Prerestorative Ortho to Maximize Aesthetics and Function

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INTRODUCTION

Attempting to achieve ultimate facial and dental aesthetics can be challenging for a dentist. "Some dentists may not consider that facial aesthetics has much to do with them." Nevertheless, using an interdisciplinary approach allows the practitioner to set a challenging goal to dramatically improve a patient’s facial appearance.

“Interdisciplinary treatment gives the dental team the opportunity to change, shape, or develop an individual’s appearance, character, or self-image, and at the same time provide a restoration that is functional and enduring.” In his article, Rodriguez Flores3 says: “Interdisciplinary treatment that combines orthodontics, implantology, and prostheses helps us to obtain good, predictable results that are stable over time, aesthetic and functional in the cases of adults with large edentulous spaces and multiple problems in dental arch.”

The goal of this article is to lay out the framework for a unique treatment philosophy. This philosophy is based on a different set of priorities in aesthetic treatment planning, which places the improvement of facial beauty and the creation of proper facial proportions and balance at the top of the list. An interdisciplinary approach, starting with dentofacial orthopedic and orthodontic treatment, allows the dentist to focus on facial appearance of the patient, instead of just treating occlusion and teeth.

In his article, Jefferson4 states that: “There is a universal standard for facial beauty regardless of race, sex, and other variables and is based on divine proportion.” Thus, following this universal principle, one of the objectives of the treatment of complicated cases should be the enhancement of the patient’s external appearance.

The presence of preexisting malocclusions in adult cases requiring full-mouth rehabilitation makes the accomplishment of the above mentioned goals more challenging and difficult to implement using only one treatment modality. The cases presented in this article can be seen as an illustration of how the interdisciplinary approach can help in the planning and execution of complex treatments of patients with preexisting malocclusions. Orthodontic treatment in the beginning, with special attention to dentofacial orthopedics, will place teeth and jaws in a position that ensures the successful completion of the subsequent prosthetic phase of the patient’s full-mouth rehabilitation and greatly improve the overall aesthetic result.

CASE 1

Diagnosis and Treatment Planning

A 55-year-old female patient presented with a constricted maxilla and bilateral crossbite. Her previous request for cosmetic improvement of her smile was rejected by numerous practitioners due to very unfavorable position of her maxillary teeth (Figures 1 to 3).

Clinical analysis along with evaluation of the patient’s photographs, radiographs, and models showed that prerestorative orthodontic treatment was indicated in order to meet the patient’s expectations.


Prerestorative Orthodontic Treatment

Orthodontic treatment started with the use removable functional-orthopedic appliance (Schwarz appliance) in order to eliminate the constriction of the maxilla and bring its size into proper relation to the mandible.

Several months later, 6.0 mm expansion of the maxilla was achieved. Once the size and width of the maxilla was deemed sufficient, braces were then placed on both upper and lower arches in order to move the teeth into more favorable positions for the future restorative phase of treatment. Four months later, the objectives of this part of the treatment with braces were achieved (Figure 4) and 2 months later braces were removed (Figure 5). The new positions and relations between upper and lower teeth had become much more favorable for the planned subsequent restorative treatment. In fact, the size and shape of the maxilla changed significantly (Figures 6 and 7a and 7b). The patient’s facial appearance, occlusion, and position of her teeth had improved considerably.

Restorative Treatment

The restorative phase of treatment was initiated with the preparation of tooth No. 5 for an all-ceramic zirconia (Nobel Biocare) crown, teeth Nos. 11 to 13 (to replace existing restorations) for a 3-unit all-ceramic zirconia (Nobel Biocare) bridge, and teeth Nos. 6 to 10 for porcelain (DENTSPLY Ceramco) veneers. Then, final impressions (Flexitime [Heraeus Kulzer]) were taken and all necessary information was sent into our dental laboratory team for fabrication of the restorations.

Two weeks later, the finished restorations were inserted. Zirconia crown and bridge was cemented using 37% etch, ing cement (3M ESPE). Porcelain veneers were cemented using Ribbond wetting agent and resin were used for splinting. Full-mouth rehabilitation was completed by fabricating 6 zirconia all-ceramic (Nobel Biocare) crowns to reestablish vertical dimension of his occlusion and to restore his ability to chew. Full-mouth rehabilitation of this patient was completed with a skeletal Class III malocclusion condition, function, and aesthetics of his smile was pretty remarkable (Figures 8 and 9).

Six months after the completion of the treatment, the patient was checked and the results were found to be stable and very satisfactory to the patient (Figure 10).

CASE 2

Diagnosis and Treatment Planning

A 50-year-old male patient presented with a skeletal Class III malocclusion and anterior crossbite which adversely affected his facial appearance and ability to chew food (Figures 11 and 12). His teeth had extensive tooth structure loss due to severe grinding and erosion from pathological occlusion (Figures 13 and 14).

Clinical analysis along with evaluation of patient’s photos, radiographs, and models showed that initial orthodontic treatment was indicated in order to improve patient’s appearance, function, and smile.

To optimize the patient’s condition before restorative work was carried out, an orthodontic phase of treatment was proposed and accepted. A removable (sagittal) appliance would be used to torque his upper anterior teeth forward and also to redevelop his premaxillary area. The other goal would be to substantially open the patient’s vertical dimension in order to improve facial proportions and create necessary conditions for restorative part of full-mouth rehabilitation.

Prerestorative Orthodontic Treatment

Objectives of orthodontic phase of the treatment were accomplished in just 8 months. The facial appearance of the patient, his occlusion, vertical dimension, and position of his front upper teeth had changed substantially at this point of the treatment (Figure 15).

Cephalometric x-rays of the patient before and after this phase of the treatment illustrate the changes that have occurred not only in the position of the upper front teeth, but in the maxillary alveolar bone itself (Figures 16 and 17).

Restorative Treatment

The restorative phase of treatment was begun with the preparation of the patient’s maxillary and mandibular posterior teeth (teeth Nos. 4, 5, 12 to 14, 19 to 21, 28, and 29) for PFM crowns to reestablish vertical dimension of his occlusion and to restore his ability to chew. Full-mouth rehabilitation of this patient was completed with a skeletal Class III malocclusion condition, function, and aesthetics of his smile was pretty remarkable (Figures 8 and 9).

The effect of the treatment on the patient’s facial appearance, occlusion, function, and aesthetics of his smile was incredible and satisfying for the both patient and the doctor (Figures 18 and 19).

DISCUSSION

The prevailing treatment philosophy in general dentistry and orthodontics is based upon the assumption of immovability of the alveolar bone; after the development of the dentofacial complex is complete and the permanent teeth have erupted. Conventional understanding is that the labial alveolus is immovable based on research done by Engelking and Zachrisson and Thilander et al., who showed that “dehiscences or fenestraions can be produced in the buccal

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Figure 11. Preoperative facial view (Case 2).

Figure 12. Preoperative left lateral facial view (Case 2).

Figure 13. Preoperative retracted view in habitual centric occlusion (Case 2).

Figure 14. Preoperative maxillary occlusal view, showing severe wear of the teeth (Case 2).

Figure 7. (a) Postorthodontic occlusal view of the maxilla. (b) Post-ortho model of the maxillary arch (Case 1).

Figure 8. Facial view of the patient after restorative phase of the treatment (Case 1).

Figure 9. Retracted view of the patient smile after restorative phase of the treatment (Case 1).

Figure 7a.

Figure 7b.

Figure 10. Natural smile of the patient 6 months after completion of the treatment (Case 1).

Figure 15. Cephalometric x-rays of the patient before and after orthodontic treatment (Case 1).
alveolar plate by moving teeth in a facial direction.”6 On the contrary, data from Lindskog-Stokland et al.7 and Melsen,8-10 advocate that the den-
toalveolar complex is much more malleable than previously believed. The interdisciplinary approach to aes-
thetic dentistry, as described in this article, sides firmly with the latter conception.

In their article “Beyond the Lig-
ament: A Whole-Bone Periodontal
View of Dentofacial Orthopedics and
Falsification of Universal Alveolar
Immutability,” Williams and Mur-
phy11 wrote: “When a theoretical
basis for manifestly successful clini-
cal outcomes cannot be fortified by
traditional orthodontic tooth move-
ment biology (that focuses solely on
the periodontal ligament as the oper-
ant organ), a new hypothesis should
be built on the old. It is forces acting
beyond the ligament that may be sig-
nificant determinants of the alveolus
and the consequent dentofacial form,
which lives, thrives, and dies by the
grace of dental root positions. Dento-
facial orthopedic physiology of the
alveolus does not deny the relevance
of periodontal ligament phenomena
but merely goes beyond the ligament
to analyze the alveolar response to
orthopedic force from a ‘whole bone’
perspective. The behavior of the bone
cannot be explained totally with a
periodontal pressure-tension model.”

The cases presented in this article
show that the remodeling and rede-
velopment of the patient’s facial and
dentoalveolar structures can be per-
formed using a dentofacial orthope-
dics approach regardless of age. The
changes undergone in patients’ faces,
the size of the jaws, and the occlusion
and teeth position cannot be ex-
plained by simple tooth movement
but rather by response of the alveolar
bone as a “whole.” A high rate of the
osteoblastic/osteoclastic activity and
bone turnover are contributing to the
continuing adaptability of the adult
dentoalveolar complex, where alveo-
lar bone moves in conjunction with
the teeth to effectively build new
bone while resorbing old bone.

Orthopedic changes in patients’
jaws and their relationships are gen-
erally responsible for overall im-
provement in facial appearance and
the creation of much better ground-
work for subsequent restorative pro-
cedures.

Both patients underwent comput-
tomography (CT) scan examina-
tions several months after the com-
pletion of the treatment (Figure 20).
The goal of this research was to evalu-
ate the long-term effect of the com-
pleted interdisciplinary treatment on
the condition and integrity of the
alveolar bone and on the position and
remodeling of a patient’s alveolar
bone. The bone movement creates a
proper orthopedic relationship be-
 tween the jaws with stable results,
regardless of the patient’s age. The
addition and implementation of this
phase of treatment will help to ensure
that the teeth and jaws are in a more
favorable position, thus dramatically
improving the dentist’s chances for
creating more optimal dentofacial
aesthetics and better occlusal/fun-
cational results.◆

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Figure 15. Postortho facial view (Case 2).

Figure 16. Preortho cephalometric radiograph
(Case 2).

Figure 17. Postortho cephalometric radiograph
(Case 2).

Figure 18. Retracted view after restorative
phase of the treatment was completed
(Case 2).

Figure 19. Lateral facial view after restora-
tive phase of the treatment (Case 2).

Figure 20. Computed tomography scans several months after treatment. Left image
(Case 1); right image (Case 2).

CONCLUSION
An interdisciplinary approach to full-
mouth rehabilitation of complex
cases that may include preexisting
malocclusions can result in signifi-
cant enhancement of the patient’s
overall facial appearance, occlusion,
functional, and aesthetic aspects of
the smile. This treatment philosophy
gives the dentist an opportunity to
assess patients in a different way,
beginning with an evaluation of the
patient’s overall facial beauty.

The ensuing orthodontic treat-
ment with special attention paid
to dentofacial orthopedics allows for the

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