



Cosmetic recontouring for achieving anterior esthetics

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Abstract

Cosmetic recontouring based on the enameloplasty of natural teeth is a treatment with esthetic benefits that can be considered both economical and safe. Not only does the clinician need to restore the harmony of the smile, but treatment planning must also take the functional aspects of the restoration into consideration. One way to recontour is through an additive technique with direct compos-

ite resin that improves the esthetic outcome of the final treatment. Of the various types of treatment that can be offered in the dental clinic, cosmetic recontouring is a conservative one with low biological and financial cost that obtains good functional and esthetic results. This article describes a clinical case including enameloplasty and the addition of direct composite resin to improve the balance and harmony of the smile and dentition. (*Int J Esthet Dent* 2019;14:134–146)



Introduction

In restorative dentistry, esthetics is defined as the art of creating, reproducing, copying, and harmonizing restorations with contiguous dental and anatomical structure.¹ Cosmetic dentistry can be defined as the set of operative procedures and the application of dental materials that aim to restore esthetic beauty and harmony.¹ Cosmetic recontouring is considered to be conservative, economical, and capable of providing benefits not only for esthetics and hygiene, but also for the optimization of occlusal function.²

Teeth that have an altered shape or position affect proper alignment, smile harmony, and dentofacial composition. One way to treat these issues is with cosmetic recontouring through minor enameloplasty or the addition of restorative materials. In many cases, this treatment option compares favorably to others that are significantly more laborious, prolonged, and expensive^{3,4} as well as poorly accepted by patients.

One frequently observed misconception is that cosmetic recontouring only involves the wearing down or leveling of the teeth. Clinicians must be knowledgeable about dental anatomy, esthetic proportions, and optical illusions to perform an analysis of dental facial harmony, which could have a direct impact on the shape, position, and/or size of the teeth.^{1,5,6} It is therefore essential to carry out proper planning to determine the need to perform additive techniques, remodeling (enameloplasty), or both.

Composite resins are the first choice as direct restorative materials and for cosmetic recontouring. In recent decades, their evolution and improvement has increased prediction and longevity and has enabled more conservative and repairable procedures.^{5,7-13}

The aim of this article, therefore, is to describe a clinical case where a simple approach for cosmetic enamel recontouring was followed, based on enameloplasty and the additive technique with composite resin to restore and enhance the esthetic appearance of the maxillary anterior teeth and the smile.

Case report

A 34-year-old female presented for treatment complaining about the position of her misaligned maxillary central incisors, the form and reduced size of her lateral incisors, and the wear of her canines. She also expressed dissatisfaction with her smile. After all the options had been explained and



Fig 1 (a) Preoperative image showing an inadequate incisal display and misalignment of the teeth. (b) Preliminary intraoral view of the maxillary anterior teeth, with the presence of peg lateral incisors.



discussed, the patient and the clinician decided on a cosmetic treatment of the six maxillary teeth using an additive technique with direct composite resin and enameloplasty.

Diagnostic approach and treatment planning

The initial clinical procedure included a careful analysis of the occlusion, a dental and periodontal examination, and a study of extra- and intraoral photographs. The radiographic evaluation showed no alteration of bone or dental (or any other) structure. The clinical examination revealed an imbalance in the harmony of the smile caused by crowding of the two maxillary central incisors, the alteration in size and shape of the peg lateral incisors, and the position and incisal wear of the canines (Fig 1).

The evaluation of the incisal edge with the lips at rest allowed for the visualization of approximately 3.5 mm of tooth structure. Photographs were taken and an assessment made with the patient's upper lip at rest. Using a periodontal probe, the position of the incisal edge of the maxillary central incisors relative to the upper lip was determined. Previous studies have shown that the amount of incisal display decreases proportionally with advancing age.¹⁴ For example, in a 30-year-old, 3 mm of incisal display at rest is usual, whereas in a 60-year-old, the incisal display could be 1 mm or less. The change in incisal display with time suggests that the resilience and tone of the upper lip tends to decrease with advancing age.¹⁵

Initially, dental arch impressions were taken with PVS material (Silagum; DMG) and models were made with type IV dental stone (Fujirock EP; GC). The casts were then duplicated and mounted on a semi-adjustable articulator (PROTARevo; KaVo), with analysis and simulation of how the dental structures would be modified.



Fig 2 Diagnostic wax-up model mounted on the semi-adjustable articulator.

Diagnostic wax-up and bis-acryl mock-up

A wax-up is fundamental for precise treatment planning. The new heights, shapes, and contours of the anterior teeth are planned based on the analysis of the occlusion, the phonetics, the dentolabial relationship, and the esthetic proportions of height/width (Fig 2).^{9,15-19} Once the model with the diagnostic wax-up had been verified and accepted by the clinician and patient, the planning was transferred to the mouth for clinical evaluation (Fig 3). This was made with an index of laboratory condensation silicone (Zetalabor; Zhermack) filled with a bis-acrylic resin (Protemp 4; 3M ESPE) for the try-in stage. This step was aided by establishing effective communication with the patient by means of a visual language, which also allowed us to verify, correct, and improve the final configuration (Fig 4).²⁰⁻²² Restorations with new lengths, shapes, and incisal edges were planned and projected based on facial and dentolabial analysis, phonetic tests, evaluation of the anterior guidance (excursive movements), and tooth size (width/length ratios).^{20,21}



Fig 3 (a) Silicone guides fabricated over the wax-up to elaborate the mock-up. (b) Frontal view with the mock-up in place.



Fig 4 (a) Lateral view of the smile with the new tooth shapes and positions. (b) Some details that needed to be corrected to improve the harmony of the smile were adjusted in the mock-up.



Fig 5 (a) Areas to be modified were demarcated. Cosmetic recontouring was performed to better align the maxillary central incisors prior to starting the definitive restorations. (b) Abrasive strips for redefining the interproximal areas.

Cosmetic enamel recontouring (enameloplasty)

After a phase of careful diagnosis, cosmetic recontouring was performed to correct the alignment of the maxillary central and peg lateral incisors. The most prominent areas of the vestibular aspects to be modified were demarcated with a Pitt permanent artist pen. To improve the alignment of the maxillary incisors, the abrasion was carried out with an 864.FG.014 diamond bur (Komet) and stainless steel abrasive strips (Fig 5). This procedure should be performed without anesthesia, as this measure is an indicator of the possible degree of sensitivity of the patient. To eliminate accentuated surface roughness, finishing was carried out with a carbide bur on a 1:4 increaser contra angle (T2 REVO; Sirona) for better operative control. The facial surfaces were polished with a coarse silicone cup (Jiffy; Ultradent). Finally, a desensitizing agent (5% potassium nitrate, and 2% sodium fluoride, Desensibilize 2%; FGM) was applied for 10 min. The gel was removed with cotton and plenty of water.

Additive technique with composite resin

Remodeling was carried out with composite resin. After tooth prophylaxis, modified rubber dam isolation and a retraction cord were placed (Fig 6a). To enhance the predictability of the treatment, an impression of the palatal and incisal thirds of the teeth surfaces from the waxed-up cast was obtained and used as a dimensional guide for composite placement and symmetry. Prior to the restorative procedures, the adaptation of the silicone guide was verified (Fig 6b).

Initially, the enamel surface was sandblasted with 53 μ aluminum oxide (AquaCare Dental Air Abrasion; Medivance Instruments). Then, 35% phosphoric acid was applied for



Fig 6 (a) After prophylaxis, modified rubber dam isolation was established. (b) Silicone guide in position to verify its position and adaptation.

20 s, followed by a water rinse and light air drying. The surfaces of the adjacent teeth were protected with teflon tape during blasting and etching. Next, an adhesive system (Bond Force II; Tokuyama) was applied in accordance with the manufacturer's guidelines (Fig 7a). Light curing was performed for 20 s with a LED light source (VALO; Ultradent).

Using a composite resin instrument, a thin layer of translucent composite (NE, Estelite Asteria; Tokuyama) was placed onto the silicone guide as a lingual shelf to establish the palatal/proximal contour and the new incisal edge. The excess material was

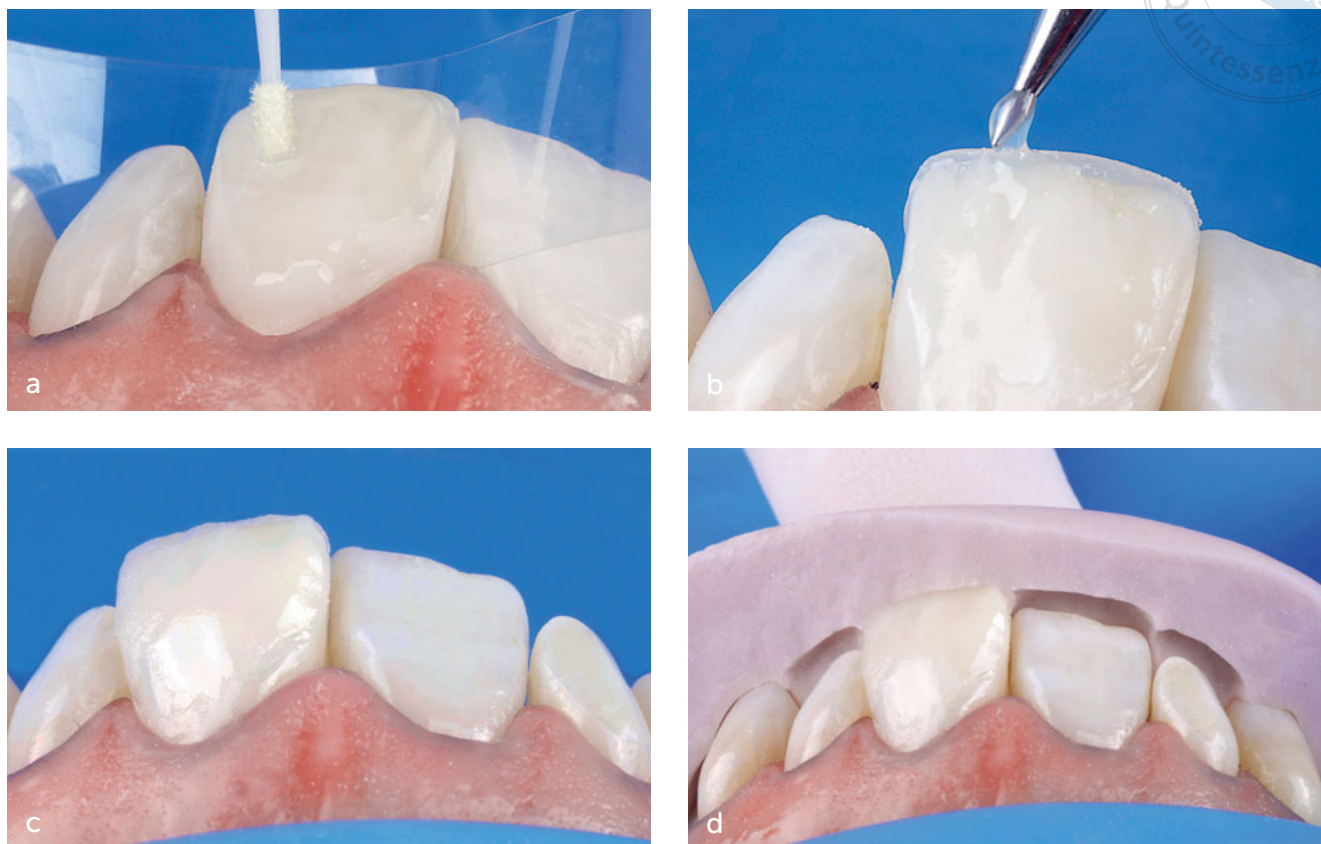


Fig 7 (a) After etching with phosphoric acid, a bonding agent was applied and light cured. (b) Highly translucent enamel composite placed between the mamelons to obtain the opalescence characteristic of this area. (c) Interproximally, a tight contact point and the correct facial embrasure forms were created. (d) The incisal and facial height was verified with the silicone matrix.

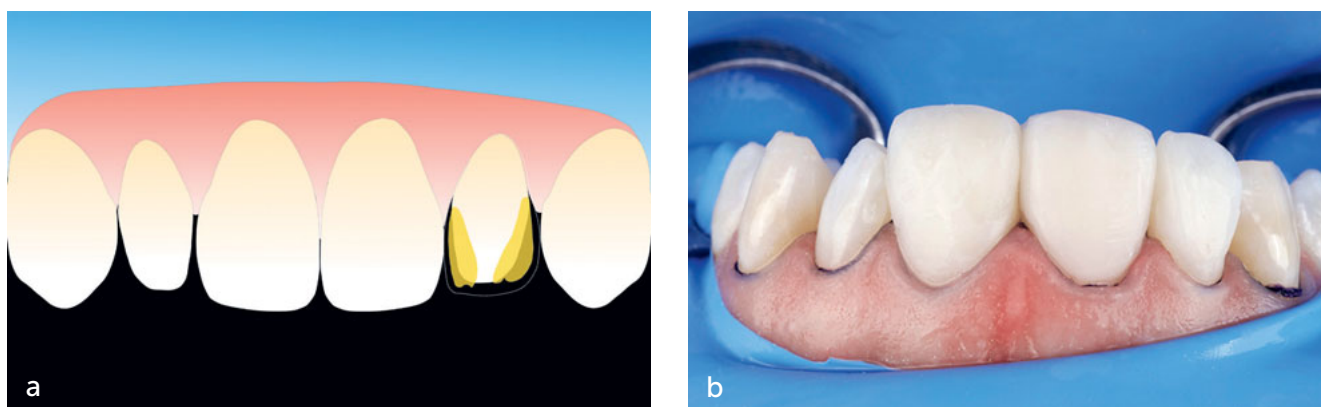


Fig 8 (a) Composite for dentin was applied to the peg lateral incisors due to the lack of contour and volume. (b) View after the application of the layer that corresponded with the artificial enamel.



removed and the composite resin light cured in position for 20 s. The artificial body (Shade A2B and A3B; Estelite Asteria) was placed over the facial portion and sculpted into the shape of the lobes and developmental depressions. To recreate the translucency of the natural enamel, a small increment of highly translucent enamel composite (TE; Estelite Asteria) was applied to the region of the incisal third between the body mamelon spaces and extremities (Fig 7b). The final layer, which corresponded with the artificial enamel, was restored with translucent enamel (NE; Estelite Asteria) for the middle and incisal thirds. Composites were carefully applied with a large-bladed instrument and smoothed with the aid of a no. 4 flat-tipped brush (Ivoclar Vivadent). Increments of composite resin were light cured according to the manufacturer's instructions. To aid in creating a tight contact point and the correct facial embrasure forms, a Mylar strip was placed interproxi-

mally and pulled through (Fig 7c). Finally, both the buccal and palatal surfaces were cured for 40 s. The facial and incisal height was verified with the silicone matrix (Fig 7d).

A similar stratification technique was applied to the peg lateral incisors, but with the addition of composite resin for dentin (Shade A2B and A1B) in the lateral zones due to the lack of contour and volume (Fig 8). Before polishing, excess material at the margins was removed with a no. 12 surgical scalpel blade (Swann-Morton). A coarse-gritted disc (FlexiDisc; Cosmedent) was used to produce the primary anatomy and to achieve symmetry between similar teeth. After the desired cervicoincisal and mesiodistal lengths were reached, symmetric light-reflection areas and light-deflecting zones were outlined with a pencil, and the distance was checked with a sharp-ended caliper.

In addition, tissue remodeling of the maxillary right central incisor was performed to position the gingival margin at the same

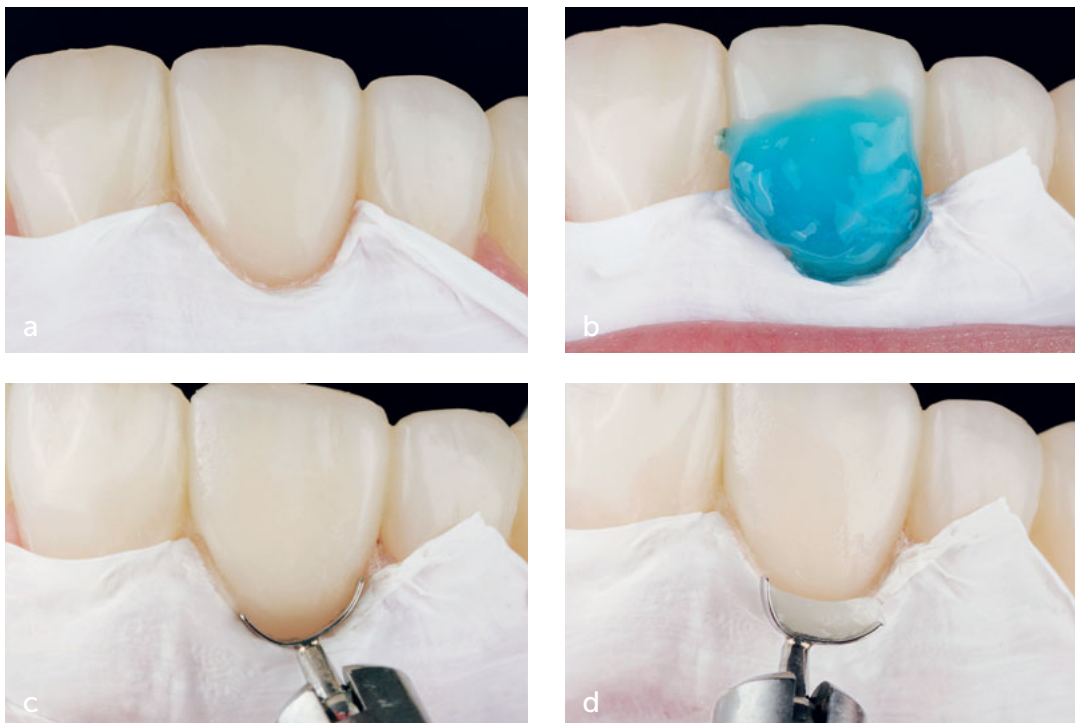


Fig 9 (a) Teflon tape and a thin retractor cord were placed in the sulcus for visualization of the cervical region. (b) Acid etching performed only on a restricted area. (c) A gingival protector instrument was used to enable the adaptation of the composite. (d) Application of the composite to remodel the gingival margin.



Fig 10 Frontal view of the maxillary anterior teeth after the restorative procedure.



height as the maxillary left central incisor and to improve the gingival architecture. This simple and rapid technique^{1,5} involves the direct application of composite. Therefore, Teflon tape and a thin retractor cord were placed in the sulcus for protection and better visualization of the cervical region. A gingival protector instrument (Zekrya; Dentsply Sirona) was used for the application. This instrument favors the adaptation of the composite resin, as shown in Figure 9.

The facial and palatal surfaces were finished in sequence with a coarse silicone cup (Jiffy). To prepare for the macro surface texture, the facial surfaces were created with the aid of a no. H48LF and no. H48LUF carbide finishing bur (Komet) on a 1:4 increaser contra angle. The final natural gloss was achieved using the Astrobrush system (Ivoclar Vivadent) and a goat hair brush (Jiffy Goat; Ultradent), followed by a felt wheel (FlexiBuff; Cosmedent), aluminum oxide polishing paste (Enamelize; Cosmedent), and abrasive strips (Polydentia) for refining and polishing the interproximal areas (Fig 10).

Occlusal bite splint

After the restorative procedure, the use of an occlusal bite splint was indicated as a temporary protection for the restorations (Fig 11a). The splint was indicated for night use during sleep for a period of 6 months. After this period, the patient will be reevaluated to verify her dental status and restorations, as well as the situation regarding the bite splint. Upon completion of the treatment, the patient was given instructions regarding oral hygiene, periodic follow-ups, and the maintenance of the restorations. She was cautioned against harmful habits such as biting her lips or hard objects, nail biting, etc. It was also emphasized that proper oral care is closely related to treatment longevity. The final aspect of the teeth and smile is shown in Figure 11b and c.

Discussion

In recent years, cosmetic recontouring has been increasingly indicated due to its im-

mediate and permanent results and is presented as a valuable alternative to more expensive treatments that demand greater operative technique.³ Recontouring can provide quick and efficient treatment for the patients for whom it is indicated. In the case presented here, esthetic and functional results were achieved based on sound planning and execution.

In cases of misaligned teeth, the procedure of choice is orthodontic treatment. However, in cases where dental misalignment is minimal, orthodontic treatment may not be appropriate. In these cases, other methods may be chosen, ranging from treatments such as cosmetic recontouring with composite resin to less-conservative treatments such as indirect veneers. These treatments can be highly successful at a lower cost with a greater commitment to the maintenance of tooth structure.¹

Cosmetic recontouring can be considered a safe form of treatment with few or no side effects.²² Zachrisson and Mjör,²³ after performing extensive cosmetic recontouring on healthy premolars, emphasized that the patients did not show permanent painful symptoms, except in some cases where increased sensitivity in the first days after treatment was observed. In the case presented here, no collateral effect or symptoms associated with pain caused by sensitivity were observed. Mondelli¹ suggests that this type of treatment should be previously planned on study models. Additionally, judicious clinical analysis using intra- and extra-oral photographs to visualize the initial dental situation and its relationship with the face is recommended. These are always very important steps for proper planning. Frequently, the clinician is challenged to modify the configuration of the smile by applying a restorative material to rearrange the disposition of the teeth. A good treatment should respect and simulate the spatial arrangement, relation, and appearance of the natu-

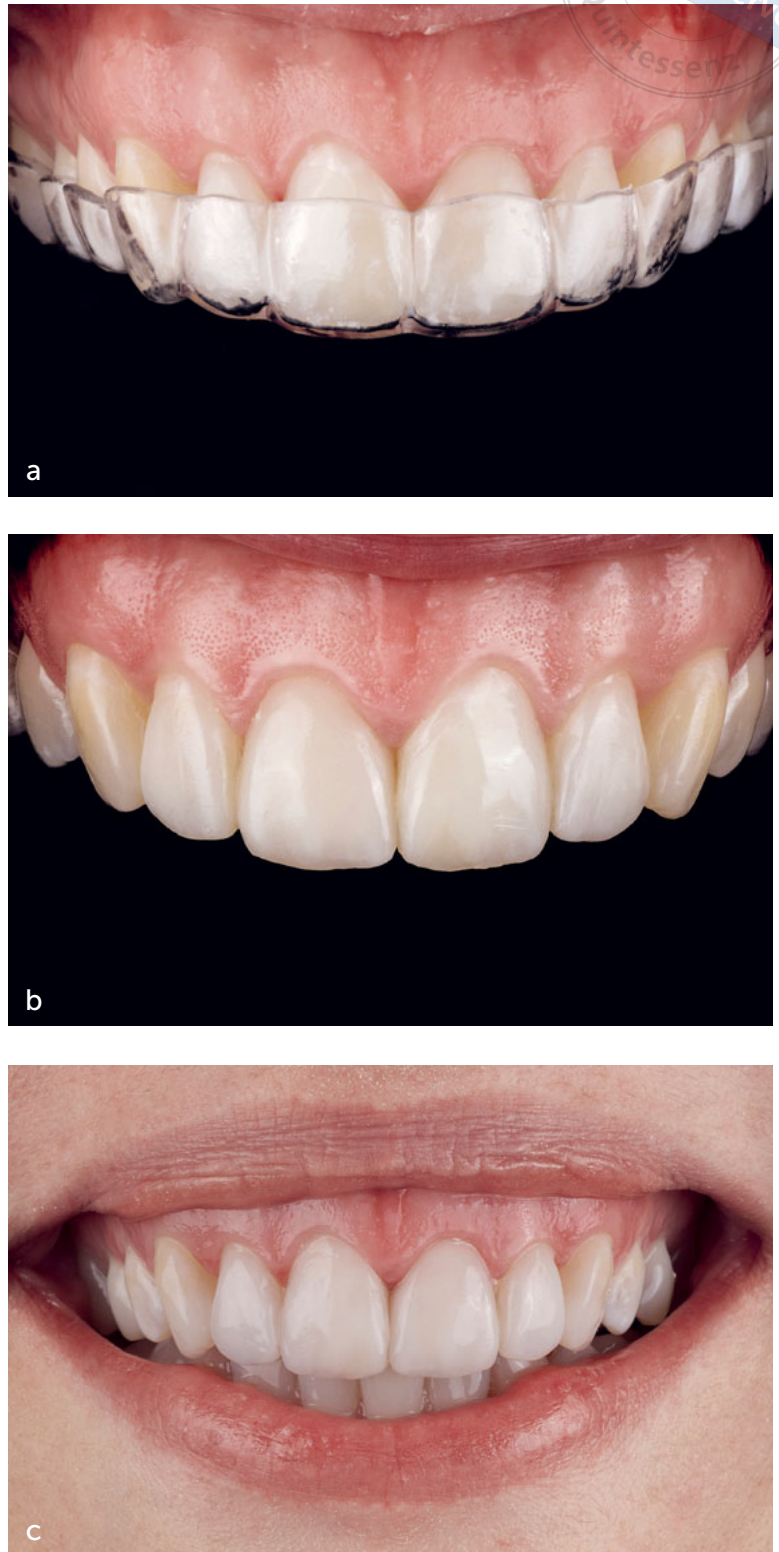
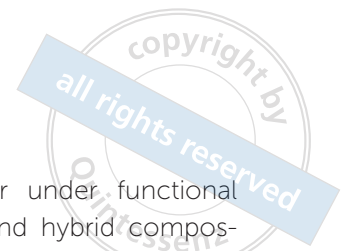


Fig 11 (a) Maxillary bite splint in position. (b) Final outcome after recontouring and restoring the anterior teeth. (c) Postoperative view showing a new arrangement of the teeth and the harmony of the smile. This case illustrates the potential of conservative dentistry.



ral tissue.^{24,25} The success of these procedures, however, depends on an understanding of the intimate structure of the natural teeth.

The evolution of adhesive dentistry has increased the indication of esthetic restorative procedures, especially those using composite resins^{5,26} and improved reinforcing fillers that have greater wear resistance and are more easily and effectively polished.²⁴ Compared with indirect restorations, these new technologies offer good predictability and load resistance, acceptable longevity, and the preservation of healthy dental tissue at a lower financial cost.^{9,12,21,26,27} Also, reintervention is relatively easy and inexpensive, and fractures or defects that may appear over time are repairable without the need to remake the whole restoration, which is an advantage to patients both in terms of conservative dentistry and financial cost.^{12,28}

As this case report shows, several conditions are potential indications for conservative additive treatment through a simplified approach that can extend the benefits of composite resin to a larger number of patients and clinicians.

Composites as anterior restoratives are the material of choice for most restorations. Several studies such as those by van Dijken and Pallesen²⁹ and Wolff et al³⁰ found that the most frequent threat to direct composite buildups is the fracture of composite resin restorations. Fracture toughness is therefore an important property, which correlates with intraoral chipping of surfaces and margins.³¹ The best current composites have a fracture toughness $< 2.0 \text{ MPa}^{1/2}$, which is similar to amalgam and better than porcelain. As there are differences in the fracture toughness values of various composites recommended for anterior restorations, a more detailed classification of materials used for anterior restorations would be beneficial in order to select the appropriate materials for a specific restoration in terms of

esthetics and behavior under functional loads.³² Nanoparticle and hybrid composites have sufficient fracture toughness for Classes I, II, III, IV, and V, and even for veneers and large buildup restorations, compared with microfilled composites that exhibit low fracture toughness and should only be considered for nonstress-bearing areas.³² A retrospective evaluation yielded an estimated 5-year survival rate of almost 80% for direct composite resin buildups.¹² This outcome supports the results of a prospective clinical evaluation of 87 direct composite buildups over 5 years with a survival rate of 89%,⁸ compared with survival data on Class III, IV, and V composites that were similar in location, dimension, and method of placement (8-year survival rate: 73%).³³ Also, for building up worn anterior mandibular dentitions, direct composite restorations have shown a good survival rate (94% restorations in 18 patients).³⁴ In this respect, clinical studies have shown positive outcomes, with few limitations or problems.^{26,29,30}

Patients should be made aware that the shade and texture of the material changes over time. Restorations also require periodic maintenance.²¹ In addition, patients should be advised about diet and environmental factors. One important factor is superficial staining, which increases when surface texture is created during the polishing procedure.³⁵ Clinicians should be aware that repolishing a stained surface could reduce it without returning the restoration to its original color.³⁵

Occlusal appliances such as hard occlusal stabilization splints are reversible interventions.²¹ The use of occlusal splints should not be considered a lifetime treatment, although they may reduce teeth grinding, muscular activity, and myofascial pain.^{36,37} Holmgren et al³⁸ surmised that the therapeutic mechanism of a splint must at least have a relationship to factor that modifies



and reduces parafunctional activity and/or redistributes the overload in the masticatory system. In this case, an occlusal appliance was made for the purpose of preventing restorative treatment failure.

Conclusion

In dentistry, achievement should not be measured solely by immediate results or esthetic appearance but also by good stability and harmony of the stomatognathic system and the long-term results of the treatment. These factors depend directly on a number of variables, including proper maintenance of restorations (eg, periodic controls, the use of an occlusal bite splint), the increase or decrease of etiologic temporomandibu-

lar joint disorder factors as well as the use of other types of treatment that help improve the patient's quality of life.

Clinical relevance

The cosmetic recontouring based on enameloplasty and the additive technique with composite resin allowed a conservative treatment with a low biological and financial cost. This simple approach was viable and obtained reliable functional and esthetic results.

Disclaimer

The authors declare that there are no conflicts of interest.

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