

The mini-screw as an anchorage device in orthodontic treatment

The “**mini-screw**” is a **temporary anchorage device** made of titanium or stainless steel, that is placed (screwed) into the jaw using a mandrel or a slow-speed handpiece (for implants) and is used in most cases to supplement dental anchorage. In some cases however, they are the sole source of anchorage. Skeletal anchorage is clearly not a replacement for other proven anchorage systems. Skeletal anchorage should serve merely to expand the orthodontic services we can offer our patients. Mini-screws are used in place of traditional appliances such as headgear and lingual arches in cases where **absolute** anchorage is necessary.

The mini-screws are designed in a conical shape and are available in various sizes and lengths with a diameter of 1.3 to 1.5mm at the top of the neck and 1.1 to 1.3mm at the tip. The screw head consists of a hexagon portion for insertion of the placement screwdriver, a horizontal slot and a hole at the junction of the two spheres allows for the attachment of elastics, chains, coil springs, ligature wires, or auxiliary hooks.

The sites most often utilized for screw insertion in the maxilla include:

1. Interradicular spaces, both buccal and lingual of the alveolar process (most useful locations)
2. the palate
3. the infrazygomatic crest
4. retromolar area

In the mandible, the most common mini-screw placement sites are:

1. Interradicular spaces, both buccal and lingual of the alveolar process (most useful locations)
2. Symphysis
3. Extraction spaces
4. the retromolar area

Today, the self-tapping/self-drilling screw is most often used and usually requires no preparation of a pilot-hole in the medullary bone. However, if the bone seems too dense, a bur should be used first to drill a pilot hole through the gingival and cortical bone. If a manual screwdriver is used for insertion, it is immediately evident when a root has been contacted, and any damage will be minimal. If a self-tapping screw encounters a root during insertion, it will stop. The doctor can then redirect the screw. In this way any trauma to anatomic structures during screw placement is not likely.



It is highly important, when screwing in the screw, to apply hand/finger pressure on the mandrel so as to drive the screw in the direction desired with no “side-way” or “wobbly” movements, which could compromise the “take” of the screw. It is recommended to use both hands to insure stability. If the screw “takes” well, the screw will be stable and most likely not come loose.

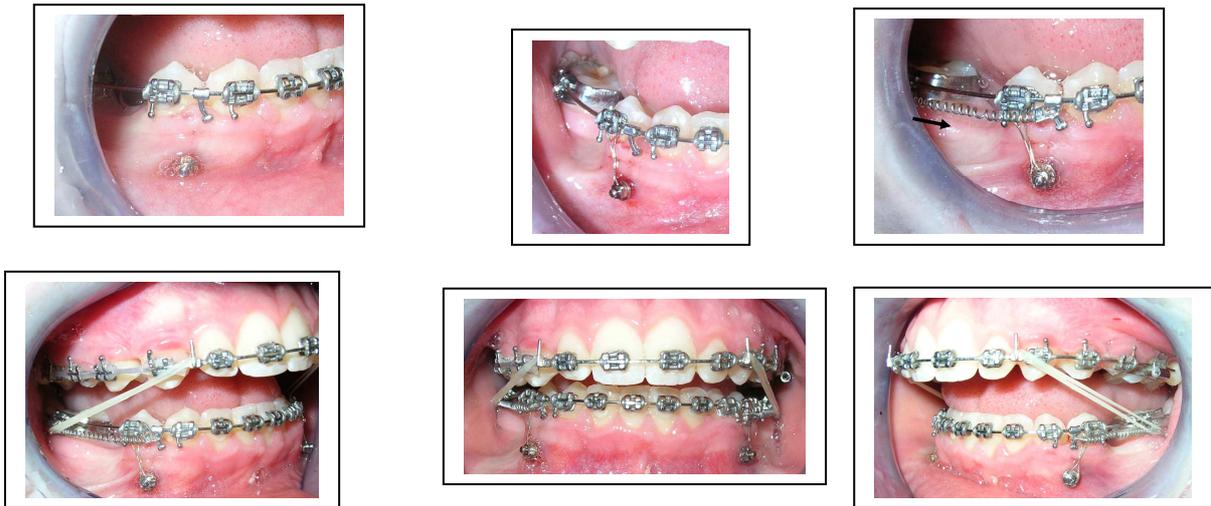
The attached gingiva is the preferred site for placement over the unattached gingiva, because it is more amenable to cleansing and provides better tissue adaptation around the mini-screw. However both sites can be successfully employed. Once the initial stability of the mini-screw has been confirmed, an orthodontic force of up to 250g can be applied immediately.

Mini-screws should be placed perpendicular to the bone surface and preferably in the apical third of a tooth because the roots are more tapered in this area and the alveolar bone thickness is greater.

In most cases, it is best to use the mini-screws to supplement dental anchorage and they should be used, along **with conventional orthodontic mechanics**, when required during the course of treatment.

I prefer to “supplement” the existing anchorage segment when possible. This is done by attaching the mini-screw (once it is screwed into place) to the anchorage segment with metal ligature wire. Then the forces to move the teeth are attached to the anchorage segment in the traditional manner for sliding

mechanics. In this way the forces are not absorbed solely by the mini-screw but are also absorbed by the anchorage segment as well.



In some cases, however, they are the sole source of anchorage. Photos below show mini-screws as the anterior attachment point for 200gram NiTi closing springs, used here to protract mandibular molars.



Molar distalizer :

The molars are CLII, OJ of 4 mm and a lack of space for 13 & 23.

MAX: 19x25 steel wire; bilateral, **200 (or 300) gram NiTi Open-Coil springs** that are compressed with **lock-stops** against the 1st molars. This set-up provides a distalizing force to the molars. **Mini-screws** (placed bilaterally between the 2nd premolars and the 1st molars) are used along with **metal ligature wire**, which is threaded through the hole in the screw-head and is brought forward and attached/wound tightly around the wire posts, to “tie-back” the anterior segment to the bone so as to control the reactionary forces on this anterior segment (“anterior anchorage”).



“**Molar distalizer**” using **mini-screws** to provide “boney anchorage” of the anterior segment so as to resist this segment advancing due to the reactionary forces of the compressed open-coil spring

These are just a few examples of the uses of mini-screws. There are many other uses for the mini-screws that are beyond the scope of this paper.