Miniscrews—a focal point in practice

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

Therapeutic auxiliary elements

Down in the jungle

The number of dental suppliers worldwide that offer miniscrews has expanded to an estimated 45 and this number is still growing. Two trends are apparent from the range of products that are currently available. There are companies that supply miniscrews only in combination with the required insertion instruments. However, miniscrews are only a means to an end where bone anchorage is concerned—an aspect that is far too often overlooked. This is because if the desired therapeutic outcome is to be achieved, appropriate auxiliary devices must also be used (eg, springs, elastic chains, wires). For the purpose of a treatment, this means that a range of suppliers must be approached in order to obtain all the elements required for the actual procedure. A potential problem under these circumstances is that the miniscrews and the auxiliary elements may be incompatible. Very few suppliers of miniscrews also offer a complete system. Such a system consists of diagnostic and therapeutic auxiliary products, in addition to miniscrews (Table 1). In the case of a complete system, it can be assumed that the head of the miniscrew will be compatible with the auxiliary elements. The building block principle can be used to construct an individually tailored appliance from the various elements. The greater the range of auxiliary elements that is available, the more freedom and flexibility these elements afford in a range of applications.

Auxiliary elements for direct chairside use

These auxiliary elements can be divided into three main groups:

• basic elements;
• semi-finished elements; and
• finished elements.

Classification is determined by the extent to which the user has to process or manipulate the element before it can be used.

Basic elements

These consist solely of orthodontic wires (particularly wires with square profiles but also those with round profiles) of various grades and materials. The wires are used to fashion individual auxiliary appliances, which can be of less resistance to torque. Square profile wires, however, can be subjected to 3-D inspection because they are torsion-free and highly stable and provide (depending on their dimensions) for a very rigid attachment between miniscrew and appliance (Fig. 2). It is advisable to use a grade of wire that fills the slot of the miniscrew.

In some cases, it may be necessary to bend a square profile wire. This can be advantageous in mesialisation when a hook can be provided on the pin for attaching a spring or stainless steel wire.

Fig. 1: The wire ligature is appropriately activated and applies the required force for repositioning of the canine. (Photo: Dr Morea, Brazil)

Fig. 2: The use of a square profile wire makes it possible to achieve very rigid (indirect) attachment. (Photo: Dr Böhm, Germany)

Fig. 3a: Situation after 13 months of uprighting and space closure, clinical situation (a) and X-ray (b).

Fig. 3b: Situation after 13 months of uprighting and space closure, clinical situation (a) and X-ray (b).

Fig. 3c: A round profile wire was attached to a proximal tube by using a straightening spring. Clinical situation (a) and X-ray (b).

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Nature knows best.

Millions of years of evolution went into refining the protein systems that stabilise and transport calcium and phosphate essential for the growth and health of our teeth and bones. Whether it is the protein carrier systems for bone growth or enamel formation, or statherin in saliva or casein in milk, they all share a common ancestry**: evolution and natural selection have refined and perfected these systems. Cows’ milk remains the most efficient carrier of calcium and phosphate, and the specific peptide which so elegantly and efficiently transports these essential minerals is called RECALDENT™ CPP-ACP (casein phosphopeptide amorphous calcium phosphate).

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Trends & Applications

have also since been found to be effective in intrusion and En Masse Retraction treatments (Fig. 9b).

Elastic chains are widely used traction elements. In contrast with NiTi springs, however, these rapidly lose their effectiveness. For this reason, a chain is only placed around the head of a miniscrew so that it can be more easily removed later. Depending on head design and the direction of the force applied, it is possible for the chain to become accidentally dislodged from the screw head. This problem can be avoided by the use of ready-made hooks (Table 5) that can be attached to the head of the screw.

Sliding hooks

Sliding hooks with a welded arm for attaching springs (Table 5) are an equally familiar piece of equipment. They are experiencing something of a renaissance in connection with the use of miniscrews. They are used for En Masse Retraction, mesialisation and distalisation. The effect of a sliding hook is determined by many different factors, which is why the value of attaching sliding hooks to the arch is disputed.

Auxiliary elements for laboratory use

All the elements discussed above can be prepared and inserted, with varying amounts of time expenditure, directly at the chairside. In recent years, the range of applications for miniscrews has also been extended to skeletal adjustment treatments, such as palatal suture expansion (see Dental Tribune Asia Pacific 5(2009):24). The corresponding appliances require very careful preparation, and for this reason, the related tasks have been transferred to the laboratory. The principal procedure involves the insertion of the miniscrew(s) and the subsequent reshaping process. Once a working model has been prepared, the appliance is constructed and adjusted appropriately. For connection to a miniscrew, a suitable abutment must be employed. In hybrid PSE, for example, two arms of the expansion screw are welded to the abutment. The laboratory abutments available from FORESTADENT fit the head of the OrthoEasy screw. An adhesive is used for fixture after insertion.

An innovative approach is the BENEFIT-System (Mondial). Analogous to prosthetic implants, an implant is placed in the bone. Instead of the widely known system where the head is firmly bonded to the thread, there are different abutments (Table 5) available. These will be threaded to the bone screw. This way, many installations can be prepared in the laboratory, for example, distalisation, anchoring, and retention RPE, saving chair time. For many mechanisms, such as molar uprighting or intrusion, impression is not necessary and the BENEFIT implant can be directly used.

Conclusion

Depending on the task at hand, it may be necessary to use various auxiliary elements. Most of the connection elements discussed are not new and have already been used successfully in orthodontic treatment for some time. For this reason, most of them will already be available in every practice, but often not where they should be. In order to be effective and not waste time searching for tools, it is advisable to have the most important auxiliary elements to hand in a tray. You can either create a DIY version of the tray or purchase one of the ready-made trays available on the market.