Dental Surgery

Clinical Sheet

THE MANAGEMENT OF SOCKETS RESULTING FROM THE REMOVAL OF TEETH OR IMPLANTS

Use of biomaterials with different remodeling kinetics.

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Following the extraction of a tooth, the alveolar process undergoes a resorption process that, in the most serious cases, may result in atrophy to such an extent as to prevent the subsequent placement of an osteointegrated implant. This process may be countered by grafting the post-extraction socket with a bone substitute in accordance with the ridge preservation technique. The graft is performed, other than to prevent contraction of the alveolar process, to also guarantee the best conditions for the implant to be osteointegrated and for the peri-implant bone levels to be preserved over time. Furthermore, the choice should also take into account the possibility that it may promote healing of tissues by secondary intention or otherwise, should one not wish to perform preparation of appropriate mucoperiosteal flaps after the extraction.

To date, it is not clear yet whether the biomaterial to be used for effectively performing ridge preservation procedures should act as a simple place holder having an effective osteoconductive effect, to then remain inside the socket for as long as possible, or a bone substitute able to physiologically remodel into newly-formed bone tissue, to promote osteointegration of the implant. The latter case might, for example, be preferable in cases where – although the implant needs to be inserted in a two-step procedure – the time of the second surgery is known and is not too long after the extraction.

Materials

The procedure described in this sheet entails using two different bone substitutes: an equine bone substitute in cortical-cancellous granules (Bioteck), obtained by the enzymatic removal of antigens using the exclusive Zymo-Teck process, and a biomaterial of bovine origin, in cancellous granules, obtained via heat treatment.

The two biomaterials differ by their remodeling kinetics or degradation: that of the enzymatically treated equine bone substitute is broadly physiological, while the heat treated biomaterial of bovine origin is definitely slower.

In the context of the procedure described below, both biomaterials were protected, after grafting, with a pericardium membrane (Heart, Bioteck); this membrane, although resorbable, retains the three-dimensional structure of the natural fibers it consists of. It, therefore, features significant resistance to traction, can be stitched and acts as a barrier for a significantly longer time (3-4 months) than the few weeks of membranes obtained from tendon or skin collagen.

Fig. 1 *– Panoramic X-ray, one may observe the compromised teeth 4.6 and 4.7 and the implant at site 3.6 without prosthesis.*

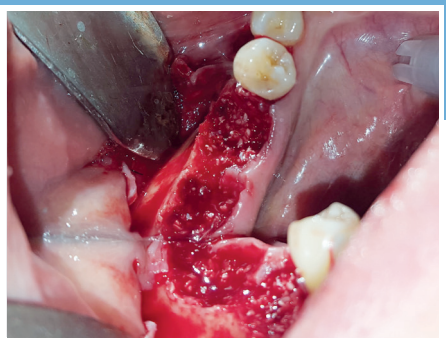

Fig. 2 *– Graft of the biomaterial of equine origin in the sockets at sites 4.6 and 4.7.*

Fig. 3 *– Placement of the pericardium membrane to cover the grafted sockets.*

Fig. 4 *– Suture. The flaps at sites 4.6 and 4.7 are not closed completely; healing will take place by secondary intention.*

Fig. 5 *– Healing of the soft tissues, before the second procedure.*

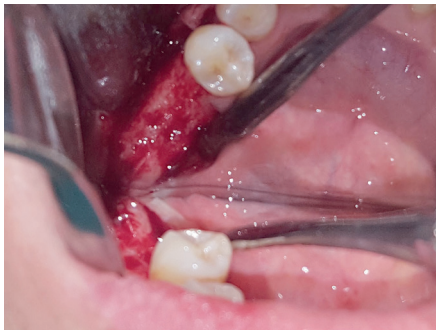

Fig. 6 *– Re-opening of sites 4.6 and 4.7: the appearance of the regeneration is extremely satisfactory; no residual biomaterial granules are observed.*

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Results

The case concerned a patient who visited the doctor complaining of difficulties in mastication and unhappiness with the esthetic appearance of her teeth. The objective examination showed multiple incongruous and infiltrated reconstructions and non-retreatable root canal treatments. In particular, one observed that teeth 4.6 and 4.7 were compromised, and the recommended treatment entailed extraction and rehabilitation on implants placed at a later time, following a ridge preservation procedure. In addition, at the site of tooth 3.6 there was an implant without prosthesis, whose placement violated all principles of prosthetic guided surgery.

Its removal was recommended, once more followed by the placement in multiple stages of a new implant, following reconstructive bone regeneration. Atraumatic extraction of the teeth at sites 4.6 and 4.7 was performed. The post-extraction sockets were grafted with the biomaterial of equine origin and then covered with the pericardium membrane; the flap was managed so as to obtain partial closure of the tissue margins to promote regeneration of the tissues by secondary intention. The implant at the 3.6 site was removed and the surgical site was grafted using the material of bovine origin and then protected with an identical pericardium membrane to the one used previously. The gingival margins were closed to obtain healing by primary intention.

The second procedure was performed four months later. The tissues at sites 4.6 and 4.7 were found to be thick and well keratinized; it was possible to place two osteointegrated implants with torque higher than 70 Ncm. At the site 3.6, the tissue was healthy but thinner on the lingual side; the presence of biomaterial that had not yet been resorbed was observed as well as lower bone density (D4 according to Misch). Nevertheless, an implant was inserted. The two implants at sites 4.6 and 4.7 were rehabilitated after five weeks; with regard to the one at site 3.6, it was decided to wait for the appropriate time before placing the prosthesis.

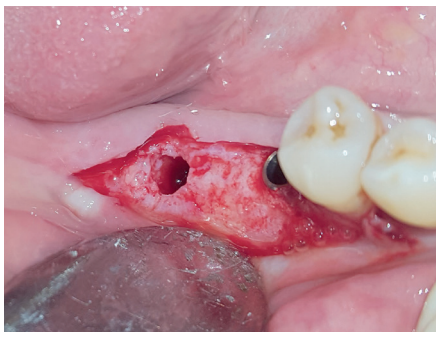

Fig. 7 *– The implant tunnel at site 4.7 and the already inserted implant at site 4.6.*

Fig. 8 *– The two implants at sites 4.6 and 4.7 when their insertion is completed.*

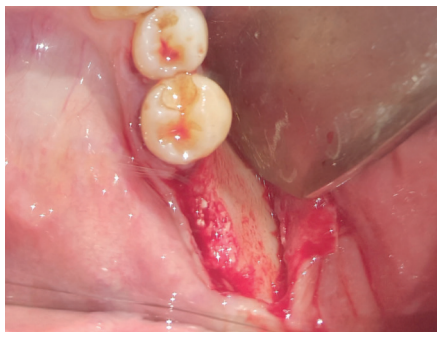

Fig. 9 *– Re-opening of site 3.6; granules of non-resorbed bovine biomaterial are still visible.*

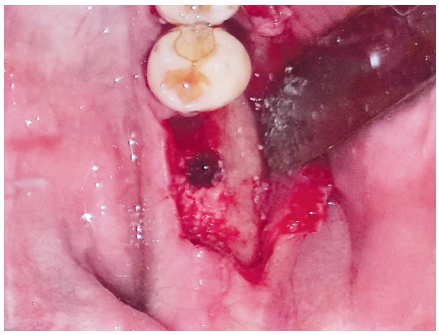

Fig. 10 *– The preparation of the implant tunnel at site 3.6.*

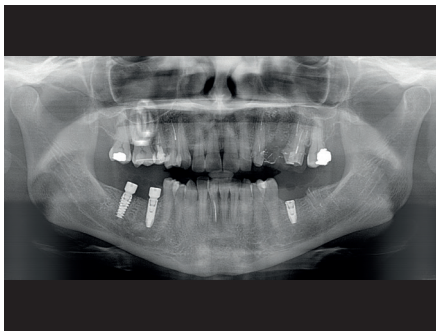

Fig. 11 *– Control panoramic X-ray at the end of implant placement.*

Fig. 12 *– The final prosthesis at sites 4.6 and 4.7.*

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