The surgically accelerated orthodontics in multidisciplinary implant treatment

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_Abstract

Multi-disciplinary treatment requires excellent communication and coordination between clinicians in a variety of fields. Although this can be difficult to be achieved at first, interdisciplinary collaboration may result in a very efficient execution that patients appreciate and benefit from. When appropriately coordinated, the job of each different specialist can be in fact facilitating 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, in fact, facilitate periodontist's and prosthodontist's objectives. This is done for example by aligning the natural dentition making possible a path of insertion of a prosthesis, or establishing a physiologic alveolar crestal topography to facilitate periodontal surgery. Orthodontic tooth movement can be then a substantial benefit for the patient. Many adults seeking routine restorative dentistry have, in fact, problems with tooth malposition that compromise 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 ratio of acceptance of adult patients. So many adults may now take advantage of the opportunity to align their teeth to improve their chewing function and the esthetic of their smiles. In addition implants have become a major part of the treatment plan for adult with missing teeth. If adjacent teeth have drifted into edentulous area, orthodontics may be beneficial to provide adequate space for implant placement and restoration. One of the major problems in acceptance of orthodontic treatment in adults is the length of treatment. So in this case periodontists and oral surgeons may be helpful to the orthodontist. They can in fact facilitate the orthodontist work. Endosseous implants can be used to enhance anchorage and increase movement control of orthodontically moved teeth. Furthermore the alveolar architecture can be reshaped with periodontally accelerated osteogenic orthodontic augmentation (PAOO®) surgery to produce regional acceleratory phenomenon (RAP),[1,2] which results in a vast increase in osteoblast and osteoclast activity. The biologic result will be osteopenia (decrease of bone mineralization without loss of volume). The clinical result will be a "softer" bone which may allow a faster movement of teeth.[3,4] In adult multi-disciplinary cases malocclusion may be associated with tooth loss, bone resorption and consequent need for implants and /or periodontal treatment and bone augmentation procedures. Expecially in these cases, a very efficient interdisciplinary collaboration may results in a great

Fig. 1_A very resorbed ridge in the edentoulous area was evident together with bone dehiscence on teeth 31, 42, 44. A regeneration with xenogeneic bone of bovine origine (Endobone, Biomet USA) and a resorbable membrane (Osseoguard, Biomet USA) was performed.

Fig. 2 _Six months after surgery one osteointegrated implant (Biomet USA) in the augmented area was placed. A regeneration of the bony fenestration on tooth 42 was also evident, while the control 44 remained unchanged.

Fig. 3_Appropriate implant placement requires orthodontic movement.

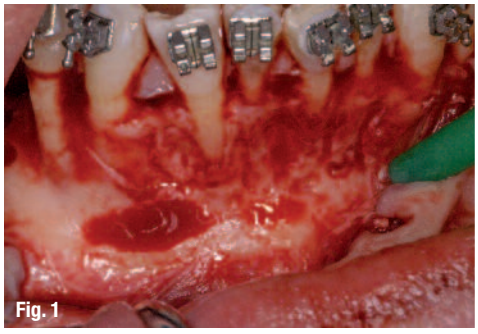
Fig. 1

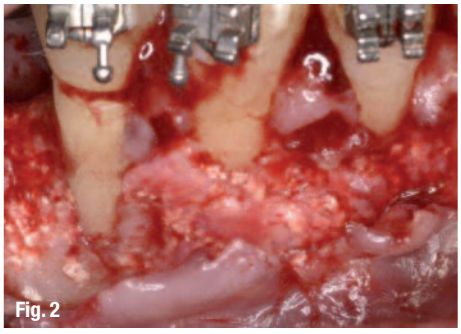
Fig. 2


Fig. 3

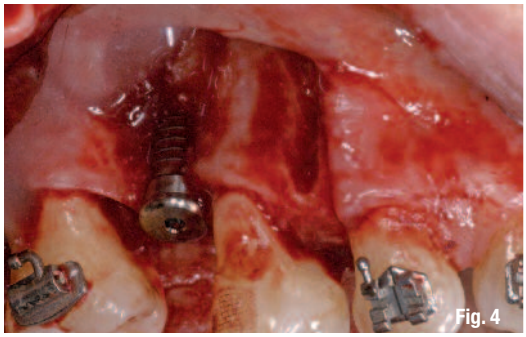
Fig. 4


Fig. 5

Fig. 4_At the time of implant placement a corticotomy was performed to accelerate the orthodontic movement and facilitate the implant restoration. Regeneration with a first layer of autologous graft collected during site preparartion, covered with xenograft and a resorbable membrane (Endobone and ~~Osseouguar~~ Biomet 3i ~~West~~ Palm Beach USA) was performed si~~u~~multaneosuly to the placement.
Fig. 5_Provisional restoration in place.

benefit for the patients.[5-12] Some examples of the application of this technique are presented.

The periodontally accelerated orthodonthic movement, as described by Wilcko, seems particularly feasible in those multidisciplinary cases where the treatment planning requires orthodontic movement and oral or periodontal surgery. In these cases, the corticotomy can be combined with a wisdom tooth extraction and/or a regenerative technique, such as GBR, in order to avoid multiple surgeries. Recently some orthodontic therapies, especially the so called low-friction, have shown clinically and radiographically that it is possible to expand dental arches without interfering with the periodontal health, by augmenting the alveolar bones. Melsen and coll.[13] confirmed what previously stated, 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 pre-operatively, may represent a limitation of this technique. Since the tooth will move with the periodontium, in cases where the periodontium is not present, we might create recession and attachment loss.[14] A recent a study on modern American skulls showed that a dehiscence was present in 40.4 % of the skulls, and a fenestration was present in 61.6 % of skulls.[15] If this data are translated in clinical treatment, it may mean that potentially at least 50 % of orthodontic patients undergoing expanding movement could be at risk of gingival recession and periodontal damage. It would be advisable, then, to introduce routine tridimensional x-rays in the pre-operative work-up (i.e. cone beam). The cone beam exam, with a reduced dose of radiation compared to the fan beam (CT scan) and a better definition[16], could be used routinely in those patients with thin scalloped periodontium where the risk of postoperative recessions is higher. The PAOO ® technique has been showed not only to be predictable in solving dehiscence and fenestration above the roots[17], but also to produce a noticeable change on the cephalometric analysis of point A and point B17. With the periodontally accelerated orthodontic movement technique the patient needs to be seen routinely for changing the wires considering that the teeth movements are much faster than in the regular orthodontic treatment. The use of segmental corticotomy (applied only to the teeth that have to move more than other) can dramatically change the relationship between groups of teeth.[18] This has to be kept in mind since it may require changes in distributing the anchorage by the orthodontist. The teeth in the area of surgery will be, in fact, moving much faster than those away from the corticotomy.

_Conclusions

When the treatment plan requires orthodontic movement and oral or periodontal surgery the corticotomy can be combined with a wisdom tooth extraction and/or a regenerative technique, such as GBR , in order to avoid multiple surgeries and optimize the final outcome for the patient. Another indication can be when the risk of creating root dehiscence in patients with thin periodontium is very high even with slow orthodontic movement and light forces applied. The roots recession can be present even without the clinical manifestation of gingival recession. An efficient multidisciplinary approach to a complex case may result not only in a faster but also in a better treatment. The periodontally accelerated orthodontic movement technique can be used, in fact, to have a 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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