Functional hard and soft tissue preservation in the sloped alveolar ridge

**Summary**

**Patient**

A 53-year-old woman presented with missing tooth 46. The alveolar ridge height at the site was uneven, sloping in a buccal direction by approximately 2 mm. The interdental papillae at tooth 45 and at tooth 47 were only marginally filled.

**Challenge**

To retain the hard and soft tissue structures around the implant to the greatest extent possible.

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**Fig. 1a** Not providing support to the lingual bone leads to its resorption.

**Fig. 1b** Risk of discoloration or necessitating augmentation.

**Figs. 2a–c** The height of the slope from the lingual to buccal side varies between 1.5 and 1.7 mm, depending on the design and diameter of the implant.

**Fig. 3** The CBCT images show the sloped atrophied alveolar ridge in region 46.
In order to reduce the risk of progressive vertical and horizontal alveolar ridge atrophy and subsequent loss of the papillae, an OsseoSpeed Profile (ASTRA TECH Implant System) was selected, with the expectation that its sloped implant design would optimally support the anatomical structures.

Treatment

Cone beam computed tomography (CBCT) was used for the planning of the case. After measuring the lingual and buccal preparation depth, an Osseo-Speed TX Profile was inserted. The final alignment of the sloped implant shoulder was carried out using the specially marked implant driver to ensure that the implant was placed flush to the bone. This allowed the marginal bone around the implant to be optimally supported. After approximately four months, the peri-implant mucosa was healed without irritation.

After making a final impression with a Profile Impression component, a TiDesign Profile Abutment (DENTSPLY Implants) was customised in the laboratory, and a metal ceramic crown was fabricated. About five months after implant placement, the ceramic veneered crown was cemented.

Case study

Adapting to the anatomical situation using a sloped implant design

Long-term clinical and aesthetic success of implant therapy can only be achieved if peri-implant hard and soft tissue structures are preserved to the greatest extent possible. Bone resorption after tooth loss in the posterior region can occur in a oro-vestibular as well as in a mesio-distal direction. In both cases the OsseoSpeed Profile implant (DENTSPLY Implants) is adapted to the anatomical situation because of its sloped implant design.

The primary objective of implant therapy is to achieve lasting functional and aesthetic success with minimal risk and without complications. As a result of tooth extraction or loss, however, horizontal and vertical resorption occurs. Horizontal resorption starts at the thinner alveolar outer walls. Vertical bone resorption is characterised by being more pronounced buccally than lingually, which can lead to a difference of up to two mm’s from the lingual to the buccal bone lamella.1

Anatomically shaped implant shoulder

When bone loss occurs, conventionally designed implants with flat implant shoulders can only partially support the peri-implant structures. This can result in discoloration of the buccal soft tissue margin or the unsupported bone may be resorbed (Fig. 1).

In order to avoid such undesirable consequences, the OsseoSpeed Profile implant was developed. The OsseoSpeed Profile implant is supported by the ASTRA TECH Implant System BioManagement Complex: OsseoSpeed, MicroThread, Conical Seal Design and Connective Contour. The implant is available in different lengths and diameters. As a result of its construction, the anatomical features...
The importance of maintaining the marginal bone level was demonstrated by Tarnow who showed that the presence or absence of a papilla largely depends on the distance from the bone level to the proximal contact point of the crown. An increase of the distance from the contact point to the bone level from 5 mm to 6 mm reduces the probability of a papilla presence from nearly 100% to 56%. Bone resorption of only 1 mm can thus suppress the development of the papilla.

The presented case shows that the vertical and horizontal atrophy of the jaw and the disappearance of the papillae could be countered successfully by using the OsseoSpeed TX Profile.

Clinical and radiographic examination

CBCT was used for the planning of the case. The CBCT image showed that region 46 had a bone level difference of about 2 mm and sufficient bone height above the inferior alveolar nerve. The ridge width and height were sufficient to place an implant with a 4.5 mm diameter and a 13 mm length. The interproximal papillae distal to tooth 45 and mesial to tooth 47 were reduced in height. Tooth 47 was clinically healthy. The endodontically treated tooth 45 had enamel defects, and improvement of its aesthetics with composite was planned for (Figs. 3 & 4).

Surgical workflow

After a crestal and intrasulcular incision, a mucoperiosteal flap was elevated, revealing the sloped ridge. After marking the implant position about 2 mm buccally to the highest lingual jaw ridge, the initial preparation of the implant site was done using a surgical template, in accordance with the manufacturer’s protocol. During the pilot drilling, the implant axial alignment was monitored with paralleling tools. The correct drilling depth was measured with an implant depth gauge at the bone walls. Initial insertion of the OsseoSpeed Profile was performed using the contra angle.

However, the final alignment of the sloped implant shoulder must be performed manually using a specially marked implant driver. It enables the sloped implant shoulder to be aligned with the bone within a fraction of a millimetre. The marginal bone around the implant can thus be optimally

Circumferential retention of the marginal bone

The OsseoSpeed Profile design provides bone support circumferentially, thus preserving the marginal bone and promoting the development of healthy peri-implant soft tissue. Because of its ability to preserve the bone lingually, buccally and approximally, the implant type is suitable in compromised molar regions with typically linguually sloped bone.
supported. Following placement of the implant-specific Healing Abutment Uni (DENTSPLY Implants), the soft tissue was sutured (Figs. 5 & 6).

The patient was recommended soft and liquid foods and to avoid chewing on the implant. After approximately 4 months, the peri-implant mucosa had healed without complications. During the healing phase, the defects of tooth 45 were aesthetically corrected with dental composite in order to facilitate the future provision of a crown (Figs. 7a–c). For the purposes of this case presentation, re-entry was carried out to inspect the marginal bone. Even without an augmentation of the dehiscence defect, bone regeneration had developed to the level of the buccal implant neck. After the re-entry procedure, the Healing Abutment Uni was re-inserted, and the soft tissue was sutured (Figs. 8a & b).

Fabrication of the crown

Two weeks later, the process of fabricating the implant restoration began (Figs. 9a & b). When using the OsseoSpeed TX Profile implant, specific prosthetic components must be used. The use of a titanium abutment is recommended in the posterior region with heavy occlusal load and little aesthetic requirements. It provides stability, while having no limiting effects aesthetically. For best results, the prefabricated TiDesign Profile titanium abutment was individualised in the laboratory to optimise the emergence profile and the progression of the marginal gingiva. When cementing porcelain-fused metal crown (PFM), care was taken to ensure that all cement residues were thoroughly removed (Figs. 10–12).

Follow-up

Clinical and radiological images were taken one, two and three years after implant placement and demonstrated the good clinical results of using the OsseoSpeed TX Profile implant. The interdependent features of the Astra TECH Implant System Bio-Management Complex together with the sloped implant neck worked to preserve the peri-implant tissues. No bone remodelling was observed, with the buccal and interproximal bone levels remaining stable at the level of the implant shoulder. Furthermore, the mesial and distal interdental papillae regeneratated, and an inflammation-free, keratinised peri-implant mucosa developed around the implant crown (Figs. 13–15c).