Miniscrews—a focal point in practice

Six-part series by Dr Björn Ludwig, Dr Bettina Glasl, Dr Thomas Lietz & Prof. Jörg A. Lisson—Part II

DENTAL TRIBUNE Asia Pacific Edition

Miniscrews— a focal point in practice

Preparing for insertion

The insertion of a miniscrew is a very simple and rapid therapeutic measure. Although there are several methods that will yield good results, successful insertion requires adherence to a few important principles. The following text details those insertion steps that offer a high degree of safety for both patient and dentist (see checklist for insertion below). It should be noted that this information is generalised and must be adapted to individual circumstances.

Checklist for insertion

Pre-operative planning and preparation:

- planning documentation (X-ray, situational models);
- marking of the muco-gingival line and tooth axes on the model, determining the site of insertion;
- sterilisation of the instruments and preparation of the workstation.

Anesthetic and assessment of the patient:

- anesthetic;
- use of X-ray side; and
- control image.

Selection of the screw:

- measuring of the thickness of the mucous membrane (optional);
- determination of the length; and
- determination of the type of screw.

Transgingival penetration:

- excision of the mucous membrane or perforation with the screw.

Preparation of the bone site:

- optimal marking of the bone; and
- perforation of the cortical bone or deep pilot drilling, depending on the type of screw.

Insertion of the miniscrew:

- manually or by machine.

Start of orthodontic measures:

- marking and fixing of the lingual elements.

Post-operative care:

- notes on care and behaviour, and
- check-up dates.

Removal of the miniscrew:

- removal of the linking elements; and
- removal of the miniscrew.

General notes on insertion

Accurate pre-operative planning is a basic requirement for successful treatment with miniscrews. Such planning includes a comprehensive anaamnesis and an accurate assessment of the findings. It is essential that the treatment be thoroughly explained to the patient.

Proper hygiene must be ensured throughout the entire operation. Both the dental chair and the treatment process must be prepared with this in mind. During the insertion of a miniscrew, adherence to all hygiene measures required for an invasive procedure, such as a sterile work environment, and gloves, must be ensured. All instruments required for insertion must be checked for completeness, functionality, and sterility. The patient may rinse with a disinfectant solution, or a suitable disinfectant can be locally applied. The patient should then be positioned to ensure a clear view of the operational area and ergonomically facilitate insertion for the treating dentist.

Pre-operative planning

To function correctly, a miniscrew requires firm anchorage in the bone (primary stability) and the positioning of its head in the denser gingival tissue (gingiva alveolaris). The selection of the insertion site must take clinical and para-clinical findings into account (X-ray image, model), as well as the goal of the treatment and the resulting orthodontic apparatus. For interradicular insertion, a bone thickness of at least 0.5 mm around the miniscrew is required. This means that for a miniscrew with an—for many reasons—optimal diameter of 1.8 mm the roots must be at least 2.5 mm from each other; thus, the bone status and the longitudinal axis of the insertion site must be carefully evaluated.

Basic information regarding this is obtained by carrying out measurements on the model. It often helps to mark the vertical axis of the teeth and the progression of the muco–gingival line on the model, based on the clinical and radiological findings. This will allow for an improved assessment of the spatial circumstances in combination with the X-ray image. To assist the accurate determination of the insertion site, X-ray aids (Fig. 2.1) are available. Although their use facilitates the selection of the insertion site, they cannot replace other diagnostic measures.

Transgingival penetration

- excision of the mucous membrane or perforation with the screw.
• Bone thickness < 6 mm: mini-
screws cannot be used.

The following guidelines aid
in selecting the length:
• In the buccal region of the up-
per jaw: 8 mm or 10 mm;
• In the palatal region (de-
 pending on the region): 6, 8 or
10 mm; and
• In the lower jaw: usually 6 mm
or 8 mm.

determination of the type of
thread
Self-cutting miniscrews re-
quire pre-drilling (also known as
pilot drilling) appropriate to the
length and diameter of the screw,
as well as to the quality of the
bone. A self-tapping miniscrew
will find its own way into the bone
and requires no pre-drilling
(Figs. 2.7a & b). Bone is more or
less elastic depending on site,
and requires no pre-drilling
(Figs. 2.9) or the work rack
from its sterile packag-
ing (Fig. 2.8a). The miniscrew
must be re-
move carefully to avoid breaking the
root (Figs. 2.8a & b).

insertion of the miniscrew
The miniscrew must be
inserted through gingival tissue.
Because of their dimensions, long
blades pose the risk of attaining a
very high torque during insertion.
Thus, insertion must be carried
carried out carefully to avoid breaking the
miniscrew. Torque ratchets are
available for use with some sys-
tems (e.g. tomas, DENTAURUM;
and LOMAS, Mondeal), which
provide a certain amount of con-
trol over the insertion torque.

transgingival penetration
The miniscrew must pene-
trate through gingival tissue,
which must thus be perforated
during insertion. Two methods
are used for the perforation of the
gingival tissue:
a) excision of the gingival tissue;
or
b) direct insertion of the screw
through the gingival tissue.

There are currently no pub-
lished studies that investigate the
effect of these two methods on
post-operative problems, histo-

tical effects, and/or the loss
rate of miniscrews.

Preparation of the bone site
Protection of the bone is
an important aspect. Insertion
without pre-drilling results in
tensional stress within the bone,
which may lead to post-opera-
tive complications. Particularly
in the case of crestally placed
screws, bone displacement may
result in a severe expansion of
the periosteum. The thickness
of the cortical bone, especially
in the lower jaw, can have a sig-
ificant effect on the torque of the
screw. To ensure that the screw
is not overloaded during inser-
tion, the compact bone of the
anterior lower jaw should be
perforated by pre-drilling as
mentioned earlier. Pre-drilling
should be done at a maximum of
1,500 rpm, using a short pilot
drill and water-cooling to re-
duce the risk of damaging the
root (Figs. 2.8a & b).

Manual insertion
Manufacturers supply various
screws with blades available for use
with some systems (e.g. tomas,
DENTAURUM; and LOMAS, Mondeal),
which provide a certain amount of
control over the insertion torque.

A self-tapping miniscrew
will find its own way into the bone
and requires no pre-drilling
(Figs. 2.7a & b). Bone is more or
less elastic depending on site,
and requires no pre-drilling
(Figs. 2.9) or the work rack
from its sterile packag-
ing (Fig. 2.8a). The miniscrew
must be re-
move carefully to avoid breaking the
root (Figs. 2.8a & b).

Insertion of the miniscrew
The miniscrew must be
inserted through gingival tissue.
Because of their dimensions, long
blades pose the risk of attaining a
very high torque during insertion.
Thus, insertion must be carried
carried out carefully to avoid breaking the
miniscrew. Torque ratchets are
available for use with some sys-
tems (e.g. tomas, DENTAURUM;
and LOMAS, Mondeal), which
provide a certain amount of con-
trol over the insertion torque.
Machine insertion

Machine insertion requires a surgical treatment unit (the torque of which can be controlled) or at least a low-rpm dual green handpiece. Accurate setting of the torque and the number of rotations is required; the rotation rate should not exceed 30 rpm⁻¹, and the torque must be restricted to the maximum load limit of the screw.

Machine insertion helps to achieve a consistent torque during insertion but means that the operator loses perception of the bone. During manual insertion, it is possible to perceive the interaction between the screw and the bone by tactile senses. Insertion by machine is shown in Figures 2.11a–f.

Attaching the orthodontic linking elements

As no healing phase is required, load may be placed on the miniscrew immediately after insertion. The selected linking element must be prepared accordingly and attached to the head of the screw (Fig. 2.12). To avoid damage to the teeth to be moved, the load on the linking element should be between 0.5 and 2 N (about 50 and 200 g).

Basic post-operative care

The healing of the gingival tissue and hygiene status after insertion must be regularly reviewed during the entire time that the miniscrew remains in place. The patient must be informed that any manipulation of the screw head with the fingers, tongue, lips, and/or cheeks should be avoided, otherwise the screw may be prematurely lost.

Removal of the miniscrew

A miniscrew can be removed under local anaesthesia. After the linking elements have been removed, the miniscrew may be removed with the same tools used for insertion. The resulting wound requires no special care and usually heals within a short time.

If it isn’t clean, it can’t be sterilised!

Hydrim and Statim, your perfect partners in the sterilisation process

Authorities now recommend that instruments cannot effectively be sterilised unless they have first been cleaned in a mechanical washer. Across Europe guidelines are under review to reflect this advice. That’s why effective sterilisation begins with the Hydrim® C51 wd or M2 instrument washer. • Hydrim pre-wash removes proteins • Hydrim uses two high pressure sprays to remove virtually all organic debris • Hydrim is independently tested for 99.9% - 100% efficacy • Hydrim perfectly prepares instruments for sterilisation • Hydrim uses patented instrument protection system • Hydrim helps protect the dental team against puncture injuries

Following the Hydrim wash cycle, the instrument basket can immediately be transferred into an S class Statim® autoclave cassette for the fastest sterilisation cycle available. Most instruments, including handpieces can now be sterilised between patients in a Statim2000G in only 8 minutes. The fast Statim S cycle process fully complies with the latest European standard EN13060 and R4 guidelines.

• Statim, the world’s most popular autoclave, automatically sterilises all solid, hollow, wrapped and unwrapped loads.

• Statim is 5 times faster than typical B-cycle autoclaves

• Statim is validated to sterilise dental instruments including handpieces

• Statim’s performance is validated by biological and mechanical means

• Statim provides tracking and record keeping via printer or data logger

The compact Hydrim C51 wd and Statim units are designed for benchtop use and are the perfect partnership for the sterilisation area even in the smallest practice. The floor standing Hydrim M2 can process about 100 instrument sets in a 10 hour day and is ideal for the larger, busy practice.