TREATING MAXILLARY HORIZONTAL ATROPHIES WITH PARTICULATE HOMOLOGOUS BONE GRAFTS: A CASE REPORT

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SUMMARY

Treating maxillary horizontal atrophies with particulate homologous bone grafts: a case report

Presentation of a clinical case characterized by an atrophic degeneration in the superior maxilla which is very common to observe in the daily routine and wants to demonstrate the excellent results achieved with bone regeneration procedures by using grafting material of a homologous derivation, in this case of a particulate type. In view of the results in here presented and of those achieved in more than 10 years of clinical experience with homologous material, it can be considered an excellent alternative to the autologous grafting procedures; and this also thanks to the clinical and histologic behaviour that this material has previously showed in the orthopedic field. The simplicity of the surgical procedures, the reduced invasivity for the patient and the possibility for the clinician to regenerate even the smaller defects contestually to implants insertion, allow many clinicians to benefit of this technique in their own practices.

Key words: horizontal atrophy, regeneration, grafting, homologous material, particulate material.

RIASSUNTO

Innesti di osso omologo particolato nella soluzione delle atrofie orizzontali del mascellare: case report

Il caso clinico presentato, caratterizzato da un processo atrofico del mascellare superiore di osservazione molto comune nella routine quotidiana, vuole dimostrare gli ottimi risultati raggiunti con procedure di rigenerazione ossea tramite l'utilizzo di materiale da innesto di derivazione omologa, in questo caso di tipo particolato. In ragione dei risultati qui presentati, e di quelli ottenuti in oltre 10 anni di esperienza clinica con il materiale omologo, esso può essere considerato un'ottima alternativa alle procedure di grafting autologo; e ciò anche grazie al comportamento clinico ed istologico che questo materiale ha dimostrato ancor prima in ambito ortopedico. La semplicità delle procedure chirurgiche, la ridotta invasività per il paziente nonché la possibilità per il clinico di rigenerare anche i difetti più piccoli, in molti casi contestualmente all'inserimento degli impianti, rendono tale tecnica alla portata di molti clinici nei propri ambulatori.

Parole chiave: atrofia orizzontale, rigenerazione, innesto, materiale omologo, materiale particolato.

Introduction

The predictability of the results in implants surgery and long term success of the implant prosthetic rehabiltations depend on various factors, and amongst those factors stands out for importance that relative to bone tissue condition which has to host the implants. It is of utter importance to rely on a sufficient bone volume both in width and height so that implants can osseointegrate. Should bone crests present conditions which are incompatible with implant procedures or make osseointegration of the implants difficult, defects are to be corrected with the regeneration procedures of the bone tissue.

Materials and methods

The grafting material chosen for the case here presented is mineralized cortico-medullary material of the homologous type. The use of this type of homologous bone was previously used in the orthopedic field, this undoubtedly constitutes a valid baseline about this material's capacities to incorporate in an optimal way to the host, and shielding itself from collateral or side effects. The material used, even though part of the bone materials from a bank (*Tutoplast,* Tutogen Medical GmbH 91077 Neunkirchen am B. Germany) present important differences as far as the conservation techinique as well as the viral and immunologic inactivation and sterilization is concerned. The tissues taken are washed with saline solutions of varying concentrations, which determine the osmotic destruction of the cells as to reduce the tissue to its collagen or mineral structure. A procedure aiming at removing fats is performed, so to allow a better penetration of the organic type solvents used for dehydration and removed from at the end of the process: thus preserving the collagen fibre structure. The product is then serilized at the end of the process with gamma-ray irradiations at 15 kGy. Thus the soluble proteins are extracted without altering the collagen structure contrary to what it happens with a lyophilization process. Preserving such structure allows a faster colonization.

Clinical case

A female, non-smoker patient, free from pathologies which would contraindicate implant therapy, after having undergone a thorough anamneses, and been informed about the planned surgical solution as well as the material chosen for the regeneration and of the possible alternatives, has signed a specific informed consent.
The patient came to our observation with the 2.4 element affected by a periodontitis in an advanced state. It is opted for the extraction and its subsequent implanto-prosthetic rehabilitation. While extracting the dental element it clearly appeared the presence of a crest atrophy process to the vestibular cortical area as to suggest a postponement of the implant surgery in the future. After having waited for 4 weeks, after local anaesthesia, a full thickness flap with just one releasing incision was performed mesially to the side to be treated. After having raised the flap, a rather spread resorption of the vestibular cortical area appeared, which despite needing a bone graft of substitute material, it did not hamper the positioning of the endosseous implant contestually (Fig. 1). After careful preparation of the surgical alveolus, an AstraTech implant was inserted with a cylindrical macromorphology and Osseospeed micromorphology (Figs 2, 3). Despite

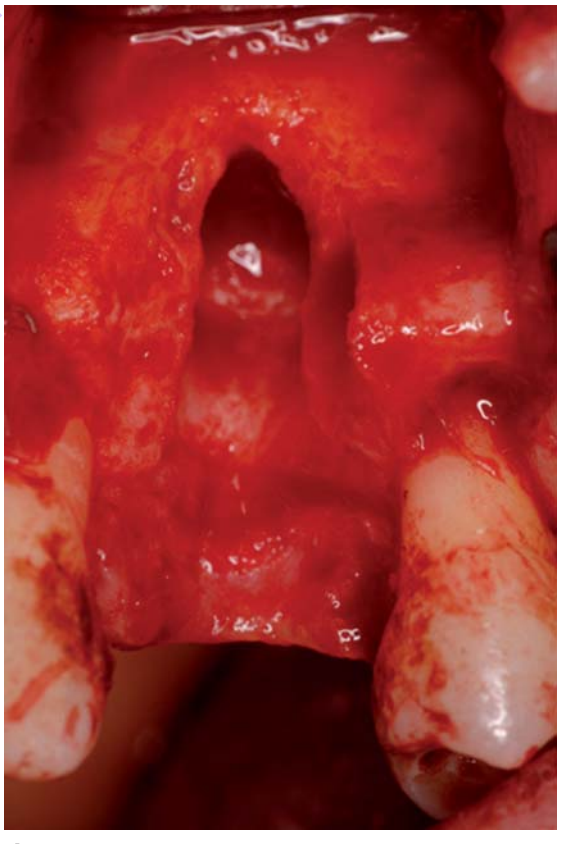

Figure 1
Cortical vestibular defect.

the conspicuous vestibular defect, the implant showed a good primary stability. This made us immediately opt for an implant with an adequate healing abutment diameter aiming at keeping the best preservation possible of the original tissue architecture (Fig. 4). Soon after the vestibular defect was regenerated, by using graft material according to the "stratification technique" which places in the deepest layers the particulate material with a bigger diameter (Fig. 4) and in the more superficial layers the particulate material of smaller diameter (Fig. 5). Abiding to the best rules of regenerative therapy, the grafted material was then protected and insulated with soft tissues by positioning a heterologous membrane of pricardium origin (Fig. 6). This membrane has the characteristics of spontainuously adhering to the material beneath without needing any further

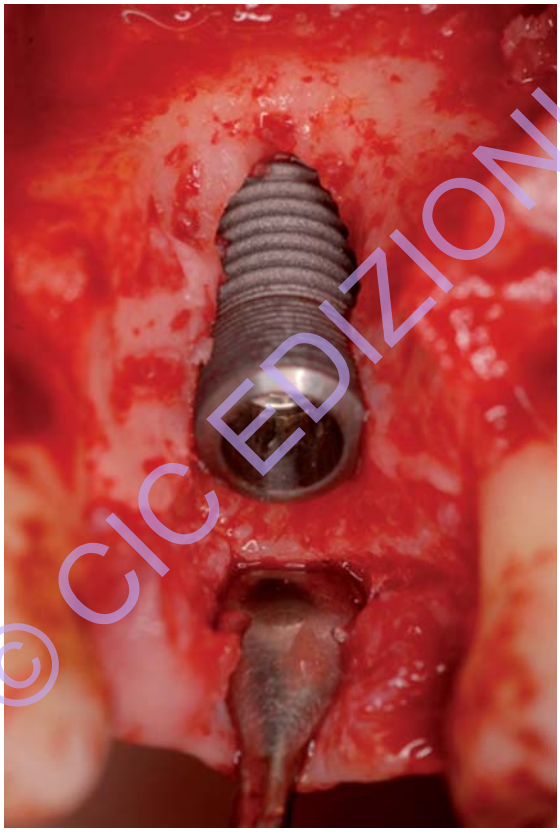

Figure 2
Astratech osseospeed implant soon after insertion. Occlusal-vestibular image.

Figure 3
Astratech osseospeed implant. Magnified image in which it is possible to see the depth limit of the position as indicated by the cortical palatal.

supports for the stabilization. It was then performed the horizontal incision of the periosteal flap layer: such a maneuver is essential in order to promote a coronal shifting of the flap itself. Such a shifting allows the passive covering of the graft and a suturing of the flap free from tractions which may jeopardize the healing of the soft tissues, which is a fundamental requirement for the final success.

For the suture a resorpable material was chosen (Vycril 5.0) (Figs 7, 8). After operation the patient was prescribed with an antibiotic (amoxicillin + clavulanic acid 1g.), antiinflammatory and mouthwash therapy with clorexidine. The postoperative follow-ups performed regularly showed an excellent healing, firstly of the soft tissues and the heal-

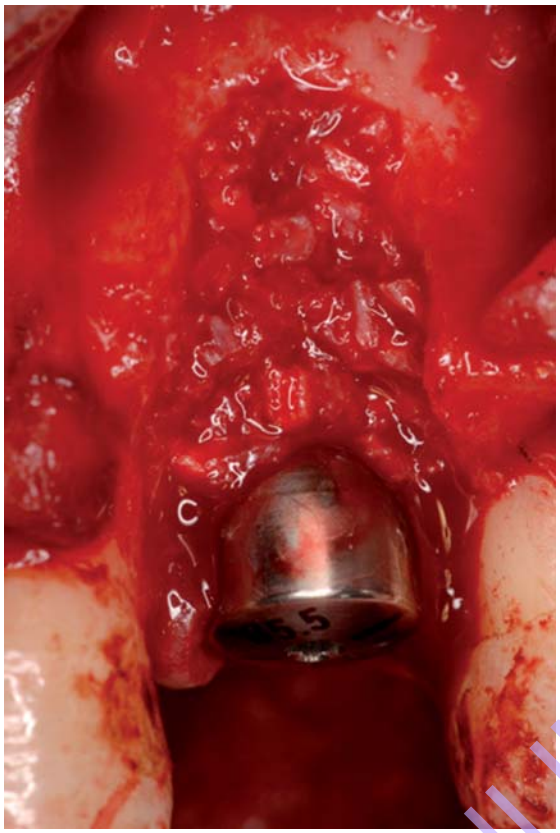

Figure 4
Homologous particulate material of bigger dimension placed in the deepest layer. It observable the use of a healing abutment having followed the "one stage" technique used in this case.

Figure 5
Homologous particulate material of smaller granules placed in the more superficial layer.

ing process was completed without any complications. Four months later a clinical and radiographic check-up was carried out. Both examinations showed a good healing state of the soft tissues as well as the hard tissues. It was therefore considered useful, having asked prior patient consent, the execution of the surgical re-entry with the purpose to verify "*in vivo*" the outcome of the bone regeneration performed four months earlier in order to document its success. After having lifted a full thickness flap, it immediately showed that the grafted material had preserved its own volume in an excellent way, giving back to the treated site both from an anatomy and morphologic point of view a natural physiology (Figs 9-12). Furthermore, having perfectly integrated, it was not possible to distinguish the bone tissue from the host neither clinically nor radiographically. To all this has to be added up the excellent preservation of the soft tissues architecture, surely favoured by the choise of using a healing abutment prior to the surgery despite having performed a bone graft, contestually (Figs 14-16).

Discussion

The clinical experience presented wishes to be a contribution to research in the implant field, for therapeutic solutions characterized by a greater simplicity, predictability and less traumaticity

Figure 6
Bovine pericardium membrane placed to protect the grafted material.

Figura 7
Flap sutured with resorpable material.

even in those clinical situations characterized by advanced bone crest atrophies which would otherwise require surgical procedures much more complex for the surgeon and decisively more traumatic and invasive for the patient. Despite recognizing to autologous type material a superiority which is clear by the conspicuous literature available, it can be said that in the light of the clinical and histologic results achieved both in the odontology and orthopedic field, the homologous material here presented can be a valid alternative to the autologous bone. Furthemore, it can also be said that the efficacy of the homologous material used in the clinical case here presented lies mainly in the different processing it undergoes, capable to preserve intact the collagen structure and make it easier the colonization by the host blood cells.

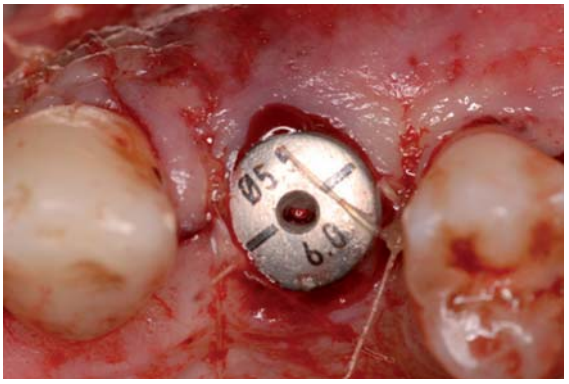

Figura 8
Occlusal view of the sutured flap at the end of the surgery.

Figure 9
Five months healing. Vestibular view.

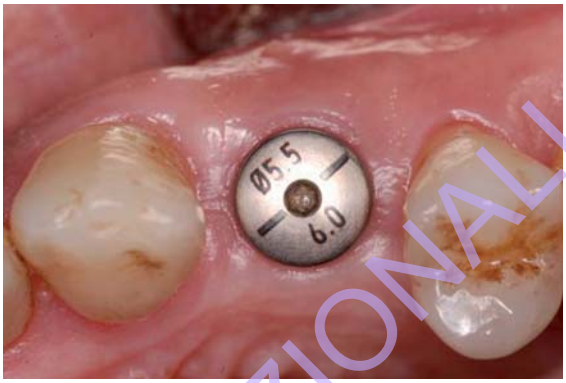

Figure 10
Five months healing. Occlusal view.

Figure 11
Surgical re-entry at five months. Vestibular view of the new regenerated bone.

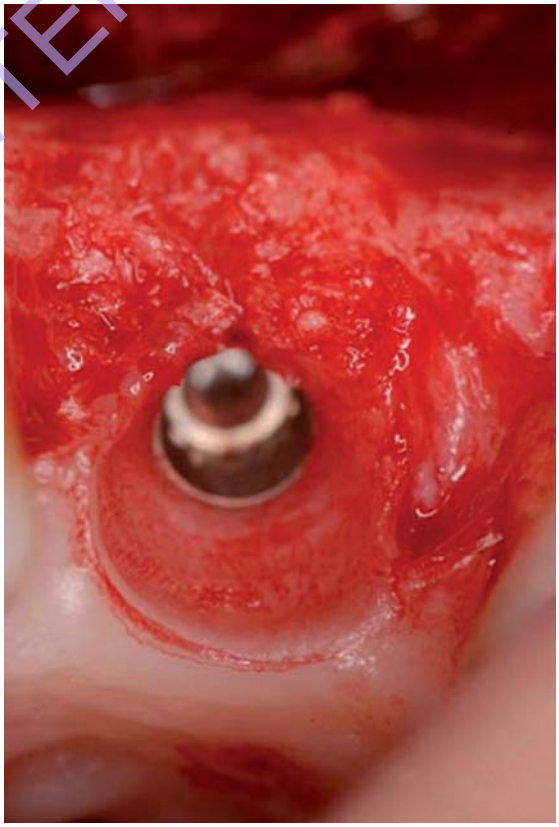

Figure 12
Surgical re-entry at five months. Occlusal view: it is possible to appreciate the complete restoration of the normal bone anatomy and the presence of a "radicular lump" essential in order to give to the final restoration "natural" aesthetic characteristics.

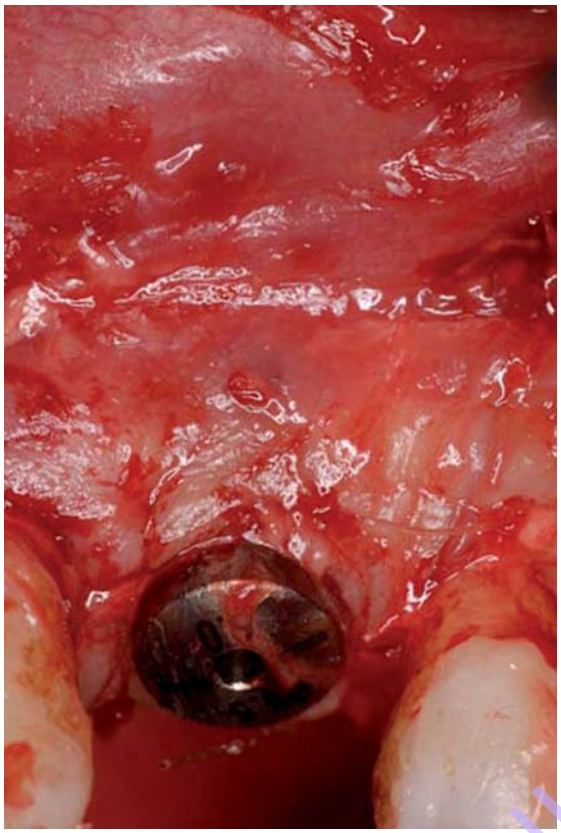

Figure 13
Repositioning of the healing abutment and suture.

Figure 14
View of the vestibular side of the treated part after the healing of the soft tissues.

Figure 15
Same perspective of the previous image soon after remotion of the healing abutment and immediately before the positioning of a transfert for taking the cast and with which the final prosthesization is started.

Figure 16
Occlusal perspective which shows the excellent health of the soft tissues and the transmucosal route adequately conditioned by the use of the healing abutment. Furthermore, the radicular lump can be clearly seen thanks to the good result achieved in regenerating the previous crest atrophy.

Conclusions

This and other clinical experiences have demonstrated the very good behaviour of the homologous bone in situations of more or less advanced atrophies. From a dimension point of view the grafts appear to be well preserved and rid of those resorpable phenoma worth noting. This is also due to the very good efficay of the heterologous membranes of pericardial derivation in insulating in a permanent way the surgical site winning the competition with the soft tissues. Furthermore, the particulate material presents an excellent easy way of using it even with the smallest defects which can then be regenerated contestually to the insertion of the implants. Its integrational capacity is decisively higher and it is not possible, at the of the healing, tell what is the grafted material from the host bone tissue and this under both the clinical and radiographical profile.

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