

Aesthetic Rehabilitation of Anterior Maxillary Diastema with Ceramic Veneers: A Case Report

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Abstract

Case Report

The use of ceramic veneers is becoming increasingly common in Ästhetik dentistry. This method is considered to be minimally invasive with high aesthetic results due to the major advances in ceramic and bonding techniques. The success of a restorative treatment in anterior teeth depends on the esthetic integration between soft tissues and hard tissues. Aesthetic management of diastema using veneers is nowadays a well-established method. The purpose of this clinical report is to describe a conservative treatment approach to recover an esthetic disharmony caused by multiple maxillary diastemas. A 27 years old female patient was seeking to improve her smile. Ceramic veneers were planned and build-up with the help of diagnostic models, wax-up and mock-up.

Keywords: Veneers, ceramic, diastema, aesthetic.

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INTRODUCTION

Dental ceramic veneers were introduced commercially several years ago [1]. It is considered one of the most conservative operative treatment procedures [2].

Several methods are currently available to restore and optimize the aesthetics of anterior teeth using minimally invasive techniques [3]. Ceramic veneers, in combination with the bonding technique, are a therapeutic modality for closing anterior diastema that is both esthetic and preserves natural tissues. However, an interdisciplinary approach combining etiologic, orthodontic, and periodontal management is necessary in most cases to improve esthetic and functional results.

To meet the aesthetic demands of patients, many therapeutic forms have been developed for diastema closure. However, not all diastema should be considered, by the practitioner, as needing correction. The patient's needs, requirements and expectations must be taken into account in the treatment planning to ensure a satisfactory aesthetic result.

CASE REPORT

Diagnosis and Treatment Planning

A 27 years old female patient was referred to the department of fixed prosthodontics at the Faculty of dental medicine of Monastir. She expressed her desire to find a solution for the gaps between her front teeth. She was unhappy with her smile and that made her self-conscious (Figure 1).



Figure 1: The patient's smile: a-Front view, b-Lateral view

She was previously referred to the orthodontic department. After analyzing the teeth proportions and calculating the Bolton Index, no orthodontic treatment was necessary for this case.

Oral examination revealed the presence of diastema between the maxillary anterior teeth of 1 to 2 mm evenly distributed. The teeth were caries free. Her oral hygiene was good.

The patient has a class I molar-canine relation with 1 mm overjet and 2 mm overbite. Two different

options were considered: a composite resin restoration or use of ceramic veneer. A minimally invasive ceramic veneer was selected.

Complete radiographic and photographic data was collected from the patient. Impressions were taken and diagnostic models were prepared and mounted on a semi-adjustable articulator. The models were studied to decide the shape and size of the restorations. A diagnostic wax-up has been done (Figure 2).



Figure 2: Cast model with wax up and the silicon matrix

- Mock Up Procedure

A silicone matrix was made from the wax up. This matrix was used to make a mock up with autopolymerizing resin (Dentocrown, Itena Clinical, France) and placed over the teeth (Figure 3). During the following appointment, any desired alteration by the patient was analyzed, discussed, and adjusted.

Five ceramic veneers were required to improve the patient's smile without impairing her occlusion. The final treatment plan was approved after form and function were evaluated.



Figure 3: Smile view of the esthetic mock up

Dental Preparation

In the mock-up driven technique, preparation is performed on the mock-up as if it was a natural tooth. This technique results in considerably less invasive dental preparations, since it takes into account the final contour desired for the veneer. Diamond burs of pre-established depths are used to perform the reduction.

A Cervical groove is created with a rounded diamond bur to initiate a sketch of the future cervical finish line. Three horizontal groove are made with a

depth marker bur on the labial surface. Then reduction of the labial surface must be performed in three different inclinations (cervical, middle, and incisal thirds) at an enamel depth of 0,5-0,7 mm (Figure 4). The proximal preparation was extended beyond the contact area (Proximal coverage) to avoid the visibility of the margin and the appearance of a black triangle. Incisal edge reduction of 1.5 mm was performed. Chamfer finish line was maintained in the cervical region at the level of the gingival margin (Figure 5).



Figure 4: Dental preparation through the mock up



Figure 5: Buccal view of the five prepared maxillary teeth

Gingival retraction was performed (Ultrapak Cord #0, Ultradent Products Inc., South Jordan, UT, USA) (Figure 6). Polyvinylsiloxane impression material (light and putty) one step technique is used to take a full-arch impression.

The light-bodied impression material was simultaneously spread on the teeth and gently blown

over the preparation while the heavy-bodied impression was loaded in the plastic tray and inserted in the oral cavity. The impression material was allowed to set according to manufacturer's instructions and then removed.

Provisional veneers were made with the same silicone matrix used for the mock up.



Figure 6: Placement of the gingival retraction cord

Laboratory Fabrication of the Veneers

Ceramic laminate veneer restorations were fabricated with a VITABLOCS TriLuxe forte (VITA ZahnFabric Germany): polychromatic, tooth-colored feldspar blanks with integrated shade gradient to reproduce the natural play of colors using CAD/CAM

technique (Figure 7). The ceramic veneers were designed on the computer and milled (Figure 8).

After completion of the milling procedure, the shape of the veneer was optimized by hand in the first crystallization stage (Figure 9).

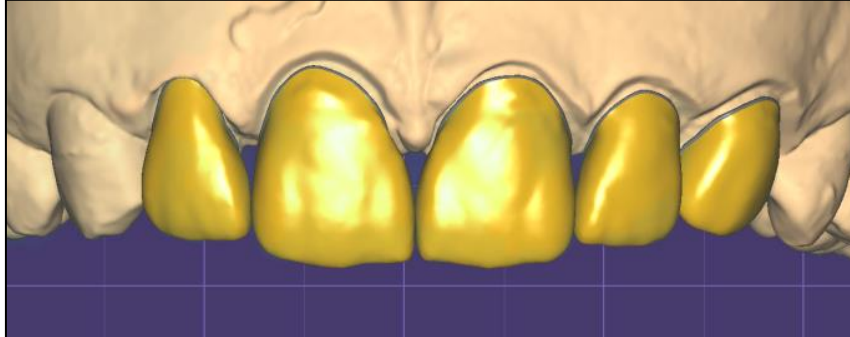


Figure 7: Computer-aided design (CAD)

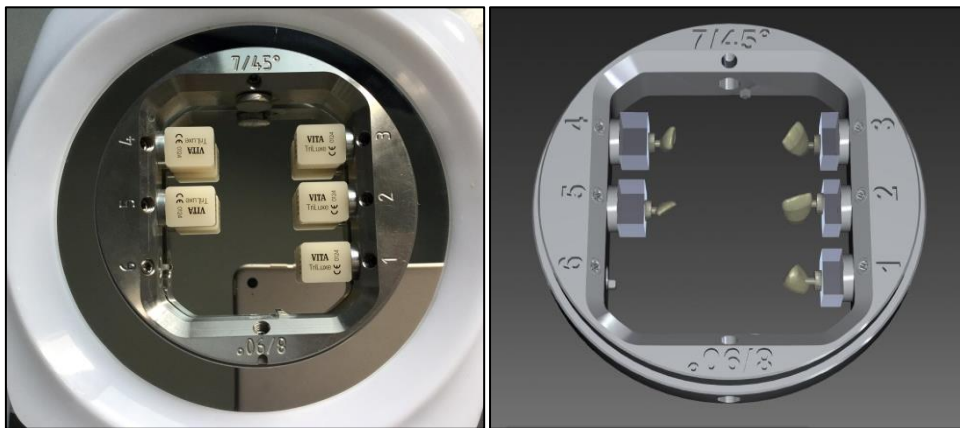


Figure 8: Computer-aided Manufacturing (CAM)



Figure 9: Five Ceramic veneers

- Cementation

1. The prepared teeth were cleaned and the veneers were tried-in using a transparent try-in paste (Variolink Veneer try-in paste, Ivoclar). After that, they were adhesively luted in accordance with the guidelines of the manufacturer of the composite resin:
2. The internal surfaces of the veneers were cleaned and etched with hydrofluoric acid for

- one min, washed under running water for another minute, and dried with an air syringe.
3. Monobond-plus (Ivoclar Vivadent, Schaan, Lichtenstein) was applied and left to react for 60 s before air drying.
4. The teeth surfaces were etched using 37% phosphoric acid for 30 s, washed for another 30 s and gently dried (Figure 10).

5. Bonding agent was applied for 10 s using a microbrush (Figure 11). Excess bonding was blown to a thin film using air spray.
6. Heliobond was directly applied on to the surfaces of the tooth and the veneers before cement application with a microbrush.
7. Light-cured resin cement (Variolink Veners, transparent shade, Ivoclar Vivadent, Lichtenstein) was applied to the inner surface of the veneers, which were gently seated on to their respective preparations using finger pressure.



Figure 10: Surface etching with 37% Phosphoric acid



Figure 11: Application of the bonding agent.

Excess cement was carefully removed with an explorer and a microbrush. Light polymerization was performed with a LED-curing unit (Blue phase LED-curing light, Ivoclar Vivadent) for 30 s from the buccal, incisal, mesial, and distal aspects of each tooth. Residual cement was removed using a #12 surgical blade and explorer. Flossing was performed at the proximal areas to ensure interproximal contact patency. The margins were polished with a silicone instrument.

Finally, the restorations were checked for any occlusal interference (Figure 12) and the entire cementation procedure was performed one-by-one starting with the central incisors, laterals, and finally, the canines. Images of the final restorations are shown in (figure 13).



Figure 12: Result at rest and on protrusion



Figure 13: (a) initial view of the smile. (b) Esthetic mock up (intramural representation of the wax up). (c) Final full face smile view

DISCUSSION

Maxillary anterior diastema can negatively affect the smile and have adverse psychological impact on an individual's social and professional life. The closure of diastema has become one of the aesthetic requirements of patients. Faced with these aesthetic demands, the practitioner must set up a global treatment plan that simultaneously responds to aesthetic and functional considerations, and that requires good communication between the patient and the entire treatment team. Keene 1963 defines the diastema as a space greater than 0.5 mm between two adjacent teeth [4]. Huang, W. J. 1995 and Oesterle, L. J., Shellhart, W. C. 1999 identified multiple diastema that can separate a group of teeth [5, 6].

The first line of treatment for diastemas is to identify the cause. Several aspects such as genetic and physiologic factors, abnormal frenum, abnormal habits, tooth-size discrepancies, and iatrogenic factors can affect the occurrence and size of an anterior diastema [7, 8]. Among the suggested options for the closing of diastemas, orthodontics, operative dentistry, and prosthodontics are the most suitable [9].

Recently, ceramic veneers have been widely and effectively used to treat diastemas, with high esthetic results [10]. Adult patients may refuse to opt for orthodontic treatment because of the lengthy process and the need for immediate esthetic results. In the present case, orthodontic treatment was unnecessary and the diastema was evenly distributed. Her main request was the closure of the diastemas in a short time with long-term esthetic results.

Ceramic veneers were presented as the initial treatment option because they involve minimal tooth preparation. They are considered a less invasive

alternative to all-ceramic crowns [11]. The mock up driven preparation takes into account the final contour desired for the veneer, resulting in considerably less invasive dental preparations [12, 13]. According to Gurel *et al.*, the mock-up driven technique resulted in 80.5% of tooth preparations confined to the dental enamel. It is supposed that this technique may result in more predictable preparations [14]. In a recent randomized clinical trial, the ceramic veneers on maxillary anterior teeth have been shown to be significantly more successful than indirect composite veneers after 10 years, both in terms of survival rate and in terms of quality of the surviving restorations [15].

Besides the creation of an esthetic proportion, another challenge involved how to prevent the formation of a black triangle between the central incisors. The appearance of the surrounding soft tissue is of major importance, and various techniques have been developed to guide and optimize its topography [16]. It is possible to condition gingival tissue for the formation of papillae with non surgical procedure. The soft tissue topography is guided prosthetically.

This required work in the gingival architecture based on the concepts of cervical contouring [17] and location of the contact point [18]. In this approach, intrasulcular placement of the cervicoproximal margins is required to improve management of the emergence profile. This leads to a more gradual and natural closure of the diastema or overly open cervical embrasure [19].

CONCLUSION

Ceramic veneers may prove to be effective in closing diastemas and should therefore, be considered as one of the main options for these cases. The meticulous respect of clinical protocols enables the

optimization of mechanical, biological and aesthetic imperatives while respecting the steps of the procedure.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interests regarding the publication of this paper.

REFERENCES

- Land, M. F., & Hopp, C. D. (2010). Survival rates of all-ceramic systems differ by clinical indication and fabrication method. *J Evid Based Dent Pract*, 10, 37-8.
- Heffernan, M. J. (2002). Relative translucency of six all-ceramic systems. Part II: core and veneer materials. *J Prosthet Dent*, 88, 10-15.
- Qualtrough, A. J., & Burke, F. J. (1994). A look at dental esthetics. *Quintessence Int*, 25, 7-14.
- Keene, H. J. (1963). Distribution of diastema in the dentition of man. *Am J Phys Anthropol*, 21(4), 437-441.
- Huang, W. J., & Creath, C. J. (1995). The midline diastema: a review of its etiology and treatment. *Pediatric Dent*, 17(3), 171-9.
- Oesterle, L. I., & Shellhart, W. C. (1999). Maxillary midline diastemas: a look at the causes. *J Am Dent Assoc.*, 130(1), 85-94.
- Tanaka, O. M. (2015). When the Midline Diastema Is Not Characteristic of the "Ugly Duckling" Stage. *Case Rep Dent*, 924743.
- Jaija, A. M., El-Beialy, A. R., & Mostafa, Y. A. (2016). Revisiting the Factors Underlying Maxillary Midline Diastema. *Scientifica*, 5607594.
- Blatz, M. B., Hürzeler, M. B., & Strub, J. R. (1999). Reconstruction of the lost interproximal papilla: presentation of surgical and nonsurgical approaches. *Int J Periodontics Restorative Dent*, 19, 395-406.
- Viswambaran, M., Londhe, S. M., & Kumar, V. (2015). Conservative and esthetic management of diastema closure using porcelain laminate veneers. *Med J Armed Forces India*, 71, 581-585.
- Bayramoglu, E., Ozkan, Y. K., Yildiz, C. (2015). Comparison of marginal and internal fit of press-on-metal and conventional ceramic systems for three- and four-unit implant-supported partial fixed dental prostheses: An in vitro study. *J Prosthet Dent*, 114, 52-58.
- Magne, P., & Belser, U. C. (2004). Novel porcelain laminate preparation approach driven by diagnostic mock-up. *J Esthet Restor Dent*, 16, 7-18.
- Gurel, G., Sesma, N., Calamita, M. A., Coachman, C., & Morimoto, S. (2013). Influence of enamel preservation on failure rates of porcelain laminate veneers. *Int J Periodontics Restorative Dent*, 33, 31-39.
- Gurel, G., Morimoto, S., Calamita, M. A., Coachman, C., & Sesma, N. (2012). Clinical performance of porcelain laminate veneers: outcomes of the aesthetic pre-evaluative temporary (APT) technique. *Int J Periodontics Restorative Dent*, 32, 625-635.
- Gresnigt, M. M. M., Cune, M. S., Jansen, K., van der Made, S. A. M., & Özcan, M. (2019). Randomized clinical trial on indirect resin composite and ceramic laminate veneers: Up to 10-year findings. *Journal of Dentistry*, 86, 102-109.
- Bichacho, N., & Landsberg, C. J. (1997). Single implant restorations: prosthetically induced soft tissue topography. *Pract Periodontics Aesthet Dent*, 9, 745- 54.
- Bichacho, N. (1996). Cervical contouring concepts: enhancing the dentogingival complex. *Pract Periodontics Aesthet Dent*, 8, 241-54.
- Tarnow, D. P., Magner, A. W., & Fletcher, P. (1992). The effect of the distance from the contact point to the crest of bone on the presence or absence of the interproximal dental papilla. *J Periodontol*, 63, 995-6.
- Lasserre, J. F., Laborde, G., Bottis, S., Koubi, S., Lafargue, H., Couder, G., Maille, G., & Margossian, P. (2010). Restaurations céramiques antérieures (2): Les préparations partielles et d'adhésion. *Réalités cliniques*, 3(21), 183-195.