Surgically accelerated orthodontics in implant treatment

By Federico Brugnami, DDS, and Alfonso Caiazzo, DDS

Abstract

Multidisciplinary treatment requires excellent communication and coordination among clinicians in a variety of fields. Although this can be difficult to achieve at first, interdisciplinary collaboration usually results in efficient treatment that patients appreciate and benefit from.

Validating the oral-systemic health connection

By Barry L. Musikant, DDS

How does one go about becoming familiar with an avenue of health improvement that we have in the past paid little or no attention to, at least on a professional level, yet has major impact on our patient’s oral health? I am referring to the nutritional status of our patients (and ourselves) and the implications it has on our general health. The central question is whether or not there is adequate validity in the quantification of our nutritional status as a measure of our health to apply it to our patients. Secondly, but of obvious clinical importance, is whether or not the technology exists that would allow us to make quantitative measurements.

In terms of answering the first question, one of the first studies that caught my attention was Munoz et al in a paper titled, “Effects of a Nutritional Supplement on Periodontal Status,” published in the May 2001 issue of Compendium. Researchers at Loma Linda University studied the impact of an antioxidant-rich oral supplement on 63 patients ranging in age from 20 to 70 years and diagnosed with gingivitis and Type II periodontal disease during a 60-day double-blind trial.

The participants were randomly assigned to two groups — the experimental group, which took two tablets each day of the proprietary blend of antioxidants, and the control group, which took a similar-look placebo.

Results of the study showed significant improvement in the clinical parameters and measurements of gingival inflammation, bleeding on probing, pocket depth and attachment levels.

“By Barry L. Musikant, DDS

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Fig. 1: A very resorbed ridge in the edentulous area is evident together with bone dehiscence on teeth #31, #42 and #44. A regeneration with xenogeneic bone of bovine origin (Endo-bone, BIOMET 3i) and a resorbable membrane (Osseoguard, BIOMET 3i) was performed. (Photos/Provided by Dr. Federico Brugnami)
When appropriately coordinated, the job of each specialist can facilitate the work of the other team members. For example, orthodontists can be of considerable assistance in periodontal and prosthetic treatment. Dental alignment of the arches can facilitate periodontist’s and prosthodontist’s objectives. This is done, for example, by aligning the natural dentition, making possible a path of insertion for a prosthesis, or establishing a physiological alveolar crestal topography to facilitate periodontal surgery.

Orthodontic tooth movement can then be of substantial benefit for the patient. Many adults seeking routine restorative dentistry have misaligned teeth, which compromises either the final restorative outcome or the ability to clean the natural dentition. Orthodontic appliances have become smaller, less noticeable and easier to maintain during therapy. Invisible or lingual appliances further improve the rate of acceptance by adult patients. Many adults can now have their teeth aligned to improve their chewing function and their smiles with reduced esthetic effect during therapy.

In addition, implants have become a major part of the treatment plan for adults with missing teeth. If adjacent teeth have drifted into the edentulous area, orthodontics may be beneficial for providing adequate space for implant placement and restoration.

One of the major problems in acceptance of orthodontic treatment by adults is the length of treatment. For this reason, periodontists and oral surgeons may be helpful to the orthodontist, as they can facilitate the orthodontist’s work and thereby reduce treatment time. Endosseous implants can be used to enhance anchorage and increase control of orthodontically moved teeth. Furthermore, the alveolar architecture can be reshaped with periodontally accelerated osteogenic orthodontic augmentation (PAOO) surgery to produce the regional acceleratory phenomenon (RAP), which results in a vast increase in osteoblast and osteoclast activity. The biological result of this is osteopenia (decrease of bone mineralization without loss of volume). The clinical result is softer bone, which may allow faster movement of teeth. In multidisciplinary treatment of adult patients, malocclusion may be associated with tooth loss, bone resorption and a consequent need for implants and/or periodontal treatment and bone augmentation. In these cases especially, efficient interdisciplinary collaboration may result in a great benefit for the patients.5–12

Periodontally accelerated orthodontic movement, as described by Wilcko, appears particularly feasible in those multidisciplinary cases for which treatment planning requires orthodontic movement and oral or periodontal surgery. In these cases, corticotomies can be combined with wisdom tooth extraction and/or a regenerative technique, such as guided bone regeneration (GBR), in order to avoid multiple surgeries. Recently some orthodontic therapies, especially the so-called low-friction therapies, have demonstrated clinically and radiographically that it is possible to expand dental arches without interfering with periodontal health, by augmenting the alveolar bones. Melsen et al.5 confirmed what was previously suggested, that the tooth will move with the bone and not in bone, especially when light orthodontic forces are applied. Dehiscence and fenestration, which are difficult to diagnose preoperatively, may represent a limitation of this technique. Because the tooth will move with the periodontium, in cases in which the periodontium is not present, we might create recession and attachment loss.14 A recent study on modern American skulls found that a dehiscence was present in 40.4 percent of the skulls, and a fenestration was present in 61.6 percent of the skulls.15

If this data is translated in clinical treatment, it may mean that potentially at least 50 percent of orthodontic patients undergoing expanding movement could be at risk of gingival recession and periodontal damage. It would be advisable, then, to introduce routine 3-D X-rays into clinical practice.

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the preoperative work-up (i.e., cone beam).

The cone-beam examination, with a reduced dose of radiation compared with the fan beam (CT scan) and better definition, could be used routinely in those patients with a thin, scalloped periodontium, where the risk of post-operative recessions is higher. The PAOO technique has been found not only to be predictable in solving dehiscence and fenestration above the roots, but also to produce a noticeable change in the cephalometric analysis of points A and B. With the PAOO technique, the patient needs to be seen routinely for changing the wires, as the teeth movements are much faster than in regular orthodontic treatment. The use of segmental corticotomy (applied only to the teeth that have to move more than the others) can dramatically change the relationship amongst groups of teeth.

This has to be kept in mind because it may require changes in distributing the anchorage by the orthodontist. The teeth in the area of surgery will be moving much faster than the other teeth.

Conclusions

When the treatment plan requires orthodontic movement and oral or periodontal surgery, corticotomy can be combined with a wisdom tooth extraction and/or a regenerative technique, such as GBR, in order to avoid multiple surgeries and to optimize the final outcome for the patient.

Another indication is for instances in which the risk of creating root dehiscence in patients with thin periodontium is very high even with slow orthodontic movement and light forces applied. Root recession can be present even without clinical manifestation of gingival recession. An efficient multidisciplinary approach to a complex case may result in a faster and better treatment. The PAOO technique can be used for faster dental movement, to treat and prevent periodontal problems and to regenerate ridge defects, allowing implant placement.

Editorial note: A list of references is available from the publisher.

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