Implantology in the atrophied alveolar ridge without augmentation

Case study on the anterior maxilla

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_Introduction

In many cultures, a flawless set of teeth embodies vitality, health, youth and beauty. No wonder that, in all ages, ambitious dentists have strived for the provision of a perfect denture. Continuous research and the clinical monitoring of success rates have led to the triumph of modern implants. The possibility of a reliable and effective alloplastic root replacement opened up a variety of perspectives for a both functional and aesthetic rehabilitation after tooth loss (Esser 2010).

Implantological treatment concepts avoid the typical adverse effects of conventional prosthetic solutions. Due to their lack of bone resistance to pressure, mucosa-supported prosthetic solutions are often regarded as a compromise. Therefore, the risk of a profound atrophy of the Processus alveolaris and a consequential denture disability should be considered by any long-term therapy planning. This aspect is of utmost importance in cases involving a premature loss of teeth.

However, implants are still rarely included in the prosthetic strategies of the general practice. Therefore, improved functionality and superior aesthetic rehabilitation are long-term possibilities yet not fully exploited. Instead, intact abutment teeth are often threatened by the reduction of the tooth structure and by overload.

As reported by numerous studies performed in the last two decades, implants have a certain protective effect which is based on the possibility of a physiological chewing force initiation in the bone, thus maintaining the alveolar bone. Today, these positive effects are important arguments for patients who are interested in implants. They can form a helpful support in the decision-making process when developing an individual prosthetic treatment plan. Moreover, implant procedures are now generally acknowledged


Fig. 1


Fig. 2


Fig. 3

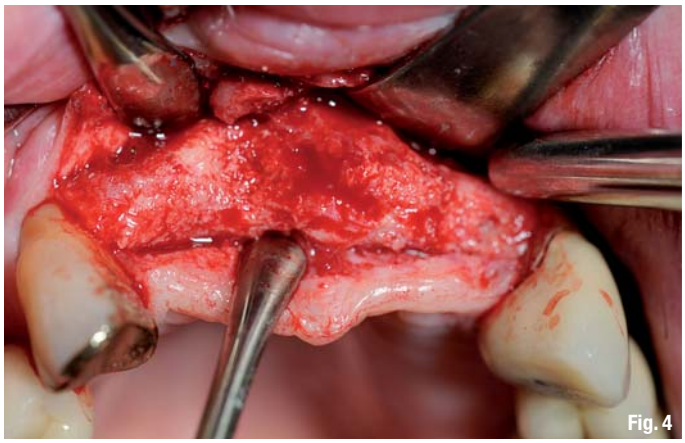
Fig. 4

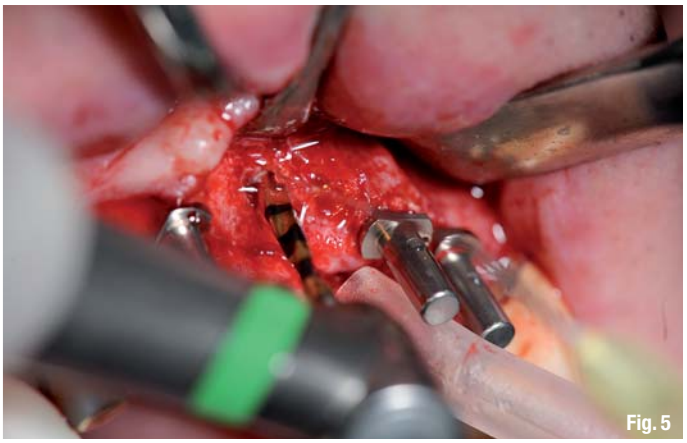
Fig. 5

as a safe treatment option. Nonetheless, researchers make great efforts to reduce the remaining deficits gathered from the data of long-term clinical studies.

_Tapered implants

Aesthetic restorations in the anterior maxilla require tapered implants with diameters designed as analogously to the teeth as possible, since the available apical space is often reduced. A sufficient diameter in the crestal region will permit a tooth-analogical profile. As a result, the existing bone material can be optimally exploited. However, dentists still come across the picture of a Processus alveolaris chamfered vestibularly, particularly in cases of pre-existing periodontal problems or tooth extractions performed a long time ago.

The retention of the peri-implant bone level is extremely important for an aesthetic, tooth-analogical reconstruction with implants. This measure is the only way for the peri-implant soft tissue to obtain sufficient osseous support and to avoid a collapse of the gingiva into the bone defect.

The newly-developed OsseoSpeed™ TX Profile Implant was modeled from nature. The resulting anatomically shaped and patented implant is designed to maintain the marginal bone both vestibularly and orally, i.e. circularly around the implant, and especially in the case of a transversally atrophied alveolar ridge.

In order to ensure optimum treatment outcomes in this context, special attention was paid to features such as the MikroThread™ and OsseoSpeed™ surface, as well as the Conical Seal Design™ and the Connective Contour™, which have already proved their liability within the so-called AstraTech BioManagement Complex.

In order to achieve the best-possible treatment outcomes surgically, the surgical procedure must follow the standard protocol for implant placement. Only during the fine adjustment of the implant position is it mandatory that the vestibular chamfered edge of the implant ends precisely with the vestibular bone lamella. This can be ensured with the help of a specially marked insertion device (Fig. 1).

_Case report

The following case report illustrates the most important steps of the implant placement. The general medical and internal case histories of the 65-years-old patient were unremarkable. His tendency towards

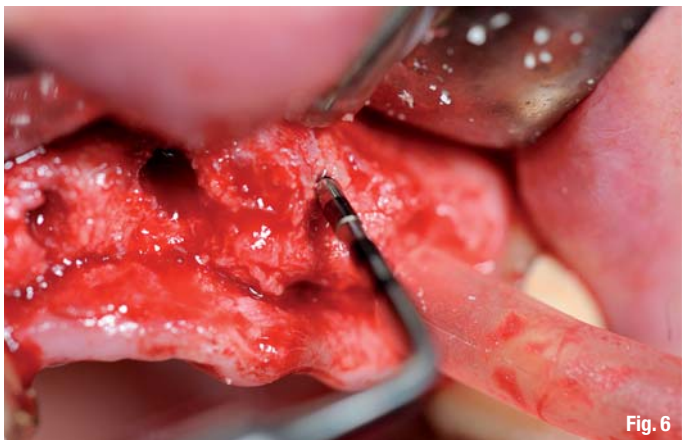
Fig. 6

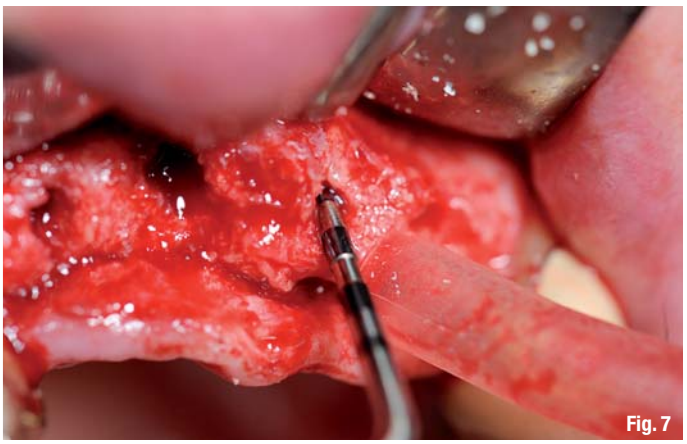
Fig. 7


Fig. 8


Fig. 9

chronic marginal periodontitis was well controlled by a systematic periodontal treatment. Only the anterior teeth #12, 11, 21 and 22 had not been preserved prior to the medical intervention.

Figures 2 and 3 illustrate the clinical situation prior to the implantological restoration of the edentulous space of teeth #12 to 22, approximately only four and a half months after the tooth extraction due to severe periodontal pre-damages. A transversally atrophied Processus alveolaris appeared after the formation of the mucoperiosteal flap and the opening of the surgical area, featuring an alveolar ridge width sufficient for implants of a diameter of 4.5 mm (Fig. 4). The verification and marking of the implant position are followed by the successive preparation of the cavities according to the well-known surgical protocol. Paralleling pins or paralleling tools can be applied to support the process already during pilot drilling in order to find an optimum axial direction and position (Fig. 5). Figures 6 and 7 demonstrate the problems of the transversally atrophied Processus alveolaris: The depth gauge in the implant cavity clearly depicts the measurable difference in the levels of the vestibular and the oral Pars compacta, amounting to approximately 1.5 mm. The implants are inserted as soon as the conditioning of the implant bed with regard to the diameter has been completed. In principle, this procedure can be initially performed by machine and according to the dentist's individual preferences. However, the final position must by all means be adjusted manually.

The OsseoSpeed™ TX Profile implant is removed from the sterile wrapping with the help of an implant driver. During the removal, a corresponding color marking must be adapted to the chamfered side of the implant(Figs. 8 & 9). Figure 10 shows how the fine adjustment of the implant position must be performed manually by means of a surgical ratchet wrench connected to handle. In this way, the dentist can determine the optimal final implant positioning accurately within a fraction of a millimeter (Fig. 11). The adjustment of the implant to a position most suitably adapted to the anatomical structures must therefore be realized by the application of light finger force. Visual control from the optimum position shows the flush transition of the inserted OsseoSpeed™ TX Profile implant to the adjacent bone of the slightly slanting alveolar process (Fig. 12). When this key position is achieved, the procedure can be continued according to the surgical standard protocol. Precisely configured closure screws were developed for this specific implant design. They are taken from a blister in a sterile manner (Fig. 13). Figure 14 depicts an implant shoulder adjusted to the anatomical structures with-

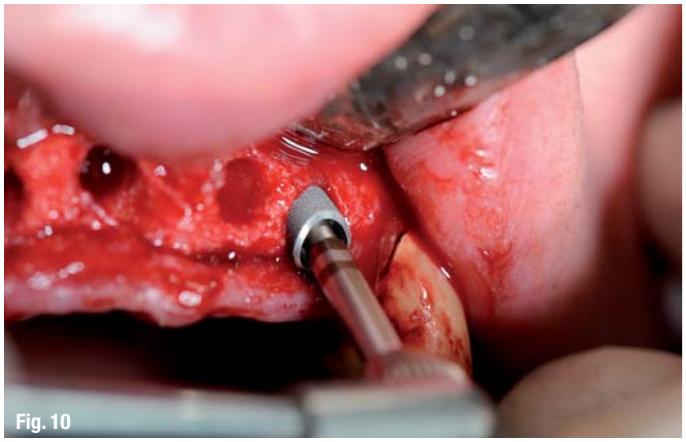
Fig. 10

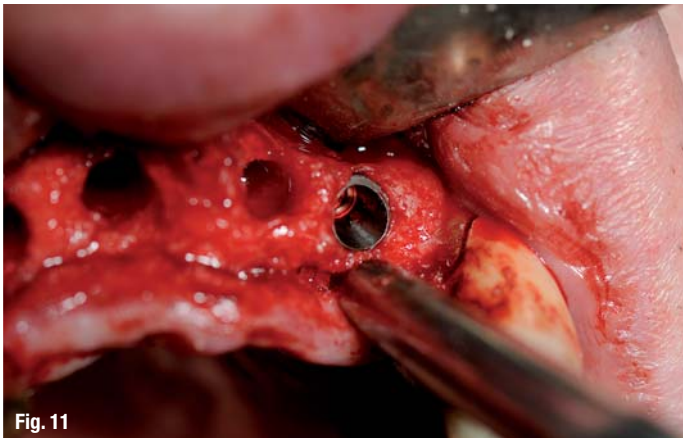
Fig. 11

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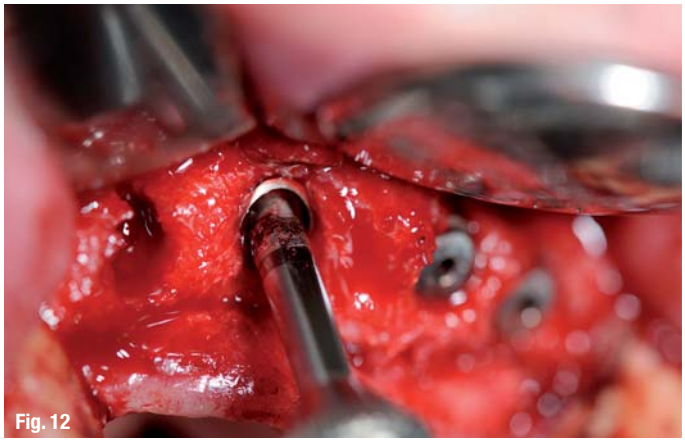
Fig. 12

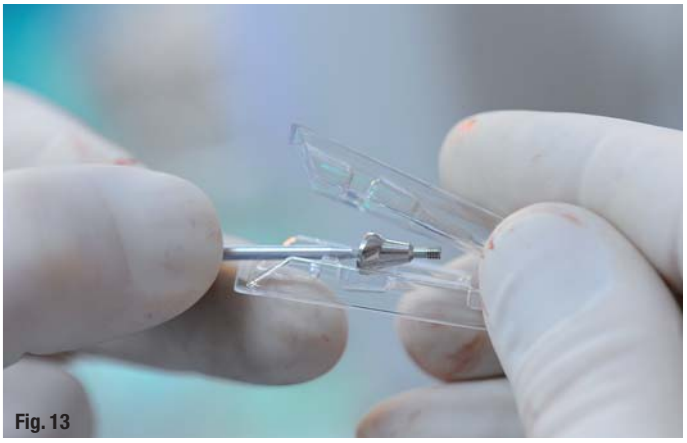
Fig. 13

out exposed implant surface. Thus, a complete circular support of the marginal bone after the insertion of the four anterior tooth implants regio 12, 11, 21 and 22 can be achieved. Augmentation is therefore not required after the insertion of the implants, but a primary wound closure is possible. In the present case, the provisional interim restoration was ensured by a removable denture. The subsequent healing process was clinically unremarkable and without any signs of irritation.

_Summary

This innovative implant design can be regarded as an indicator for future developments. It is particularly promising for an application in the transversally atrophied Processus alveolaris (vestibular). The tapered OsseoSpeed™ TX Profile implant has successfully closed a therapeutic gap, achieving valuable long-term outcomes without any need for additional augmentative procedures. This unique implant furthermore puts an end to the all too common compromise between the retention of the marginal bone level on the one hand and the achievement of attractive aesthetics in cases involving transversally atrophied alveolar ridges on the other. In addition, the implant's design makes it much easier to preserve the three-dimensional bony structure around the implant in accordance with the natural model. The retention of the marginal bone, both vestibularly and orally, also has positive effects on the approximal bone level and can support the natural aesthetics of the soft tissues. According to Prof Dr Dr Wagner, the implant design matches with the anatomy of the alveolar ridge rather than the Processus alveolaris adjusting to the implant. Therefore, the above-described implant is particularly suitable for an insertion into the aesthetic zone. However, due to the chamfered implant design, AstraTech recommends that this product initially only be utilized by dentists and surgeons who have extensive experience in the field of implant dentistry._

Editorial note: A list of references is available from the author. First printed in DENT IMPLANTOL 15, 6, 382–387 (2011).

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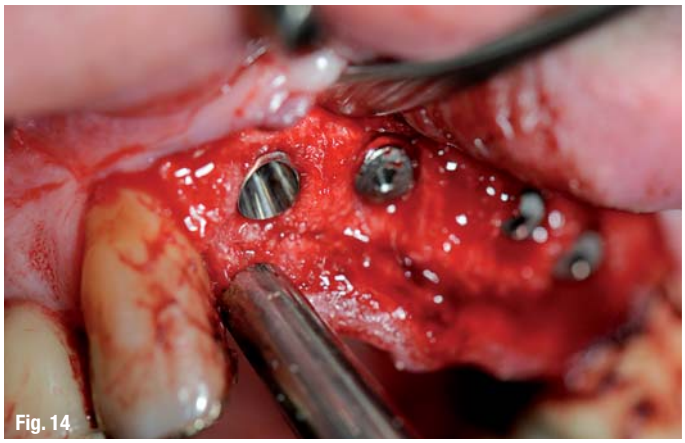
Fig. 14

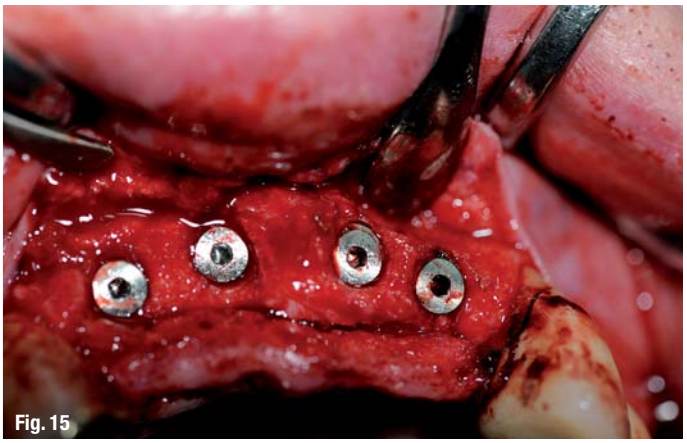
Fig. 15

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