

Surgical Guide for Optimal Positioning of Mini-Implants

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Optimal positioning has always been critical to the effectiveness of dental implants. The choice of location depends on the initial diagnosis, the purpose of the implant therapy, the proximity of adjacent structures such as the mandibular nerve and maxillary sinus, and esthetic factors, and often involves collaboration among the prosthodontist, radiologist,^{1,2} and oral surgeon. Several devices have been developed to provide three-dimensional control of the surgical bur, making the procedure safer and more accurate.^{2,3}

Orthodontic mini-implants require a less complex surgical procedure.^{4,5} Still, if the quantity of interproximal bone and the inclination and proximity of the roots are incorrectly evaluated, there is a risk of root perforation.⁶ A careful clinical and radiographic assessment before implant placement is therefore a necessity.^{7,8} Various authors have proposed determining the implant position by means of a metallic wire connected to the orthodontic fixed appliance or a removable acrylic template.^{7,9} Because periapical radiographs provide only two-dimensional information, however, the success of these techniques depends on accurate execution of the parallax technique.

Another critical factor in orthodontic mini-implant placement is the angle of insertion. Recommended angles of the implant to the long

axes of the teeth have ranged from 10-20° in the mandible and from 30-40° in the maxilla¹⁰⁻¹² (Fig. 1).

The present article describes a new surgical guide that provides three-dimensional surgical bur control for accurate placement of self-tapping orthodontic mini-implants at the desired location and angle. The procedure is illustrated in a 13-year-old female patient who presented with a Class II, division 1 malocclusion and was treated with four first bicuspid extractions. A headgear was prescribed to provide anchorage, but was not effective due to poor compliance. Orthodontic mini-implants* were then used to

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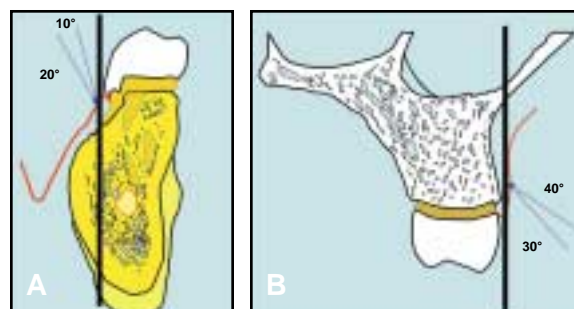


Fig. 1 Recommended angles of implant insertion.¹⁰⁻¹² A. Mandible: 10-20°. B. Maxilla: 30-40°.

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complete the upper anterior retraction without loss of anchorage.

Surgical Guide Fabrication

After a thorough clinical examination, a cast is made of the appropriate dental arch (Fig. 2). The presurgical radiographs are evaluated with the parallax technique to assess the interproximal bone morphology and root proximity (Fig. 3).

Next, 2mm hollow steel sleeves with an internal diameter of 1.3mm are cut and affixed to the plaster cast with wax at the proper implant locations and angles (Fig. 4). A 1.2mm-diameter surgical bur or other similar metal instrument is inserted into the sleeve to assist in correctly orienting the sleeve to the desired angulation.

The cast is waxed around the implant holes and occlusal areas for fabrication of an acrylic transfer tray (Fig. 5). The isolated areas are wetted and then coated with petroleum jelly. Cold-cure acrylic resin is applied to these areas, and

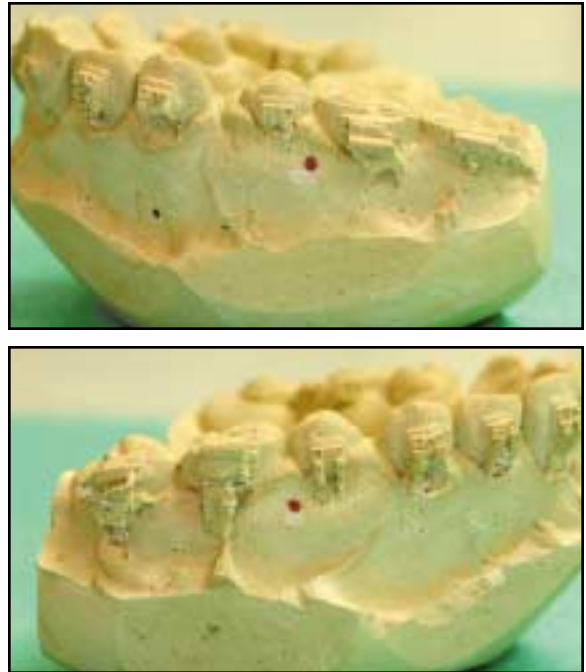


Fig. 2 Patient's plaster casts with implant sites marked.



Fig. 3 Presurgical radiographs used to evaluate interproximal bone morphology and root proximity.



Fig. 4 1.2mm-diameter surgical bur inserted into hollow steel sleeve with 1.3mm internal diameter to indicate correct angular orientation.



Fig. 5 Cast waxed around area of surgical guide.



Fig. 6 Acrylic resin before polymerization.

the excess is trimmed away to produce a medium-thin layer (Fig. 6). After polymerization, the surgical guide is trimmed to its final size and shape (Fig. 7).

Implant Placement

The surgical guide is submerged in a 1% chlorhexidine solution for 12 hours prior to implant placement to avoid any bacterial contamination. At the surgical appointment, it is tried in the mouth to confirm the correct location of the implant sites, as marked on the cast, and the absence of any interferences from fixed appliances that could jeopardize occlusal stability (Fig. 8).

Local anesthesia is applied, and pilot holes are drilled at the implant sites, through the metal sleeve of the surgical guide, with a 1.2mm-diameter surgical bur (Fig. 9). The guide is then removed, and the screws are inserted with a screwdriver (Fig. 10). A follow-up radiograph is

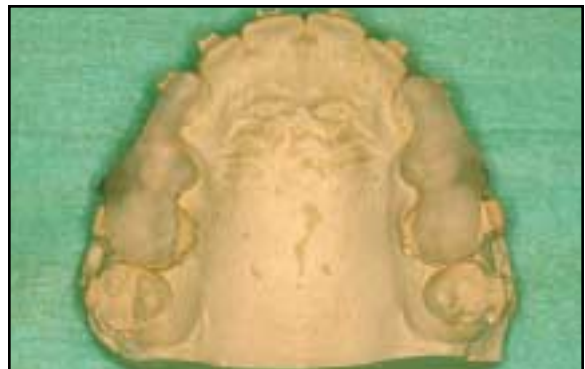


Fig. 7 Surgical guide after polymerization.



Fig. 8 Fit of surgical guide checked in mouth.

taken after surgery to verify that the implants are in the desired positions and to rule out any root perforations⁶ or peri-implant radiolucencies¹³ (Fig. 11).

In this patient, the implants displayed excellent initial stability.¹⁴ One week later, the gingival tissues around the implants were healing nicely, with no sign of swelling or redness.¹⁵

Discussion

A surgical guide is reportedly the safest means of ensuring accurate implant placement.^{7,9,16} We have treated more than 50 cases using this method, without experiencing any root perforation or impact.

The surgical guide also allows the precise



Fig. 9 Surgical penetration of implant site.

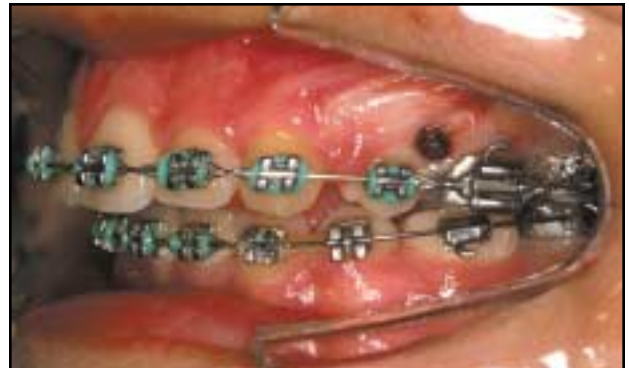


Fig. 10 Implants after placement.



Fig. 11 Post-surgical follow-up radiographs.

implant location to be conveyed from the orthodontist to the oral surgeon. The patient's degree of comfort with the procedure is improved when the position and direction of the bur are not being constantly revised during surgery. Nevertheless, the surgeon must be made aware that even when using a surgical guide, a sudden increase in resistance after penetration of the cortical bone indicates root contact, which means the angle of insertion must be changed to avoid damage.

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