



Bio-aesthetics: giving a new face to smile enhancements

Author_ Dr Didier Dietschi, Switzerland

Bio-aesthetics is the quintessence of biology, biomechanics and aesthetics and aims to more conservative, ethical solutions to a myriad of aesthetic deficiencies.

_Introduction

A more attractive smile, improved dental aesthetics and durable results have been for long intimately linked to ceramic restorations such as veneers and crowns and remain strongly anchored in patients and dental professional minds. Modern composite resin technology has however challenged this assumption because they offer excellent aesthetic potential and acceptable longevity, with a much lower cost than equivalent ceramic restorations for the treatment of both anterior and posterior teeth.¹⁻³ Moreover, composite restorations allow for minimally invasive preparations or no preparation at all when mo-

difying existing tooth anatomy or assuming the replacement of decayed tissues; this constitutes an unparalleled advantage of "free-hand bonding" also due to its relative simplicity. This rationale has been the foundation of a new concept named "bio-aesthetics", giving priority to additive, minimally or microinvasive procedures to preserve tooth biology and biomechanics.

While resin composites are universally considered the "standard of care" material for the filling of small to medium class III, IV and V cavities, they can be used today in many more indications such as the correction of small to moderate aesthetic and functional deficiencies.^{2,3...+} Recent developments in composite optical properties and physical properties have also significantly contributed to simplifying their application and improving treatment outcome and predictability.⁴⁻⁶ The aim of this short article is then to demonstrate the potential and multiple applications of composite as a modern aesthetic restorative material in the context of bio-aesthetic treatment approach.



Fig. 1a



Fig. 1b



Fig. 1c



Fig. 1d

Revisiting smile rehabilitation concepts: Bio-aesthetics

Choosing the right restorative approach (direct or indirect, composite or ceramics) has been debated over decades and finally, the decision largely depends on the practitioner's own education background and experience with each of the aforementioned options. Only "extreme"

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Fig. 1e

Figs. 1a & b Pre-operative views of a young patient presenting relatively large diastemas distally to lateral incisors. The case is complicated by improper occlusal relationship with lower canines which reduce the space available for restorations. **Figs. 1c–e** Post-operative views showing an improved smile configuration using "no-prep" direct composite restoration (inspiro, Edelweiss DR). This treatment illustrates the "bio-aesthetic" philosophy which truly represents a breakthrough in modern restorative dentistry.



Fig. 2a



Fig. 2b



Fig. 2c



Fig. 2d

Figs. 2a & b Pre-operative smile of a young patient presenting post-orthodontic enamel hypocalcifications and asymmetrical shorter incisors.

Fig. 2c A free-hand mock-up was made to assess the ideal length for an optimal smile configuration.

Fig. 2d Post-treatment view showing better smile balance and harmony, following micro-abrasion (to remove white spots) and direct bonding (inspire).

Parameters	Direct option	Indirect option veneer to crown
age of the patient	younger	older
size of the decay	smaller	larger
tooth vitality	vital	non-vital
tooth colour	normal	non-treatable discolouration*
facial anatomy	normal	altered
number of restoration	unrelated	unrelated

*using chemical treatments (vital & non-vital bleaching or microabrasion)

Tab. I

Types of procedures	Typical procedures
Non restorative	_ Aesthetic chemical treatments (bleaching, micro-abrasion) _ Direct bonding
Minimally invasive	_ Direct bonding _ Ultra-thin Veneers _ Modern inlay and onlay techniques
Micro-invasive	_ Classical veneers, inlay and onlay
Macro-invasive	_ Crowns and bridges

Tab. II

Table I Treatment decision process.

Table II Modern progressive treatment concept and various types of procedures.

conditions such as minor aesthetic form and colour corrections or extensive decays in non-vital teeth, lead to evident solutions (direct and respectively indirect restorations), while the majority of other cases lie in a "gray zone" which actually makes a pertinent choice more intricate. A simple yet effective approach to this dilemma relies on a sound bio-mechanical analysis of the teeth potentially involved in the treatment status, combined to the usual functional and aesthetic analysis. Then, having as a prime objective the respect of tooth biology and conservation guides clinician to a logical decisional tree, such as presented in table I.

The "Bio-aesthetic" philosophy actually give priority to chemical color improvements (vital bleaching, non-vital bleaching, micro-abrasion), associated to direct composite restorations and bonded ceramic restorations for more extensive decays, limiting the use of traditional full crowns to existing restoration

replacement and a few conditions of extreme tooth "fragilization" (weakening). The progressive treatment concept presented in table II then summarizes the modern vision of aesthetic restorative dentistry.



Fig. 3a

Fig. 3a_Pre-operative views of a young patient showing enamel hypocalcifications and asymmetrical tooth forms.



Fig. 3b



Fig. 3c

Figs. 3b & c_Shade selection is performed using a special dual-laminate shade guide which grants colour predictability (inspiro).
Figs. 3d & e_A partial mock-up (teeth #11 and #12) is made to assess the impact of planned restorations on the smile configuration.



Fig. 3d



Fig. 3e



Figs. 3f & g_Rubber dam is placed to provide an optimal working environment. The full smile (premolar to premolar) is visible to facilitate procedures and especially to keep control of the smile line configuration.

Fig. 3h_A conservative preparation of the white spots is made to provide a minimum space for color correction (1–1.5 mm).

Fig. 3i_A first layer of dentin shade is placed to cover residual discoloured area and provide a correct chroma (body i2, inspiro).

Fig. 3j_The second layer is placed with an achromatic enamel providing proper translucency and opalescence (skin white, inspiro).

Fig. 3k_Further form correction are made with the same enamel shade (no dentin is needed as layers are not thicker than 1–1.25 mm).



Fig. 3l_Detailed view of the corrected central and lateral incisors, using minimally invasive approach with direct composite.

Fig. 3m_Post-operative view showing a more harmonious smile configuration and uniform tooth colour.

Fig. 3n_Two years view showing no alteration of these partial composite restorations.

Figs. 3o & p_Anatomical details of the restoration micro-morphology and surface smoothness which proved stable over 2 years of clinical function (inspiro, Edelweiss DR).

Fig. 3l



Fig. 3m



Fig. 3n



Fig. 3o



Fig. 3p

So far, the over-simplification (mono-incremental) as well as over-complexity (multi-incremental) of shading systems has tremendously limited the benefit of direct composite restorations.

_New shading approach: the natural layering concept

To achieve perfect direct restorations has been for long and hypothetical aim due to the imperfect optical properties of many composite resins systems. So far, the over-simplification (mono-incremental) as well as over-complexity (multi-incremental) of shading systems has tremendously limited the benefit of direct composite restorations. Even today, the complexity of some systems is often associated to shading concepts mimicking ceramic systems (which are applied in totally different layer thicknesses) or the influence of over-meticulous clinicians who compensated deficient composite optical properties with intricate layering concepts. The use of the natural tooth as a model and the identification of respective dentine and enamel optical characteristics (tristimulus $L^*a^*b^*$ colour measurements and contrast ratio) has then been a landmark in developing better direct tooth coloured materials.^{4,7-8} The 'natural layering concept' is then a simple and effective approach to creating highly aesthetic direct restorations which has become a reference in the field of composite restorations.⁹⁻¹²

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_about the author

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Didier Dietschi, DMD, PhD,
Privat-Dozent, Senior lecturer,
Department of Cariology &
Endodontics, School of
Dentistry, University of Geneva,
Switzerland. Adjunct Professor,
Department of Comprehensive
Care, Case Western University,

Cleveland, Ohio. Private practice & Education
Center – The Geneva Smile Center, Switzerland.

The Geneva Smile Center
2 Quai Gustave Ador
1207 Geneva
Switzerland