclusion**: The CEM technique provides a conservative, cost-effective option for esthetic restorations, offering predictability, immediate results, and control over each step, making it ideal for cases with previous cosmetic reconstructions.

Introduction

The search for a perfect smile is associated with physical, psychological and socio-economic well-being [4]. Small, misplaced teeth with changes in shape and color [3, 4] may compromise dental occlusion and lead to crowding or diastema, interfering directly in the esthetics of the smile [2, 4, 8]

The development of adhesive materials has provided dentists the ability to directly restore coronary fractures and repair defective enamel with composite [9], becoming the first choice in anterior tooth restorations due to their natural characteristics [9, 10, 20], especially when the rehabilitation involves healthy teeth and a minimal intervention technique is imperative [22].

Direct restorations imply in some challenges such as moisture control and damage to the marginal gingiva, besides to color instability, excessive wear and polymerization shrinkage, disadvantages inherent in the material [10]. Other restorative techniques have been proposed to improve marginal adaptation and minimize the tensile stresses resulting from polymerization shrinkage at the cavity walls [10], called the semi-direct technique. In this technique the resin is placed and sculpted in the lesion, light-activated, and then removed. Finishing and polishing are then performed extraorally, and the restoration cemented [10]. Another way to do the semi-direct technique is with the support of a Custom Esthetic Matrix (CEM) [2], that defines the anatomical characteristics of the vestibular region with the wax-up diagnostic, facilitating finishing and polishing steps.

The success of direct or semi-direct restorations also depends on the professional's understanding of tooth's structure [17], as each has its own individual characteristics. Thus, the way light interacts with enamel and dentin is also different [17]. In addition, the internal morphology of dentin and the thickness of dentin and enamel should be considered when choosing the ideal material.

In order to bring naturality to the restoration, it is important to reproduce the texture of the enamel vestibular surface, so that light reflection and scattering, the natural condition of the dental surface, can occur properly. Thus, the purpose of this paper is to predictably demonstrate cosmetic reanatomization and closure of multiple diastemas using composites with the CEM [2].

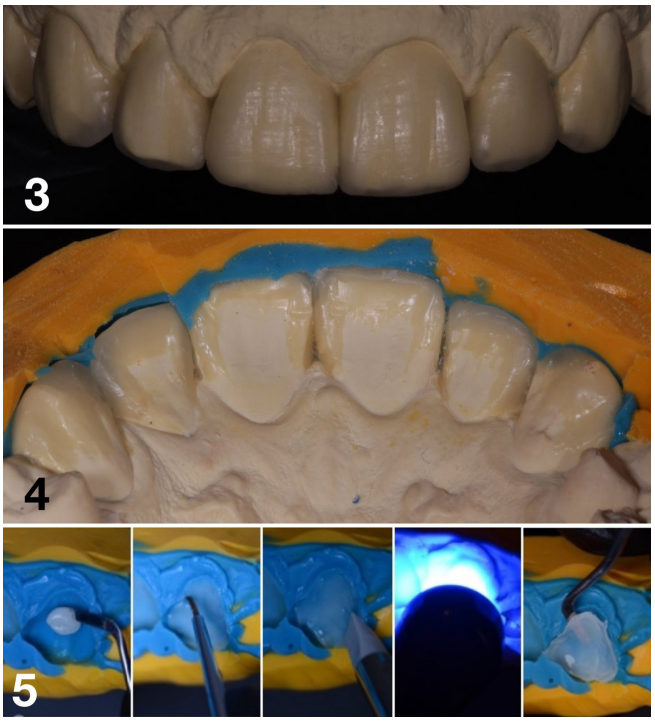
Case report

Male patient, 20 years old, sought specialized dental care, reporting dissatisfaction with smile's esthetics due to diastema between the anterior teeth. In addition, he mentioned having small teeth and having had orthodontic treatment before (figure 1).

After the clinical examination, old restorations in the central and lateral incisors were found, which were already performed as an attempt to close such spaces (figure 2). It was decided to anatomize the anterior teeth with the CEM technique, as this is an ultra-conservative procedure and able to restore the esthetic characteristics of natural teeth, not only widening the teeth in an attempt to close the diastemas, but providing height at the edges and small increase of the incisal edges in order to establish proportionality [2].

Figures 1 and 2– Patient with small teeth (1) who has previously undergone orthodontic treatment (2)

Diagnostic wax-up was performed to prepare the CEM matrix and to obtain teeth's texture, in addition to its new proportions (figure 3). An addition silicon guide was made (3M ESPE, St Paul, USA) in two steps: first the putty, followed by fluid silicon (figure 4).



Figures 3, 4 and 5 – Dental waxing with case planning (3); preparation of the silicone matrix (4); preparation of the resin veneer (5)

The first step of the remodeling was the color selection based on a Shade guide (VITA) with A1 being selected for Empress Direct enamel (Ivoclar Vivadent, Liechtenstein). Then, to make the veneers, the resin was accommodated inside the CEM, using spatulas and brushes to prevent blistering and light curing for 60 seconds in each one. The pieces were removed with the aid of a resin spatula. In order to assess which would have better adaptation to the buccal face and proximal contacts, 3 semi-direct facets per tooth were fabricated (figures 5 and 6).

Figure 6 – Semi-direct facets

After the test of the pieces, the clinical procedures in the teeth began. Modified absolute isolation was performed and the structures were cleaned with a prophylaxis brush (DH-pro) (figure 7). Retractor cord #000 (Ultrapack; Ultradent, Indaituba, BR) was inserted.

It is important to emphasize that no tooth structure reduction was performed on the healthy tooth structures, and only esthetic recontouring with composite resin was performed using an additive technique. 35% phosphoric acid gel (Ultra-Etch, Ultradent, Indaituba, BR) was applied and then rinsed with water for 1 minute (figure 8). The dental structures were dried for 10 seconds, the Prosil Silane (FGM, Joinville, BR) was applied and left to dry for 60 seconds and the Universal Adhesive System (FGM, Joinville, BR) was applied 2 times.; with the aid of microbrush, air blasted for 20 seconds and light cured for 20 seconds (figure 9).

Figures 7, 8, 9 and 10 – Dental adhesion

For cementation, Empress Direct A1 resin (Ivoclar Vivadent AG, Liechtenstein) was used (figure 10). A resin increment was placed in the middle third, followed by the veneer seating with moderate digital pressure to cement each piece. To avoid dark interdental triangles, the interproximal contacts were planned during diagnostic waxing and designed to extend naturally into the interproximal space. During cementation, polyester strips ensured proper adaptation without bonding the veneers together. A polyester strip was used on the proximal to avoid adhesion between each veneer. Excesses were removed with an explorer probe and light cured for 60 seconds each (figure 11).

The final morphology of the anterior teeth was established, occlusion checked with articulation paper (Parkell, Inc; Edgewood; New York; USA) and all teeth involved were polished (figure 12). For the correction of the light reflecting areas, Sof-Lex Pop on 4931G (3M ESPE, St Paul, USA) finishing discs were used, and lines were drawn to simulate the ideal position of the edges, achieving symmetry for these regions. To remove surface imperfections, a medium-grained yellow rubber brush was used.

Secondary anatomy and surface texturing were performed using diamond tip #2200 (KG SORENSEN) and a laminated drill bit #7664 (JET CARBIDE FG). Diamond polishing paste (Diamond Gloss, TDV, Pomerode, BR) together with felt disc was employed to impart high gloss to the restoration surface while retaining the desired texture. Finally, a silicon carbide brush was used.

Figures 11, 12 and 13 – Veneer adhesion (11); polishing (12) and final (13)

Results

After polishing, the anterior teeth restorations presented adequate symmetry and esthetics, presenting natural interaction with the other teeth, gums and lips (figures 13-15).

Closure of the diastema using the CEM technique resulted in a natural and esthetic smile with well-proportioned anterior teeth. The veneers provided proper interproximal contacts, preventing the formation of dark interdental triangles and ensuring seamless integration with the surrounding dentition. Careful shade selection and composite layering technique contributed to a lifelike appearance, enhancing translucency and surface texture.

Cementation was successfully performed with precise adaptation, and excess material was removed to maintain clean margins. Finishing and polishing procedures refined contours, improved light reflectance and achieved a high-gloss finish. The final restorations exhibited symmetry, functional occlusion and harmonious integration with the lips and gingival tissues, meeting the patient's esthetic expectations.

Figures 14 and 15 – Final appearance natural interaction with the other teeth, gums and lips

Discussion

With the advance of restorative materials and the development of new techniques, treatment options are becoming less invasive, conserving healthy dental tissue as much as possible [2, 8, 18]. The evolution in adhesive dentistry has led to the indication of these procedures. Restorations with the use of composite resins increased [5, 15, 16], due to the new particle size formulations, which were reduced to produce high polishing materials [9, 10, 19]. Therefore, these materials have reached a degree of excellence, and are now being used as a first choice in anterior tooth restorations, due to the wide variety of colors and effects that allow reproducing the natural characteristics of the tooth [8, 10, 19, 21, 22].

The composite resin used in the clinical case report was Empress Direct (Ivoclar Vivadent, Liechtenstein) is a nano hybrid composite containing barium glass, ytterbium trifluoride, mixed oxides and silica fillers with an average size of 0.7 μm [23]. It is indicated for diastema closures, class III, IV and V restorations, veneers and shape modifications, and enamel crack repairs [24, 25]. Its advantages for anterior aesthetics are high polish ability and luster; smooth surface that resists staining; natural optical properties; excellent translucency, opalescence and fluorescence; wide range of shades that allow precise color matching and layering; minimally invasive and reversible with conservative and easily modifiable; excellent handling, easy sculpting for detailed anatomy. Its advanced filler technology makes it ideal for esthetic anterior restorations with natural appearance and longevity [24, 25].

Through composite resins, professionals can control color and morphology in a way very similar to prosthetic works using ceramics [11], however, with immediate and reversible results [2, 9, 12, 13]. It is considered reversible because it does not involve any reduction of tooth structure prior to cementation. In this case, the composite veneers are placed directly over the existing tooth surface without removing any enamel, making the procedure minimally invasive. Because no permanent changes are made to the tooth structure, the veneers can be removed if necessary without damaging the underlying healthy tooth tissue. To remove the veneers, a dentist would typically use a specialized instrument, such as a laser [26] and dental bur, to gently separate the composite material from the tooth surface. The process would involve careful manipulation to avoid damaging the natural enamel. Once the veneer is removed, any residual bonding agent can be removed using a polishing technique, leaving the tooth structure intact and undamaged. This reversibility is one of the major advantages of composite restorations over more invasive options such as crowns or ceramics, which often require significant tooth preparation. They favor a minimally invasive approach, aiming at the maintenance of healthy tooth tissue and at the same time having a lower cost compared to ceramic veneers [5, 14, 19].

However, direct procedures also have disadvantages, including color instability, excessive wear, polymerization shrinkage, loss of surface texture, time-wasting secondary anatomy, and possible staining. On the other side, indirect restorations, despite having better physical properties and excellent marginal adaptation, require more invasive preparation, it depends on the laboratory, making subsequent repairs more difficult, and two or more sessions are required to conclude the procedure.

One of the biggest challenges to dental clinicians is the selection of the restorative materials that will mimic physical and optical characteristics of enamel and dentin, which should be functional and have a natural result [9, 11, 13]. When choosing, consideration should be given to the wear resistance of the material and the need for tooth preparation to receive the new restoration [20].

To reduce the chances of a wrong choice when selecting compounds, the practitioner must understand the working principles of each material and how they relate to tissues when light interacts [1, 5, 6, 11, 13, 14]. How light relates to a smooth substrate, where light is easily absorbed, is different from when it interacts with a textured surface, where reflections are created that directly influence the appearance of the light [1, 7]. This will allow a correct stratification of the composite resin making the restoration look natural [6, 8, 20]. To be successful in esthetic restorations it is suggested to plan through the diagnostic waxing and silicon guides [8] to ensure predictability of results, and lessen the impact of smile modification to psychologically prepare the patient changes [12] and avoid unsatisfactory results [2, 8, 19].

The anatomical characteristics of the vestibular region must be well defined in the diagnostic wax-up, to facilitate finishing and polishing steps. Thus, they can be copied using high precision materials for later CEM production. A diagnostic mock-up with bisacrylic resin could be considered prior to the definitive restorative procedure to better visualize the outcome and ensure the planned aesthetic result. Thus, custom aesthetic matrix coupled

with diagnostic waxing increases the chances of restoration success, making it as natural as possible [9]. In addition, when it comes to anterior segment remodeling, some factors such as tooth position, height-width ratio, arc shape, and mouth width, along with the golden proportion, gingival level, gingival zenith, incisal curvature, interproximal contact point, tooth alignment, incisal and cervical embrasures, tooth anatomy and form, texture, and color, are key to achieving a harmonious smile.

Conclusion

Through the diagnostic waxing, the custom esthetic matrix (CEM) was made to obtain the semi-direct composite veneers. In cases of previous cosmetic reconstruction, composite resins may be used as a first option due to the conservative technique and the best cost benefit when compared to indirect procedures. The predictability of an immediate outcome and control over each restorative step also contributes to the selection of this procedure.

References

1. Baratieri LN, Araujo E, Monteiro S. Color in natural teeth and direct resin composite restorations: essential aspects. Eur J Esthet Dent. 2007;2(2):172-86.

2. Bueno ALN, Pupo YM, Araujo FDO, Kubitski M. Matriz Estética Personalizada (MEP): abordagem ultraconservadora e previsível para confecção de facetas semidiretas. JCDR. 2015;12(2).

3. Davis LG, Ashworth PD, Spriggs LS. Psychological effects of aesthetic dental treatment. J Dent. 1998;26(7):547-54.

4. De Araújo AO, Manta DF, Lopes MJP, Pedrosa MDS, Silva CHV, Durão MDA. Prefabricated composite resin veneers: a clinical case report. Braz Dent Science. 2018;21(1):119-25.

5. Devoto W, Saracinelli M, Manauta J. Composite in everyday practice: how to choose the right material and simplify application techniques in the anterior teeth. Eur J Esthet Dent. 2010;5(1):102-24.

6. Dietschi D. Optimising aesthetics and facilitating clinical application of free-hand bonding using the "natural layering concept". Braz Dent J. 2008;204(4):181-5.

7. Dietschi D. Free-hand bonding in the esthetic treatment of anterior teeth: creating the illusion. J Esthet Dent. 1997;9(4):156-64.

8. Fonseca RB, Kasuya AVB, Favarão IN, Honorato ISS, Santos ML, Alves Filho LC. Técnica de estratificação e texturização superficial de resinas compostas em dentes anteriores: seis meses de acompanhamento. Int J Braz Dent. 2013:322-30.

9. Fahl N. Achieving ultimate anterior esthetics with a new microhybrid composite. Compend Contin Educ Dent. 2000;(26):4-13.

10. Fahl Júnior N. The direct/indirect composite resin veneers: a case report. Prac Periodontics Aesthet Dent. 1996;8(7).

11. Fahl N. Trans-surgical restoration of extensive Class IV defects in the anterior dentition. Prac Periodontics Aesthet Dent. 1997;9(7):709-20.

12. Fahl N. A Polychromatic composite layering approach – part II. Prac Proced Aesthet Dent. 2007;19.

13. Fahl N. A polychromatic composite layering approach for solving a complex Class IV/direct veneer/diastema combination: part II. Prac Proced Aesthet Dent. 2007;19(1):17-22.

14. Fahl N. Ultimate aesthetics with composites: when art and science merge. Dent Today. 1999;18(9): 56-61.

15. Furuse AY, Herkrath FJ, Franco EJ, Benetti AR, Mondelli J. Multidisciplinary management of anterior diastemata: clinical procedures. Prac Proced Aesthet Dent. 2007;19(3):185-91.

16. Ferracane JL. Resin composite – state of the art. Dent Mat. 2011;27(1):29-38.

17. Magne P, Holz J. Stratification of composite restorations: systematic and durable replication of natural aesthetics. Prac Periodontics Aesthet Dent. 1996;8(1).

18. Magne P. Composite resins and bonded porcelain: the postamalgam era? J Calif Dent Assoc. 2006;34(2):135-47.

19. Pontons-Melo JC, Pizzatto E, Furuse AY, Mondelli J. A conservative approach for restoring anterior guidance: a case report. J Est Rest Dent. 2012;24(3):171-82.

20. Reis A, Higashi C, Loguercio AD. Re-anatomization of anterior eroded teeth by stratification with direct composite resin. J Est Rest Dent. 2009;21(5): 304-16.

21. Snyder T. Conservative replication of nature with a class IV direct composite understanding stratification to emulate nature's optics. J Cos Dent. 2012;28(1):22-8.

22. Wolff D, Kraus T, Schach C, Pritsch M. Recontouring teeth and closing diastemas with direct composite buildups: a clinical evaluation of survival and quality parameters. J Dent. 2010;38(12):1001-9.

23. Ivoclar Vivadent AG. IPS Empress® Direct – The Highly Esthetic Composite System. Schaan, Liechtenstein: Ivoclar Vivadent AG; 2019 [cited 2025 Mar 5]. Available from: URL:https://www.ivoclar.com/medias/sys_master/celum-connect2-assets/celum-connect2-assets/ha6/h1e/10371784605726/696714-IPS-Empress-Direct-System-Brochure-11475.pdf.

24. Ferracane JL. Resin composite – state of the art. Dent Mater. 2011;27(1):29-38.

25. Dietschi D. Layering concepts in anterior composite restorations. J Adhes Dent. 2001;3(1): 71-80.

26. Yang X, Ye S, Wei B, Zeng L. Removal of resin cement using a picosecond laser: an in vitro study. J Prosthet Dent. 2025;133(4):1058.e1-1058.e9.