Optimizing Smile Composition and Esthetics with Resin Composites and Other Conservative Esthetic Procedures

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Abstract

Numerous esthetic deficiencies may be present in natural, restored, or orthodontically enhanced smiles. The most frequent defects are transposed anterior teeth following aplasia, existing or remaining diastemas, form abnormalities and discolorations, abrasion, erosion, and dysplasia. Conservative treatment modalities such as enamel recontouring, bleaching, microabrasion, and resin composites have the potential to correct or improve esthetic problems. These treatments deserve more attention because they have tremendously improved in practicability, efficiency, and predictability. The search for a perfect smile should not always lead to invasive solutions such as veneers and crowns, since invasive treatments may have a negative impact on the long-term tooth biomechanical behavior and global treatment cost. This article discusses the treatment rationale for the use of nonrestorative and additive procedures and their respective indications in a comprehensive approach to dental esthetics. (Eur J Esthet Dent 2008;3:14–29.)
In today's world, there is a strong focus on perfect physical appearance. Natural, restored, or orthodontically enhanced smiles may present esthetic deficiencies that require treatment. However, the search for a perfect smile should not drive clinicians to use invasive solutions such as veneers and crowns to treat all of these esthetic anomalies, since such treatments may have a negative impact on the long-term tooth biomechanical behavior and global treatment cost. Transposed anterior teeth following aplasia, existing or remaining diastemas, form abnormalities and discolorations, abrasion, erosion, and dysplasia are common clinical findings in all age groups. Conservative treatment modalities such as bleaching, microabrasion, and resin composites have the potential to correct or improve these esthetic problems and recently have shown tremendously improved practicability, efficiency, and predictability.

Bonded ceramic restorations or full crowns should be considered for more critical dental conditions.

The aim of this paper is to review the current conservative restorative modalities aimed to correct functional, anatomic, and esthetic anomalies found in patients with healthy or orthodontically corrected dentitions. The implications of this new therapeutic philosophy in a comprehensive approach to dental esthetics will also be discussed.

**Table 1** Modern treatment strategies for effective and conservative correction of different esthetic deficiencies according to the dental conditions and the patient's age

<table>
<thead>
<tr>
<th>Dental condition</th>
<th>Deficiencies</th>
<th>Typical patient age</th>
<th>Preferred treatment options</th>
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</thead>
<tbody>
<tr>
<td>Virgin teeth</td>
<td>Discoloration</td>
<td>Young/young adult</td>
<td>Bleaching and microabrasion</td>
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<td></td>
<td>Form or functional abnormality</td>
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<td></td>
<td>Diastema</td>
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<td>Slightly decayed</td>
<td>Erosion</td>
<td>Young adult/adult</td>
<td>Free-hand bonding</td>
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<td></td>
<td>Abrasion (incisal wear)</td>
<td></td>
<td>Bonded ceramic restoration</td>
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<td></td>
<td>Abfraction</td>
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<td></td>
<td>Dysplasia, hypoplasia</td>
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<td></td>
<td>Caries lesion</td>
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<td></td>
<td>Failing restoration</td>
<td></td>
<td></td>
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<tr>
<td>Largely decayed</td>
<td>Erosion</td>
<td>Adult/elderly</td>
<td>Bonded ceramic restoration</td>
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<td></td>
<td>Abrasion (incisal wear)</td>
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<td>Full crowns</td>
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<td>Failing restoration</td>
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</table>
A new approach to comprehensive esthetic dentistry

Many functional, anatomic, or esthetic deficiencies can be treated using either conservative techniques, such as free-hand bonding, or more invasive techniques, such as indirect ceramic restorations. The decision should be based not on technical or material considerations, but rather on each tooth’s biomechanical status. This means that age, severity of tissue loss, and size of the restoration should guide the clinician toward the best possible therapeutic choice (Table 1 and Fig 1). In addition to the potential supplementary tissue loss, financial considerations must also be taken into consideration when treating young patients. Maintenance and replacement of indirect ceramic restorations will tremendously increase treatment costs in the long-term. Likewise, indirect restorations do not necessarily offer superior esthetic results compared to properly selected and meticulously applied conservative techniques. The conditions suitable for conservative smile enhancement will now be discussed.

Fig 1  (a to c) Preoperative view of a young adult with worn and irregular incisal edges, diastemas, and global aging of the smile. (d and e) Smile configuration was corrected using direct bonding according to a functional and esthetic waxup. (f) Postoperative view showing the enhanced smile obtained with only additive procedures.
Missing anterior teeth and postorthodontic conditions

The early loss of permanent teeth following trauma or congenital aplasia may be corrected by orthodontic or prosthetic means, often including implants. The proper diagnosis of dental and skeletal conditions normally guides the choice between treatment options.\textsuperscript{12–14} The need for long-term maintenance of prosthetic rehabilitations and their potentially negative influence on periodontal health\textsuperscript{15,16} have always been considered the main factors favoring an orthodontic solution. However, different anatomic, functional, and esthetic anomalies may result from the orthodontic approach. Patients’ increasing concern for esthetics obliges the dental team to consider these potential deficiencies (Figs 2 and 3):
Fig 2  (a) Postorthodontic status following closure of spaces resulting from bilateral incisor aplasia. (b and c) Premolars and canines were recontoured and bonded to create more harmonious tooth forms. (d to f) Post-treatment view showing improved smile configuration. Correction of the gingival profile will be performed after completion of tooth eruption.
Fig 3  (a and b) Postorthodontic status following alignment of the anterior teeth. Significant tissue loss resulted from previous malocclusion and accidental fractures. On the left side, the lateral incisor is missing.  
(c) Direct bonding was used to reconstruct incisal edges of the maxillary incisors and restore a proper smile line. Adhesive, additive restorations are in line with the conservative approach formerly applied with the orthodontic treatment.
- Unusual crown dimensions (larger or smaller)
- Unusual root diameter (larger or smaller)
- Unusual shape of the crown
- Difference in color (mainly for canines)
- Difference in gingival contour or level

Moreover, these anomalies may prevent the displaced tooth from achieving proper position, thus leading to functional disturbances. The unfavorable outcomes of orthodontic treatments and spontaneous space closure should be anticipated by planning appropriate orthodontic and postorthodontic modalities involving a multidisciplinary approach.

Congenital esthetic deficiencies
Since patients are increasingly aware of these esthetic anomalies, conservative esthetic correction is more and more mandated (Fig 4). Related conditions in the smile frame include:

- Discolorations
- Hypoplasia
- Unusual tooth forms or dimensions
- Diastemas

Fig 4  (a) Preoperative situation showing extensive dysplasic and hypoplasic lesions. (b and c) Light home bleaching preceded the removal of existing restorative material and remaining white or brown discolorations. (d) Conservative preparations on the central incisors and the larger circumferential cavity of the right lateral incisor were filled with dentin- and enamel-like materials, imitating normal tooth anatomy. (e and f) Postoperative views showing the enhanced appearance following a highly conservative treatment approach.
Acquired and other esthetic deficiencies

Many other esthetic deficiencies in intact dentitions require the attention of the modern dental team (Fig 5). Such conditions in the smile frame include:

- Discolorations (ie, traumatized, nonvital tooth)
- Diastemas
- Abrasion, abfraction, and erosion lesions
- Tooth fractures
- Caries
- Functional deficiencies

All aforementioned conditions are potential indications for conservative additive treatments, according to preexisting tissue loss and functional status.
Fig 5  (a) Preoperative view of a 50-year-old patient with natural tooth arrangement following bilateral incisor aplasia. (b and c) Lateral views showing the numerous esthetic deficiencies, including poor space distribution, improper tooth forms, and abrasion. (d and e) Postoperative view of the reconstructed smile following bleaching and additive procedures. This case illustrates the potential of conservative adhesive dentistry in relatively complex cases.
Nonrestorative, additive, and other treatment options

Conservative, nonrestorative modalities include:

- Bleaching techniques and microabrasion for color correction
- Recontouring to achieve minor anatomic corrections
- Gingival recontouring (gingivoplasty) to retrieve normal soft tissue outline

Additive modalities include:

- Free-hand bonding to correct localized morphologic and functional deficiencies
- Bonded ceramic restorations for extended morphologic and functional corrections

Nonconservative modalities include:

- Bonded ceramic restorations to correct limited morphologic and functional problems
- Crowns for full-tooth reconstruction and extended functional corrections

Fig 6  (a) Preoperative view of a 60-year-old patient showing incisal abrasion and smile aging. (b) After lengthening the incisal edges of the central incisors, followed by recontouring of the incisal edges of the lateral incisors, a younger and more attractive smile line is established. (c and d) The rounded angles of the lateral incisors help to conservatively rejuvenate abraded smiles.
**Enamel recontouring (enameloplasty)**

After an orthodontic mesial drift of lateral segments to close spaces resulting from lateral incisor aplasia, the new position of the canines may demand minor form corrections to be performed before additive reshaping of the teeth using resin composite (Fig 2).\(^{18,19}\) Similarly, incisal edge or cusp leveling may be needed prior to, simultaneously with, or instead of other restorative procedures (Fig 6). In many situations, minor form corrections can be performed, eg, to level incisal edges or canines cusps or to round the edges of anterior teeth.

**Bleaching and microabrasion**

Vital bleaching is used routinely as a single elective esthetic treatment or as a prerestorative procedure. Home bleaching using 10% to 20% carbamide peroxide proved safe and efficient over long-term periods\(^ {2,3}\); therefore, it is the preferred and most economical approach to conservatively brighten a smile. Moreover, it proved more effective than chairside bleaching in tissue depth, which favors its use for altering dark natural tooth color.\(^ {20}\) Nonvital bleaching is another useful procedure for traumatized anterior teeth in young patients, especially those with minimal tissue loss. However, the risk of discoloration relapse is significant, and a more stable, though less conservative, esthetic solution is often mandated for long-term patient satisfaction.\(^ {21}\)

Following orthodontic transition of anterior teeth, a color problem often appears with canines moved to a more mesial position (Figs 2 and 5). These teeth present higher color saturation (in most cases, a similar hue but higher chroma) compared with incisors. The combination of shade, dimension, and shape differences may result in an esthetic problem. After the required coronoplasty is made, color correction should be carried out for vital teeth, preferably with home bleaching\(^ {22}\) or eventually with chairside bleaching\(^ {23}\) when the color difference is discrete.

Microabrasion aims to remove superficial stains usually related to discrete or moderate fluorosis.\(^ {24-26}\) This condition is fairly common and complicates any restorative treatment; indeed, mimicking enamel opacities is difficult and creates a situation that is rarely esthetically pleasing (Fig 7). The procedure is conservative, though it requires the removal of some superficial enamel.

**Free-hand bonding**

Along with dramatic improvements in their physicochemical properties,\(^ {27}\) modern resin composites present superior esthetic qualities and satisfactory color stability.\(^ {28}\) They allow excellent esthetic results to be achieved with relatively simple application and layering methods. State of the art treatment includes the use of dentin- and enamel-like masses, which are completed with effect materials in well-selected indications (Figs 1 to 7). This simplified approach potentially extends the esthetic benefit of modern resin composites to a much larger number of practitioners and patients.

**Veneers and crowns**

When complete reconstruction of the labial surfaces is requested and major tooth anatomy corrections are needed, partial or full indirect ceramic restorations are suitable.\(^ {7-9,29}\) Due to improvements in the esthetics and surface quality of modern porcelains, the veneer option is favored when the entire buccal surface must be re-
Fig 7  (a) Postorthodontic smile presenting esthetic challenges such as improper alignment, space distribution, gingival hyperplasia, fluorosis, and enamel damage following removal of ceramic brackets. (b and c) Extra- and intraoral views following bleaching and gingivectomy around the right canine. (d and e) Microabrasion was performed with Opalustre (Ultradent) under rubber dam until most of the white flakes disappeared. (f to h) Embasures between the central incisors and canines, along with the distal corner of the right central incisor, were reshaped with composite. Premolars were also elongated. (i and j) Posttreatment views showing the restorative and esthetic compromise justified by the patient's age (17 years). Microabrasion facilitated the restorative phase and allowed a more esthetic and smooth transition with natural tooth structure. Further procedures may be necessary to deal with the excess space on the left side.
placed, such as in severe tooth displasia, abrasion, or erosion.\textsuperscript{29} When the tooth contours and root diameter diverge too far from the accepted esthetic standards, or when dealing with extremely decayed teeth, crowns may be indicated. The willingness and ability of the patient to accept the long-term repercussions of retreatment and maintenance must also be taken into consideration during treatment planning. Pulpal or endodontic complications and mechanical failures (global biomechanical risk) have a higher incidence with full prosthetic restorations.\textsuperscript{30,16,20} Therefore, the possibility of fulfilling patient expectations and meeting current esthetic standards with conservative procedures should always be considered.

**Conclusion**

To satisfy new demands regarding tissue conservation, function, and esthetics, treatment parameters must be redefined for all kinds of smile deficiencies concerning young patients with healthy dentitions, particularly following orthodontic treatment. A more comprehensive case analysis including long-term prognoses should be undertaken to offer the patient the best available solution with minimal tissue sacrifice. A global and reasonable treatment approach should include bleaching techniques, microabrasion, recontouring, and resin composite bonding. Ideally, the application of nonconservative, nonadditive procedures should be postponed whenever possible. Today, it is often preferable to use conservative treatments with minor, foreseen esthetic limitations that will clearly benefit the long-term biomechanical behavior of concerned teeth.

**References**