Surgical procedure

Drilling template

A drilling template can be advantageous for the prosthetically favourable positioning of the implants. The use of drilling templates fabricated on the basis of CT pictures has already been described.

Fig. 7
Lab fabricated drilling template

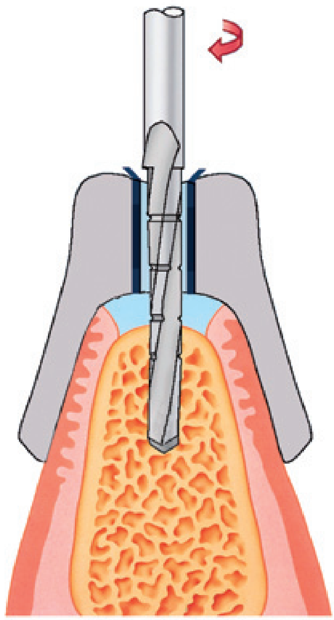


Fig. 8
Representation of pilot drill hole using a drilling template

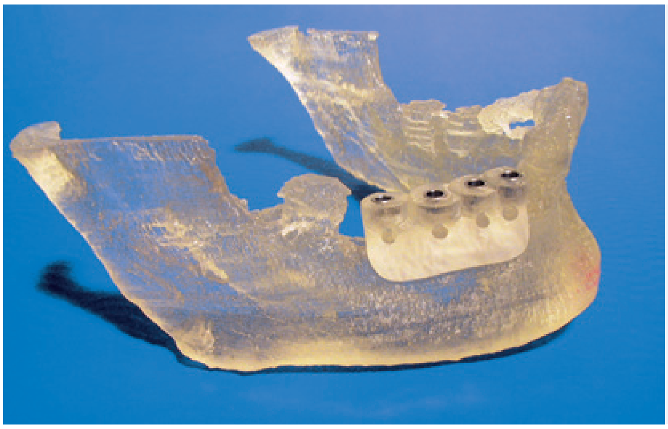
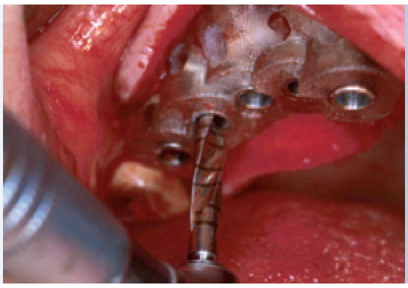
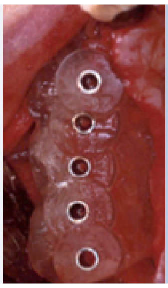
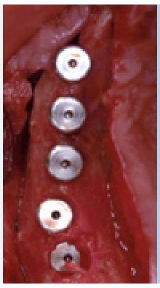


Fig. 9
Drilling template (SurgiGuide) of the SimPlant® platform, Materialise GmbH

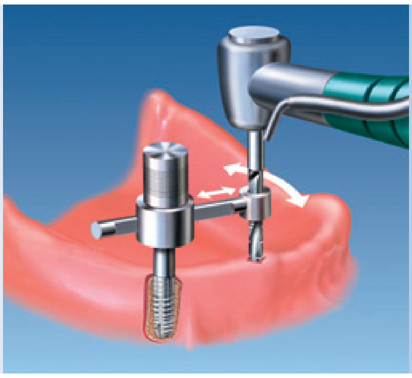
Fig. 10
Drilling template in situ







The fabrication of the drilling template in the dental laboratory is carried out on the basis of an impression and the pertaining radiographs. For the Trias® implant system the associated sleeves are available which consist of a sleeve-in-sleeve system. When the template is fabricated with a sleeve 2.0 mm in internal diameter, a fitting sleeve with an internal diameter of 2.0 mm can be inserted:



One possibility of influencing the direction of insertion in a defined way when several implants are inserted is the use of the parallel implant. The resulting prosthetic direction of insertion may be limited for certain treatments (bridge or bar, conical or telescopic crown).

Using the knurled head screw, the parallel implant is screwed into the implant inserted first. The freely movable arm serves to make the next pilot drill hole. The mobility is limited by the length of the arm and its axial rotation. With various arms an axial rotation from 0° to 6° and up to 10° is possible.

Incision

In dependence on the number of implants and on anatomic and esthetic aspects, the gingiva is opened using a scalpel or laser and the location for the implant is freed by folding the soft tissue cover outwards (the implant should, if possible, be placed at the highest point of the bone). Alternatively, opening can be carried out using a mucosa punch (optionally available). For this procedure the exact bone dimensions must, however, be known.

Opening by means of a scalpel offers a good view of the place of implantation and the incision can be expanded, if necessary. Some examples:

Mandible, without teeth – implants interforaminal

Fig. 11: Two implants mandible

Fig. 12: Four to six implants/vestibuloplasty

Fig. 13: Four to six implants, transgingival or immediate loading / cone

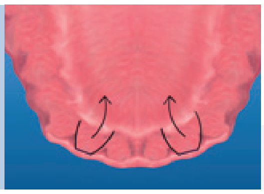


Fig. 11

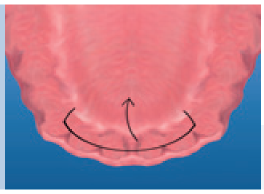


Fig. 12

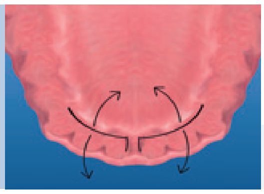


Fig. 13

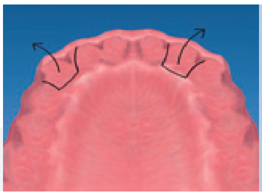


Fig. 14

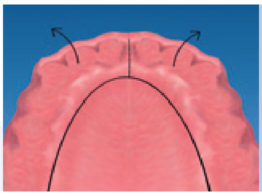


Fig. 15

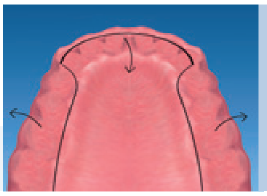


Fig. 16

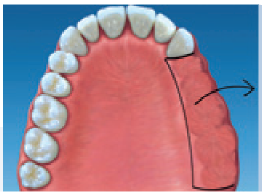


Fig. 17

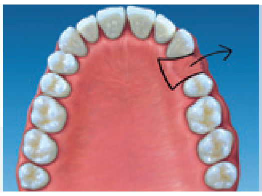


Fig. 18

Maxilla

Fig. 14: Single-tooth implants

Fig. 15: Several implants

Fig. 16: Several implants / alternating incision for vestibuloplasty

Fig. 17: Free-end gap, palatally displaced incision

Fig. 18: Single-tooth implantation, parapapillar incision

The drills of the *Trias®* implant system need external cooling. It takes place automatically via a separate supply on the surgery hand piece or is ensured by a surgery assistant. The risk of overheating of the bone by clogging of the cooling hole as may occur when internally cooled drills are used is thus avoided.

Preparation of Implant Bed

The descriptions of the following drilling steps give recommendations which need to be adapted to the surgery conditions depending on the bone mineral density and the bone quality.

A. Marking with the round or cortical drill
at the prosthetically optimal point. If the ridge is tapered, the place of insertion which at least is of the order of the implant diameter should be flattened beforehand using the round drill.
Recommended speed: 1,400 rpm. (Figs. 19 and 20)

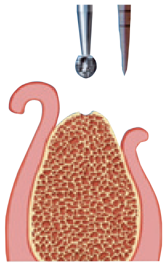


Fig. 19

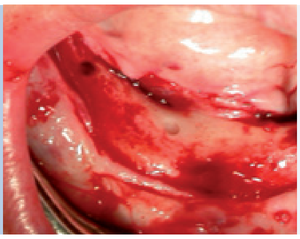


Fig. 20

B. Pilot drilling with the twist drill
The twist drill has a diameter of 2.0 mm and is provided with depth marks corresponding to the implant lengths: 8, 10, 12, 14, 16 mm. The depth of the pilot drill hole depends on the anatomic situation and the implant length selected. For each implant length, a depth stop is available which is slipped over the twist drill to define the drilling depth.
Recommended speed: 800 rpm. (Figs. 21 and 22)


Fig. 21

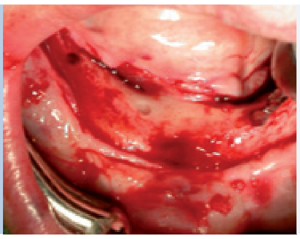
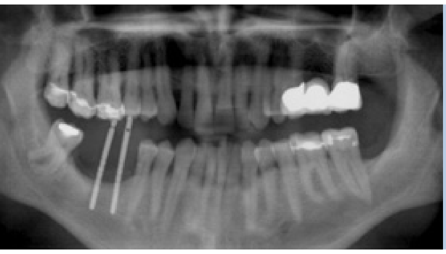


Fig. 22



C. Depth measurement

The depth measurement can be carried out using the depth gauge or the parallelization tools. Both instruments have a depth graduation beginning with 8 mm and extending in 2 mm spacings up to 16 mm. If parallelization tools are inserted, the pilot drilling can be checked against a radiograph and changes can be made, e.g. the pilot drill hole can be deepened or a final drill shorter than originally provided can be used (Fig. 23).

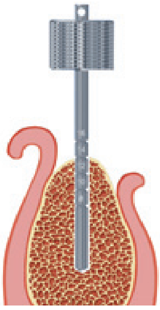


Fig. 23

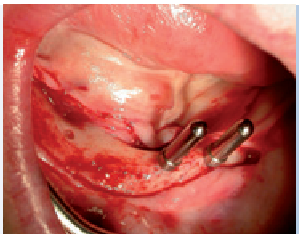


Fig. 24

When several implants are inserted, the parallelization tools can substantially support the parallelism of the pilot drilling. To achieve this, a parallelization tool is positioned in the completed pilot drill hole. Then the alignment of the next pilot drilling can be made visually (Fig. 24).

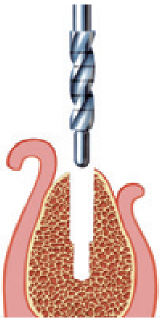


Fig. 25

D. Extension with the 2-caliber drill

The 2-caliber drill is a special cutter which follows the specified pilot drilling with its round guiding nose (2.0 mm dia.) and increases the drilling diameter to 3.0 mm. The depth specified for the pilot drilling is not changed.
Recommended speed: 800 rpm. (Figs. 25 and 26)

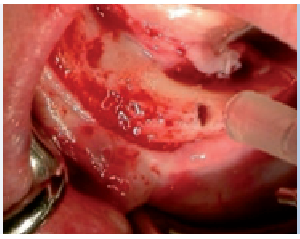


Fig. 26

E. Final drilling, 3.3 mm dia.

All final drills are provided with a depth stop. The selection of the right length must be borne in mind. For the 3.3 mm diameter, only one final drilling is necessary.

Recommended speed: max. 600 rpm. (Fig. 27)

Fig. 27

Fig. 28

F. Final drilling > 3.3 mm dia.

For a final diameter of, for example, 3.8 mm, first the final drill of 3.3 mm dia. (green colour ring) and then the final drill of 3.8 mm dia. (yellow ring) are used.

Recommended speed: max. 500 rpm. (Figs. 27, 28 and 29)

For implant diameters greater than 3.8 mm, final drills 4.4 mm, 5.0 mm and 6.5 mm in diameter are available. Here, as a principle, the drills with the smaller diameters are used one after another in ascending order as pre-drills. For the implant 6.5 mm in diameter, the separate 6.0 mm pre-drill is used as an intermediate step.

Recommended speed: max. 400 rpm.

Fig. 29

Attention:

Careful preparation of the implant bed with intensive but pressureless cooling is to be ensured. This applies to the relatively large diameters of 5.00 mm and 6.00 / 6.5 mm in particular.

The four- to six-edged final drills are very well suited to obtain autologous bone material (Fig. 30). For purposes of augmentation, this material can be collected in the lab dish.

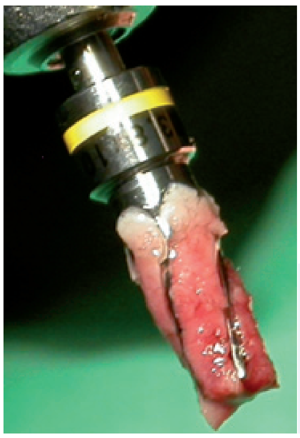


Fig. 30

Insertion

Before breaking the seal, the diameters (colour coding) and the length of the implant must be checked. The *Trias®* implant is removed from the packaging and inserted into the implant bed after having briefly been wetted with autologous blood. The *Trias®* implant is arranged on an implant carrier (see page 19) which is identical with the universal insertion tool.

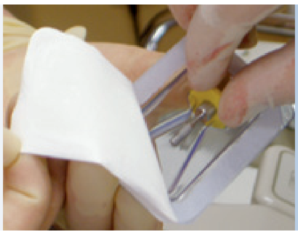


Fig. 33

The implant needs not be transferred but can be set into the prepared implant bed and then be gently inserted direct from the packaging (Fig. 33).

By slowly inserting the implant (approx. 15 rpm, torque max. 60 Ncm), the self-tapping capacity is ensured while the friction increases sensibly. After one or two revolutions the plastic ring can be removed. Then the insertion can take place flush with the cortical bone (Fig. 34). Make sure that no soft tissue particles get into the implant bed.

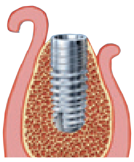


Fig. 34

The final position of the implant should be reached by means of a torque ratchet (see also chapter 6). At a recommended torque of 35 to 45 Ncm, this allows an estimate of the actually reached torque to be made (Fig. 35).

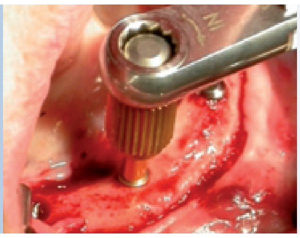


Fig. 35

- > It is pointed out that immediate loading is not recommended for a torque < 35 Ncm
- > If 45 Ncm is exceeded, the protocol for dense bones is to be complied with.
- > As an alternative to manual insertion, the *Trias*® implants can also be inserted using the mechanical insertion tool, the recommended speed being 20 rpm.
- > The implant position can be checked using the implant post.

Implant Closure and Suture

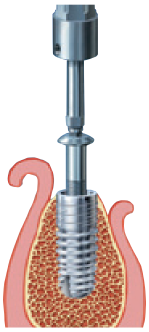


Fig. 36

By means of the healing screw forming part of the implant carrier the implant is closed. The torque ratchet is not used here (Fig. 36).

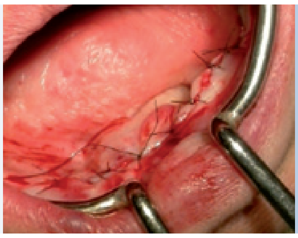


Fig. 37

Now the wound is closed with a head or mattress suture depending on the esthetical (e.g. papilla form) or anatomic requirements (Fig. 37). Before closure, defects in the jaw or extraction wounds can be augmented.

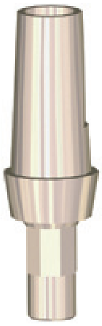


Fig. 38

In case a temporary denture is necessary in the front teeth area, a temporary element with different gingival heights is available. This element which is made of plastics can be provided with a temporary crown which is ground out of contact and has a purely esthetic function (Fig. 38). Further details are available from product sheets offered for the respective system elements of Servo-Dental.

General information:
The patient must be instructed expressly and in detail about the necessary oral hygienic measures and integrated into a continuous recall system.