The Stable Tissue Concept

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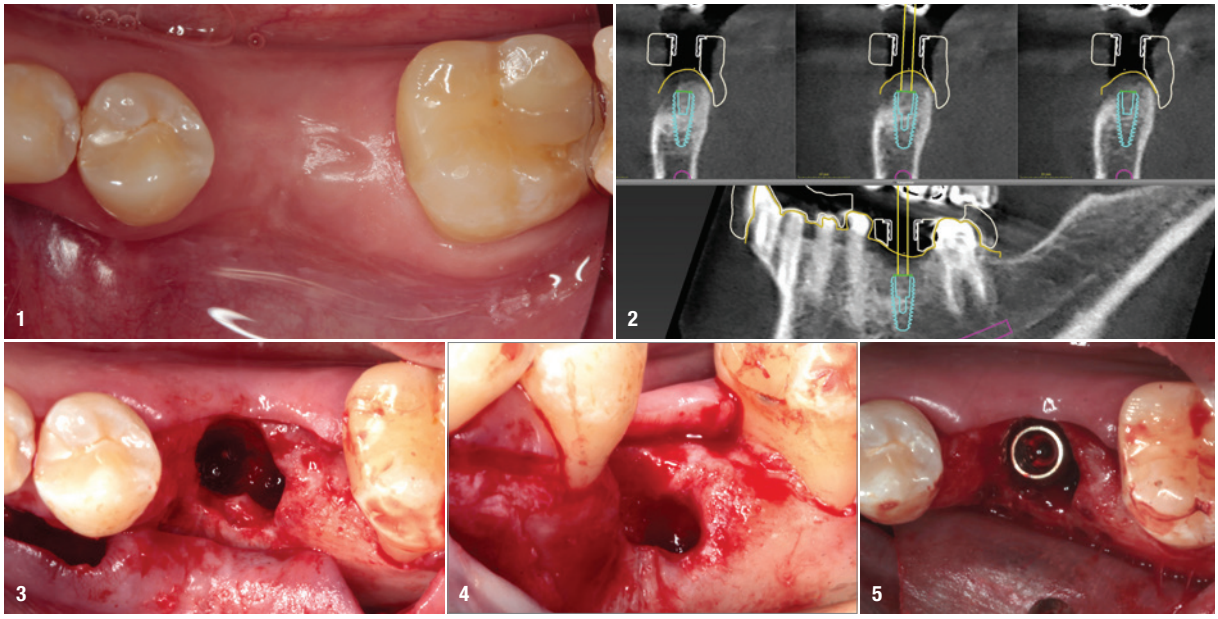
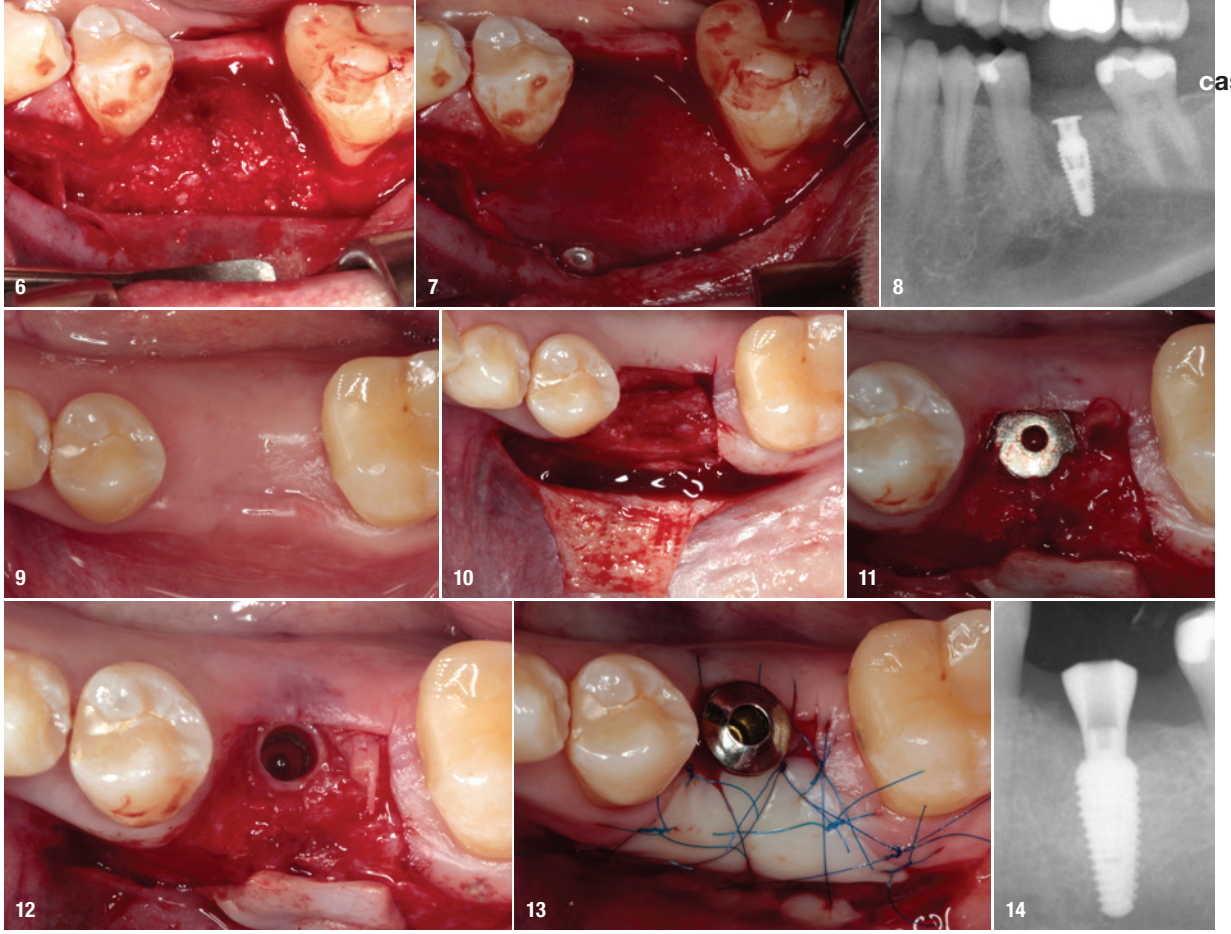
In order to achieve long-term stable results, it is important not to disregard biological principles. Bone and soft-tissue management should be an integral part of the portfolio of implantologists, since stable tissue is the basic prerequisite for implantological success. To this end, hard- and soft-tissue augmentation must be performed with materials adapted to the situation and indication. Another important factor is the choice of the implant system, because this can also be decisive for whether the bone level is maintained. Conical internal connections are therefore recommended, as they ensure the necessary stability of the abutment. Many reasons for bone resorption around implants are described in the literature. Firstly, implants are often screwed into bone that is too thin; a circumferential bony layer of at least 2 mm is required to keep an implant stable.[1] In addition, two-piece implant systems usually have the disadvantage that the abutment has some mobility. Twenty years ago, Hermann et al. were able to prove that it is not the gap between the implant components that induces bone resorption, but that this process is caused by micro-movements between the implant and abutment.[2] It is therefore important to select an implant system that completely eliminates these micro-movements. Numerous studies show that implant systems with tapered internal connections can avoid such movements.[3] However, there are also major differences between these implant systems. Systems with self-locking tapered connections show the least movement between implant and abutment, and that is particularly the case for the Morse taper connection.[4] The Morse taper was developed to secure tool components in the spindle of a tool. It is characterised by a taper angle of a maximum of 1.5°, transmitting the torque from the hollow cone of the operating tool spindle to the shaft of the tool, which is clamped in it, in a friction-fit manner by static friction as a result of self-locking.

The implant system (K3Pro, Argon Dental) used in the following case has such an internal connection. These implants do not show any gap formation in radiographic analysis, even at the maximum load of 200 N, and do not exhibit any micro-movements. In this case report, a clinical procedure according to the Stable Tissue Concept is described.

Clinical case

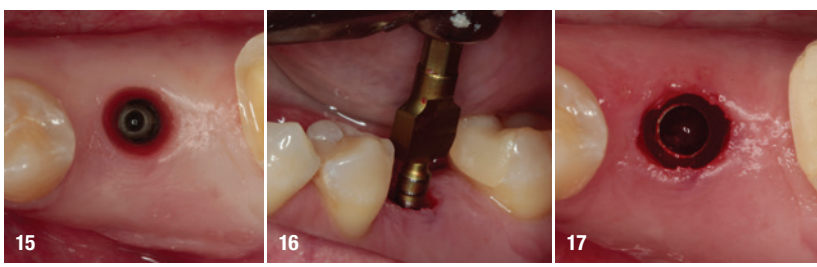
The patient visited the practice in 2016 after the removal of tooth #36 elsewhere to have the gap restored with a dental implant (Fig. 1). A bone defect was visible on the preoperative radiographic image (Fig. 2). After elevation of a mucoperiosteal flap and careful curettage of the surgical site, it became obvious that augmentation was required

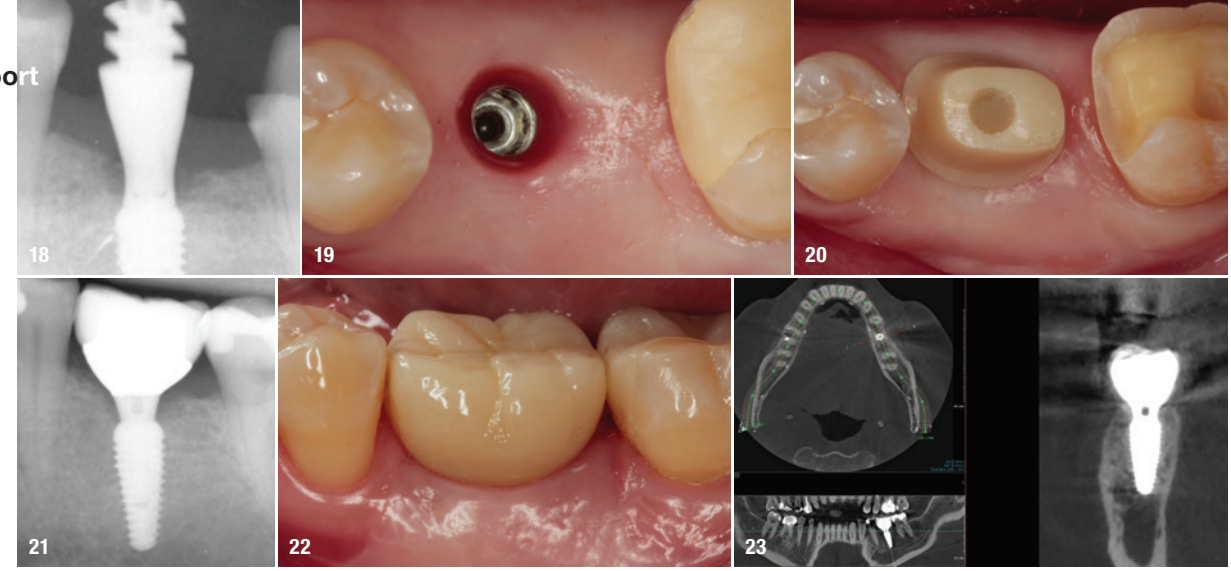




(Figs. 3 & 4). Despite the spectacular-looking defect, it was quite easy to augment. It was a multi-walled defect confined mesially and distally by two teeth that maintained the bone volume. The regeneration potential was therefore very high and favoured a prognosis of success. An implant was placed with high primary stability (Fig. 5). The author prefers bone grafting materials that resorb entirely and are converted into natural bone. Allogeneic bone has precisely these desired properties. The grafting material used here (Osteograft, Argon Dental) was human donor bone prepared by the German Institute for Cell and Tissue Replacement. The grafting material was prepared in PRGF (plasma rich in growth factors) matrix (BTI) to obtain so-called sticky bone.[5] Embedded in this clot, the particulate material adapts well to the defect (Fig. 6). Every grafting material needs stabilisation to prevent mechanical irritation, that is, it must heal in a completely stable position. Movement hinders the process of mineralisation, leading either to healing via the connective tissue or to resorption.[6] In this case, stabilisation was ensured by two things. First, a very rigid membrane was used. This membrane was a deproteinised thin cortical plate that becomes very flexible after rehydration. Second, membranes must always be fixated by pins, screws or sutures in such a way that movement of the barrier membrane is avoided. In this case, resorbable pins were used to protect the membrane both buccally and lingually from dislocating (Fig. 7). When employing an implant with a fixed tapered connection, like the one used here, it should be placed sub-crestally.[7] In order to facilitate the exposure, no cover screw was used for closure. However, a membrane support screw with a height of 2 mm was used to ensure more comfortable handling (Fig. 8).

Five months after insertion, it was found that the band of keratinised gingiva was to narrow and that movements from the cheek were transmitted to the alveolar ridge (Fig. 9). This underpins the importance of the presence of sufficiently keratinised gingiva.[8] Implant exposure was carried out by means of elevation of an apical flap (Fig. 10). If locating the membrane support screw is easy, as it was in this case, in almost all cases no further removal of bone is necessary (Fig. 11). Upon removal of the screw, the effect produced by this procedure became visible. Figure 12 clearly shows the cylindrical chimney that extended the entire length of the membrane support screw to the transition into the inner cone. This tissue was quite stiff and immobile. The histological composition would be interesting to know, since macroscopic evaluation is rather difficult. The author suspects that this was a complex connective tissue structure with slight mineralisation. For this treatment case, the author had a customised anatomical healing abutment milled, which was to accommodate the slim design in the apical part so that the augmented bone did not have to be removed again (Fig. 13). Owing to the still insufficient amount of keratinised tissue and lack of soft-tissue thickness, an





autologous soft-tissue graft was taken from the palate and fixated vestibularly to ensure that there was no movement whatsoever (Fig. 14). The thickness of the tissue above the implant shoulder also plays an important role; it should not be less than 3 mm, otherwise bone resorption will occur.[9]

Prosthetic restoration

Two months after exposure, the prosthetic restoration was carried out. Since an individual anatomical healing abutment was used in this case, the implant shoulder was completely covered by the connective tissue chimney described (Fig. 15). In order to expose the shoulder, the entire chimney was removed again with the aid of a sulcus former so that the impression post could be placed on the implant shoulder without a gap (Figs. 16 & 17). However, the entire biologically built structure was destroyed as a consequence (Fig. 18). At the time of crown installation, the situation was macroscopically completely free of irritation and healed (Fig. 19). An individually tailored hybrid abutment made from zirconia was attached to a titanium adhesive base and placed in the patient, and a lithium disilicate crown was cemented intra-orally (Fig. 20). The postoperative radiograph shows the gap-free fit and the removed bone in the apical region of the abutment (Fig. 21). Clinically, a perfectly integrated restoration without tissue loss was seen four years after placement (Fig. 22). The CBCT scan showed that complete remineralisation of the bone in the interface appeared to have occurred (Fig. 23).[10,11]

Discussion

This procedure, which was very experimental at the time, has since become the standard procedure in the author's practice and is the basis of the Stable Tissue Concept. The parts required for the Stable Tissue Concept are now available preassembled. This means that all the parts, from the anatomical healing abutment to the abutment, have been modified to the required geometry and matched to each other in such a way that no tissue needs to be removed in the interface. The impression post no longer rests on the implant shoulder for reference, but is attached deep in the index of the implant to enable precise impression taking without being inhibited by the taper. The implant used here serves as the basis of this concept. The internal connection with the Morse taper cone fulfils creates the prerequisite that any movement in the abutment is eliminated and no bone resorption occurs. The standard insertion depth of the implant is 2 mm sub-crestally. Such a procedure is only possible with this internal connection; it is possible to insert the implant even deeper without causing any biological complications. Of course, hard- and soft-tissue augmentation must be performed in such a way that the biological conditions for long-term success are created. The augmentative procedure must be adapted to the specific clinical situation. No matter the case, sufficiently thick soft tissue ensures that there is little bone resorption. In the author's practice, the aim is always to generate 4–5 mm of keratinised gingiva above the implant shoulder.

about the author

Germany-based **Dr Kai Zwanzig** studied dentistry at the University of Münster in Germany and received his PhD from the same university. He completed a four-year specialisation in oral surgery. Since 2007, he has been in private practice together with Dr Bodo Zwanzig in Bielefeld in Germany, which he established as a referral practice for oral surgery specialising in complex implant cases, plastic periodontal surgery, anterior aesthetics and ceramic restorations. He has authored specialist articles in numerous dental journals.

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Literature

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