



## Bioactivity in compound resin resistance and polibility: a clinical case report

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### Abstract

Concern about appearance and the importance of an attractive smile is well established in modern society. A healthy aesthetic standard satisfies anyone regardless of sex, age, or social class. The growing interest of patients for a better aesthetic appearance, associated with the significant development of new restorative materials and wide dissemination in the media of this concept of beauty, led to changes in the concepts of dental treatment. This work aimed to demonstrate through a clinical case how biotechnology can help in treatments in a minimally invasive way. For this, a total of 34 articles were analyzed in full, however, 17 were included and discussed in this study. The literature reviews used and the observation of random studies was from the Bireme, PubMed, SciELO, and LILACS databases. It can be concluded in this clinical case that the success of aesthetic treatment is closely linked to the correct indication and knowledge of the dental surgeon in different products on the market, in addition to using it correctly, taking into account the patient's desire.

**Keywords:** Composite Resin. S-PRG. Direct Facet.

### Introduction

The aesthetics of a person's smile is largely influenced by color, shape, position, and dental malformation, often impairing their social relationships [1,2]. Henrique et al. [3] explain that the smile is considered an essential part of communication between people, in recent decades there has been a great appreciation of aesthetics in dentistry and the dentist

has been increasingly sought after by patients seeking harmonic smiles in terms of shape, size, positioning, and color, aiming for whiter and more perfect teeth.

In general, people desire pearly white teeth, tooth color is one of the most important factors in determining satisfaction with tooth appearance, and self-satisfaction with tooth color decreases with increasing severity of discoloration [4]. Aesthetic rehabilitation to restore the harmony of the upper anterior teeth promote satisfactory results in the aesthetics of the smile, thus the rehabilitation technique using composite resin stands out for its speed, safety, and effectiveness [5].

Kitagawa et al. [6] say that currently a revolutionary pre-reacted glass ionomer (S-PRG) filling technology where fillers were prepared by the acid-base reaction of a fluorine-aluminum-silicate glass with polyalkenes acid in water was recently developed and a new category such as "Giomer" was introduced to the market. Therefore, S-PRG is designed with the ability to release and recharge fluoride, in addition to releasing several other ions such as strontium, boron, sodium, aluminum, and silicon dioxide in high concentrations [7].

In this way, to guarantee this harmony, a treatment plan that will be performed is necessary. restorative techniques and materials are used to change the shape of teeth through direct procedures [8].

### Clinical case report

#### Study Design

The present study was elaborated according to the rules of the **CARE case report** (<https://www.care-statement.org/>).

### Ethical Aspects

The present study preserved the patient's anonymity, as well as preserving the rights and care of the patient and her information as recommended by the Declaration of Helsinki of 1964.

### Patient Information and Clinical Findings, Timeline, Diagnostic Assessment, Therapeutic Intervention, and Follow-up

A 43-year-old female patient arrived at the office of Dr. Taylane referred by the periodontics team at Unorte / Unipós complaining about the aesthetics of her smile. During anamnesis, clinical and radiographic examination to verify periodontal health, physiological tooth darkening, and absence of carious lesions or areas of exposed dentin are noted (**Figure 1**). Thus, no extrinsic or intrinsic factor was identified for tooth staining, which is physiological. The treatment plan consisted of the aesthetic anatomization technique and color stratification with composite resin with an increase in the incisal guide in the direct technique on elements 11 and 21. The patient was then informed about the treatment protocol, as well as her care during and after the sessions.

**Figure 1.** Initial appearance of the smile.



Source: Own clinical case.

With evaluation and release of the patient who requested to maintain the format, with an increase in size but with real anatomy of the dental elements, she chose not to undergo bleaching treatment. After approval by the patient, conditioning was performed with 37% phosphoric acid for 30 seconds on enamel, followed by drying and subsequent application of the adhesive system and photoactivation for 20 seconds, following the manufacturer's instructions. Beautifil II LS composite resin in color A2 was used for the layer referring to the palatal enamel, the opaque incisal halo was made with the resin in color A2 and the layer referring to dentin was made with the resin in color A2 and the last layer referring to the enamel with resin in A3 color (**Figure 2**).

**Figure 2.** Augmentation of the incisal guide with composite resin.



Source: Own clinical case.

After the restorative process was completed, the retractor wire was removed and immediate occlusal adjustment was carried out, finishing with diamond tips only for adjustment, which in this case was disocclusion. Polishing is very effective and fast with this technique, with this material, and with the Super Snap – Shofu discs (**Figure 3**), achieving a high shine.

**Figure 3.** Super Snap Disks – Shofu.



Source: Own clinical case.

In a session for evaluation after 3 months of making the incisal guide augmentation (**Figure 4**), exactly what the research proves is noted, it can be seen the result after 7 and 3 months of polishing, it was not necessary to repolish and with total patient satisfaction.

### Discussion

Portilla et al. [9] explain that to measure the change in the color of a tooth, there are two types of methods: subjective and objective, and that the changes in the color of the teeth can arise from several factors, among them extrinsic or intrinsic. Extrinsic stains are usually acquired from the environment and are associated with coloring substances that adhere to

**Figure 4.** Final appearance of the smile after 3 months of polishing.



Source: Own clinical case.

the tooth surface, such as coffee and tobacco, plaque accumulation, and the use of some types of medication, being considered superficial stains and easy to remove. On the other hand, intrinsic alterations can be congenital, related to the formation of teeth, or acquired through dental trauma, pulp necrosis, or fluorosis, in which case the pigments are incorporated into the dental structure and are removed with bleaching or more invasive procedures such as wear and/or restoration of teeth [10,11].

The authors Gouveia et al. [5] explained that the light transmission capacity of enamel and dentin is approximately 70.1% and 52.6% respectively so more translucent resins are used to replace the enamel portion and more opaque resins for the reconstruction of artificial dentin seeking to obtain more natural characteristics to the restored dental elements, therefore, for the execution of the mimicry technique, there are specific resins for enamel (E-enamel, T-translucent) and dentin (D-dentin, B-body, Opaque), allowing procedures rehabilitators with excellent aesthetic results. Composite resins have good performance in the aesthetic contour of incisal edges, as they have resistance to fracture and wear, excellent polishing, color stability, and good optical properties such as fluorescence and translucency, being indicated for anterior restorations in minimally invasive procedures or without any wear. tooth through an additive technique [8]. Gouveia et al. [5] reported that composite resin is a restorative material with physical and mechanical properties similar to the dental structure and that nanoparticulate composites such as the one used in this clinical case have high mechanical resistance to fracture and wear, less polymerization shrinkage, excellent surface polishing, good color stability and optical properties such as fluorescence and translucency, being indicated for anterior and posterior restorations.

When compared to ceramics, composite resin has advantages such as excellent aesthetics; acceptable

longevity; lower cost; does not require laboratory steps; fast, safe and effective technique; and even reversible, if the desired aesthetic result has not been achieved [8]. This incessant search has resulted in advances in the physical and optical properties of dental materials, in the development of more conservative techniques, and, consequently, in obtaining excellent results [8]. Aranha et al. [12] agree that the evolution of adhesive systems and light-curing composite resins has enabled the performance of less invasive adhesive restorative procedures with excellent aesthetic results.

Thus, Tamura et al. [13], say that the S-PRG technology is a functional bioactive glass with ion release, releasing six types of ions, namely: fluoride, strontium, sodium, aluminum, boric acid, and silicic acid, which aims to strengthen the tooth structure, inhibition of tooth demineralization, buffering ability against intraoral acids and inhibition of dental plaque adhesion to the resin surface.

Furthermore, the S-PRG filling has already been used clinically by being incorporated into filling materials, bonding systems, temporary types of cement, and orthodontic resins [13]. Rossoni et al. [14] also agree that S-PRG technology is a bioactive filler produced by PRG technology, which is applied to various dental materials. The authors Miki et al. [15] stated that such a technology was developed to cause less plaque accumulation and reduced bacterial attachment, as well as a composite resin component capable of releasing metal ions that have antibacterial activity against caries and periodontal pathogens [16]. And yet on the durability of the connection Kitagawa et al. [6] found that improved durability of resin-dentin bonds can be achieved not only through strengthened dentin due to the absorption of fluorine ions from PRG-Ca fillers, but also due to retention of the relatively insoluble 4-AETCa formed around the remaining apatite crystals within the hybrid layer in self-etching adhesives containing 4-AET.

Dias et al. [8] explained that the aesthetic contouring of natural teeth is a conservative, economical and safe procedure, this treatment can be performed through the additive technique with a direct composite resin that offers a good aesthetic appearance for the anterior teeth and the smile and contour. can allow efficient and rapid treatment when properly planned and indicated. Among these adhesive procedures, there is the making of direct veneers in composite resin, which consists of applying and sculpting one or more layers of this material on the dental surface. The execution of these restorations has become popular in recent years thanks, in particular, to two factors: the possibility of conserving healthy tooth structure and the excellent aesthetic results that they

can enable [13]. Thus, the direct technique requires the professional's skill and knowledge of restorative materials, which combined with a good diagnosis and elaborate planning, will result in the correct indication of the treatment and a satisfactory result [8,17].

Thus, finishing and polishing are steps of fundamental importance for the success of composite resin restorations. It is defined as the process of removing irregularities or excesses to improve the anatomical contours, promoting regularity to the surface of the restoration. Polishing, in turn, consists of obtaining shine and light reflection, making the surface homogeneous, removing the grooves generated by the finishing tips, and making the procedure performed more durable [8].

## Conclusion

It is concluded that the treatment performed reached the expectations requested by the patient, returning the anatomy of the tooth, and still, based on this research, Shofu was concerned with making a biomimetic resin comparable to the cutting-edge materials on the market. In this way, through biocompatibility, but especially with bioactivity, it has become a great differentiator in the market, providing patient satisfaction with a more conservative, lasting, and minimally invasive approach.

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## Ethics aspects

The present study preserved the patient's anonymity, as well as preserving the rights and care of the patient and her information as recommended by the Declaration of Helsinki of 1964.

## Informed consent

The patient signed the consent form.

## Data sharing statement

No additional data are available.

## Conflict of interest

The authors declare no conflict of interest.

## Similarity check

It was applied by Ithenticate@.

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