

## Conservative Esthetic Approach of Anterior Teeth Using Minimal Intervention and Preservation of all Sound Tooth Tissue: a Case Report

### Abordagem Estética Conservadora dos Dentes Anteriores Utilizando Intervenção Mínima e Preservação de Todo o Tecido Dentário Sadio: Relato de Caso

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#### Resumo

Este relato de caso clínico descreve uma abordagem conservadora de uma reabilitação para harmonia do sorriso que foi realizado com gengivoplastia, clareamento dentário e resinas compostas para finalizar o caso. Este artigo clínico descreve o relato de caso de uma paciente com necessidade de solução estética e corretiva para os dentes anteriores, que apresentava um sorriso desarmonioso, em sua forma e cor além do sorriso gengival. Como resultado, gengivoplastia, clareamento dental e restauração com resina composta foram realizados. A gengivoplastia com preservação óssea foi possível por apresentar grande volume de tecidos moles e uma distância  $\geq 2$  mm, desde a crista óssea até a junção do cimento esmalte. Clareamento com o uso de técnicas associadas: Clareamento de consultório (Whiteness HP 35%) e caseiro supervisionado (Whiteness Perfect 10%) foram realizados, e depois, a “técnica da barreira palatina” utilizando a resina IPS Empress direta foi realizada a partir de um enceramento diagnóstico para iniciar o procedimento restaurador dos dentes anteriores.

O uso de técnicas minimamente invasivas é uma alternativa eficaz para reabilitação de dentes anteriores. Como no caso, a gengivoplastia, o clareamento dental com técnicas associadas e restaurações com nanocompósitos têm permitido resultados estéticos satisfatórios, ainda mais em relação à preservação dentária, principalmente em pacientes jovens.

**Palavras-chave:** Clareamento Dentário. Gengivoplastia. Estética. Restauração Dentária.

#### Abstract

*This clinical case report describes a conservative approach to a smile harmony rehabilitation performing a gingivoplasty, dental bleaching and resin-based composites to finalize the case. This clinical article describes the case report of a patient in need of an esthetic and corrective solution for the anterior teeth, which presented a disharmonic smile, in its shape and color, besides the gingival smile. As a result, gingivoplasty, dental bleaching and restoration with composite resin were done. Gingivoplasty with bone preservation was possible because there was a large volume of soft tissue, and a distance  $\geq 2$  mm from the bone crest to the junction cementum enamel was confirmed. Bleaching was performed with the use of associated techniques: office (Whiteness HP 35%) and supervised at-home (Whiteness Perfect 10%) bleaching were performed, and then the “buccolingual technique” using a nanocomposite resin IPS was used from a diagnostic wax-up to perform the restorative procedure for the anterior teeth. The use of minimally invasive techniques is an effective alternative for the anterior teeth rehabilitation. As in this case, the gingivoplasty, dental bleaching with associated techniques, and restorations with nanocomposites allowed satisfactory esthetic results, even more so in relation to dental preservation, mainly in young patients.*

**Keywords:** Tooth Bleaching. Gingivoplasty. Esthetic. Dental Restoration

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#### 1 Introduction

The smile of a person is what draws most attention, especially when it comes to young patients. As a result, many people look forward to having whiter teeth and a harmonious smile, which creates a high demand for esthetic solutions.<sup>1,2</sup> Among the interdisciplinary methods used to ensure smile harmony, dental bleaching can be used for those who exhibit color change, through office and/or home-office bleaching gels to ensure dental bleaching; gingivoplasty in cases where the gingival smile is present, and restorative techniques for changing the teeth shape through direct and/or indirect restorative techniques.<sup>1-3</sup>

However, it is well known that when there is a choice

of conservative/ minimally invasive techniques, direct techniques with the use of composite resins are the first option.<sup>(2,4,5)</sup> These are excellent for maintaining dental integrity, and have low cost; besides, in the last few decades, composites have improved their optical properties, allowing a precise color replication color and the tooth translucency.<sup>4,5</sup> Resin has satisfactory esthetic results, but periodic follow-ups must be performed since it tends to pigment over time.<sup>4,5</sup>

The present case report discusses the smile harmonization associated with gingivoplasty, dental bleaching and adhesive restorations, and describes a clinical protocol using gingivoplasty, in combination with a dental bleaching technique for the establishment of the desired color, and a

direct composite resin for the smile anatomical regularization to restore the dental harmony of the anterior teeth.

## 2 Case Report

A caries-free, 20-year-old female patient attended the Piracicaba Dental School (University of Campinas, Piracicaba, São Paulo, Brazil) with esthetic complaints about her smile and the shape and color of her anterior teeth (Figure 1). The patient's history showed previous orthodontic treatment and no extractions. The clinical examination revealed a gingival smile, fluorosis, short teeth, the unit 11 not aligned with the dental arch, different coloration of the canines in comparison with the others and residual orthodontic luting agents. As part of the examination, an impression was made using an alginate material (Hydrogum 5; Zhermack, Badia Polesine, RO, ITALY) for the reproduction of plaster models. Additionally, a diagnostic wax-up was done on the maxillary arch model (Figure 2).

**Figure 1 - Initial clinical appearance**



Source: Authors.

**Figure 2 - Diagnostic wax-up**



Source: Authors.

Firstly, gingivoplasty was performed by the internal bevel technique to achieve the desired gingival margin position, thus improving the width-to-height ratio of the dental crowns. There was no need for a full flap procedure incorporating osseous removal for crown lengthening in any teeth, since bone probing and a computed tomography (CT) scan confirmed the  $\geq 2$  mm distance from the bone crest to the junction cementum enamel. No suture was needed either, since the papilla integrity was preserved. Postoperative follow-ups were carried out after 7, 15 and 30 days, observing excellent healing of the gingival tissue (Figure 3).

**Figure 3 - Result in 30 days after gingivoplasty**



Source: Authors.

Adequacy of oral hygiene was performed, including the removal of orthodontic cement residue. Then, a combination of in-office and at-home bleaching was done. Firstly, three 15-minute sessions of in-office bleaching were performed at 7-day intervals (Whiteness HP 35%, FGM, Brazil). During in-office bleaching intervals the day before and the day after these procedures at-home bleaching was not performed, only on the other days during 15 days for 4 hours/day (Whiteness Perfect 10%, FGM, Brazil). The initial shade was A3.5 (13), A3 (23,33,43), A2 (12-22, 32-42) and the after-bleaching shade was B1 (12-22, 32-42), A1 (13,23,33,43) according to the VITA classical shade guide.

A silicone guide was obtained from the wax model of the new dental anatomy to provide a mock-up using a bis-acrylic resin (Yprov Bisacryl A2, Ylller) (Figure 4). Afterwards, some adjustments and tests were performed and the patient was informed about the direct and indirect restorative options. The decision was to apply direct composite resin restorations (units: 13, 12, 11, 21, and 22, 23). An impression of the mock-up was made using a polyvinyl siloxane material (Scan Putty, Ylller) for obtaining the silicone barrier to help in the resin restorations.

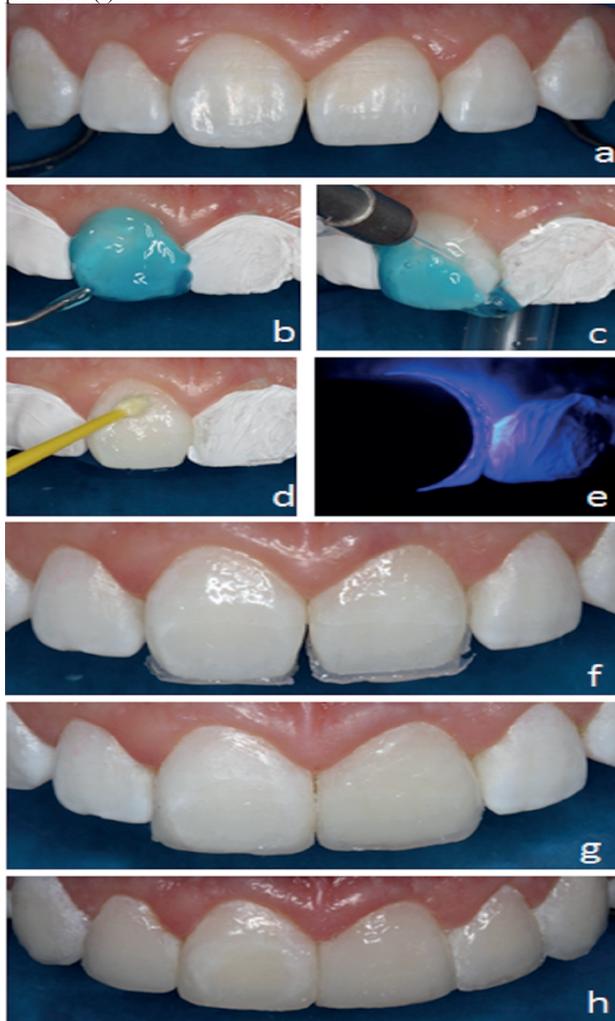
**Figure 4 - Diagnostic Mock-up**



Source: Authors.

Two weeks later, when the color was already stabilized, the final color was selected. After rubber dam isolation (15–25) (Figure 5), a Polytetrafluoroethylene (Teflon) tape was used to isolate the adjacent teeth (Figure 5). Afterwards, the enamel was etched with 37% phosphoric acid gel (Condac 37%, FGM, Brazil) for 30 seconds (Figure 5). The phosphoric acid was rinsed for 30 seconds and the excess water was removed with an air jet.

**Figure 5** – Modified rubber dam isolation (a); etched with 37% phosphoric acid gel (b); phosphoric acid was rinsed (c); application of the universal adhesive (d); adhesive photopolymerized (e); first layer of translucent resin (f); proximal layer of translucent resin (g); layer of dentin resin (h); final aspect of the resin before polished (i)



source: Authors.

Two layers of the universal adhesive (3M ESPE, SP, Brazil) were actively applied for 20 seconds each, and a distant and gentle air jet was performed for solvent evaporation. Then, light activation for 20 seconds was done (Radii Cal 1200mW/cm<sup>2</sup>, SDI). The silicone barrier was positioned to reproduce the palatal portion of the teeth with a thin layer of a nanocomposite (IPS Empress Direct – Trans 30, Ivoclar Vivadent) (Figure 5). Every resin increment was light-cured for 10 seconds. A second increment of the same resin was applied with the help of a polyester strip to reproduce the mesial and distal. Moreover, an intermediate layer of dentin resin (IPS Empress Direct – DB1, Ivoclar Vivadent) was applied, followed by a final layer with an enamel resin (IPS Empress Direct – EB1, Ivoclar Vivadent) (Figure 5).

To finish up, the rubber dam was removed and the main excess of composite resin was eliminated using diamond burs (KG Sorensen Indústria e Comércio Ltda, Barueri, SP, Brazil) and a flexible abrasive disk (Sof-lex XT, 3M

ESPE, SP, Brazil), improving the macro-anatomy. Occlusal adjustment was performed, considering the laterality and protrusion movements. In a second session after 48 hours, the final polishing was carried out to give the desired texture and microanatomy, with a series of finishing burs (KG Sorensen Indústria e Comércio Ltda, Barueri, SP, Brazil) and flexible disks (Sof-Lex™ 3M ESPE, SP, Brazil) in decreasing grains, enhancing the vertical and horizontal details. Then, for the interproximal area, finishing strips (Sof-Lex™, 3M ESPE, SP, Brazil) were used to remove any irregularities. Finally, polishing with foam cups (Enhance Polishing Cups, Dentsply Caulk, Milford, DE, USA) and a diamond polishing paste (Prisma Gloss, Dentsply Caulk) in association with felt disks (Diamond Flex, FGM, SP, Brazil) was performed.

The final esthetic quality of the shade and texture of the restoration was evaluated 7 days postoperatively. Moreover, the success of the treatment was confirmed (Figure 6) in a further section, immediately meeting the patient's and professional's expectations. However, follow-up is essential to conserve the good results over time.

The research protocol was subjected to the Ethics Committee of Piracicaba Dentistry College approved under CAAE No. 12525019.4.0000.5418.

**Figure 6** - Final aspect of the clinical follow up after 7 days



Source: Authors.

## 2.1 Discussion

Esthetics has become an important issue in modern society. With the decrease in the prevalence of caries, the focus has gradually shifted from functional dentistry to dental esthetics.<sup>1</sup>

The present case report assessed a conservative peri-esthetic-restorative approach to the management of unesthetic anterior teeth. The proposed treatment, a combination of gingivoplasty, dental bleaching and direct composite resin restoration, follows the contemporary dentistry context: “minimal intervention and maximum preservation of sound tooth tissue”. In addition, this approach allows a satisfactory, predictable, and non-time-consuming clinical procedure.<sup>6</sup>

The harmony between the gingival contours mainly of the upper anterior teeth is fundamental for the smile esthetics. There are a number of periodontal plastic surgery techniques for the proper management of periodontal soft tissues in order to provide esthetic standards. Nowadays the focus has been on the increase of the clinical crown of the anterior-superior teeth, at the expense of the gingival tissue only, without involvement of the bone tissue, since that minimally invasive techniques are highly requested by the patients.<sup>3,7</sup>

After 30 days, the necessary period for healing of the gingivoplasty and to establish harmony among the colors of

the teeth, it was proposed to carry out the combined bleaching technique (CBT), which is a combination of in-office and home-bleaching techniques. The advantages of the two bleaching methods are that they shorten the whole bleaching time and enhance the whitening effect.<sup>8,9</sup> The initial option for home bleaching is linked to a technique that is increasingly common, since its success is linked to being an easy-to-use, safe, conservative, economical and effective alternative.<sup>9</sup> Despite the disadvantages of the at-home approach, which are the use of the tray, the commitment of the patient to the evolution of the treatment and the longer application time, adding this method reduces color relapse in the short term, as well as sensitivity.<sup>8,9</sup> The office bleaching, due to its higher rate of short-term relapse and sensitivity,<sup>8,9</sup> was performed in only one session to maintain color until the restoration preparatory period.

In order to obtain a better evaluation of the restorative need in each case, diagnostic wax-up is the best choice to highlight the filling areas. Thus, with a conservative approach, a direct nanocomposite technique was used to preserve the tooth structure. These materials consist of an organic matrix of polymerizable resin and filler particles that are bonded chemically using the silane coupling agent. Among the advantages of choosing the composite resin is the esthetic characteristics of matching the natural tooth color, the low cost compared to indirect materials, easy handling, and good clinical durability, even if the procedure requires a long time of execution.<sup>7,10</sup>

In a study by Frese et al.<sup>11</sup> 176 direct composite restorations with non- or minimally invasive treatment were evaluated. The follow-up of the restorations showed a functional survival rate of 100%, with an overall survival rate of 84.6% after 5 years, which proves that direct composite buildups provide an excellent treatment alternative for the esthetic correction and reshaping of anterior teeth, with a good long-term prognosis.

Composite resin materials that are used to build up incisal edges must be very fracture-resistant as high shear forces may jeopardize the restoration during chewing stress.<sup>12</sup> The nanocomposites have a high mechanical strength, fracture, and wear resistance, lower shrinkage of polymerization, excellent polishing, color stability and good optical properties such as fluorescence and translucency, and are safely indicated for previous restorations.<sup>2,4,5</sup> IPS Empress Direct resins have a uniform distribution of the charge particles, which allows the material to exhibit high gloss after a simple and fast polishing (according to the manufacturer). The same color as natural dentin, dentin B1 presents higher opacity compared to the enamel. In addition, the translucency of the enamel B1 layers was adjusted to diffuse the dental substrate, and other translucency levels can be obtained through the layers, such as Trans 30 (according to the manufacturer).

The layering technique using composite resin is the most recommended for anterior teeth. This technique aims to enable complete light curing of resin increment, and reduction of the

polymerization contraction, which decreases the tensions on the surface.<sup>2,13</sup> In addition, the buccolingual layering technique allows an accurate transfer of the anatomic shapes of the diagnostic wax-up, preserves healthy dental structure, gives a very satisfactory esthetic final result, and has good esthetics predictability.<sup>14</sup>

No preparation or bevel was done in this case, since no systematic clinical trials have addressed these topics so far. Yet, the advantages of a bevel in anterior restorations with all sound teeth have been questioned recently.<sup>12</sup>

The selection of the adhesive system with prior acid conditioning in enamel is related to the micromechanical interaction potential under the surface of the dental substrate. The previous conditioning facilitates the adhesive penetration into the enamel microporosities, thus allowing satisfactory retention at the tooth-restoration interface, since the bonding to enamel is crucial for the prevention of marginal discoloration and for a good seal.<sup>13,15,16</sup> However, the adhesive system and the restorative material must be applied correctly to ensure the restoration longevity, especially in anterior teeth.<sup>15,16</sup> Therefore, a dry working field is essential for direct adhesive restoration, so the placement of a rubber dam to avoid contamination with saliva, blood or water bonding to interfaces is necessary.<sup>12,17</sup>

Polishing is a very important step, since a well-polished restoration prevents bacterial adhesion and plaque buildup, which consequently reduces the risk of caries lesion. As a result, polishing techniques with the aid of discs, pastes, or strips of sandpaper are used to remove excess material mainly in areas that facilitate the accumulation, such as interproximal regions. This is related to the longevity and maintenance of restorative treatments.<sup>(2,4,5)</sup>

Failure behavior in anterior restorations is different from posterior teeth, with less secondary caries present and more restorations being replaced for esthetic appearance and fracture.<sup>10</sup> As reported by Alonso and Caserio, the most common failure of esthetics demands are color alterations, surface staining, and marginal mismatch, which can negatively influence the patient's perception of the restoration.<sup>18</sup>

The findings of the present review generally indicate a good clinical performance in the long-term (follow-up 3+ years) for anterior composite resin restorations, with annual failure rates varying from 0 to 4.1%.<sup>19</sup>

The development of materials and techniques that allow minimally invasive procedures that preserve dental tissue is highly advantageous. Dental bleaching techniques represent a satisfactory esthetic result and, for the desired color stabilization as well as nanocomposite resins, can be indicated for anterior teeth restoration, as they demonstrate good optical characteristics, mechanical properties, high gloss and easy polishing. In addition, these procedures promote effective long-term performance and good results.

### 3 Conclusion

The use of minimally invasive techniques is an effective alternative for the anterior teeth rehabilitation. As stated in this case, the gingivoplasty, dental bleaching and restorations with nanocomposites have allowed satisfactory esthetic results, even more in relation to dental preservation mainly in young patients. In addition, the proper treatment plan should be established before any clinical procedures in each case in order to obtain good results; like most dental treatments, this requires periodic checks.

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