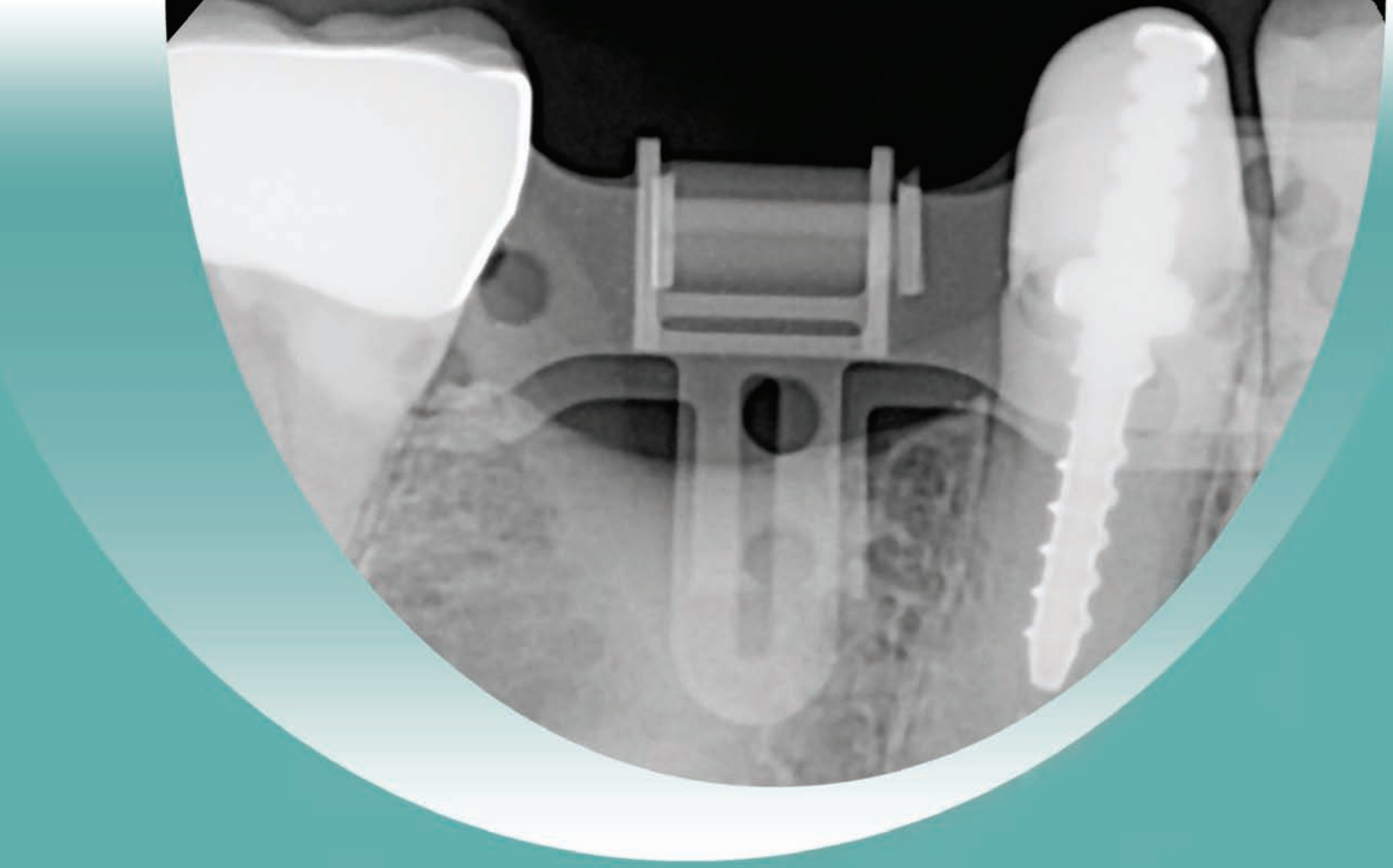


The 3D Click Guide

A New Direction for Guided Surgery

About the author

Lambert J. Stumpel III, DDS is a 1982 graduate from the Royal University of Utrecht, School of Dentistry, the Netherlands. He is a fellow of the Academy of Osseointegration and a member of the Pacific Coast Society for Prosthodontics. Dr. Stumpel is the holder of two patents for dental implant related devices and has authored over 20 scientific publications. He lectures Nationally and Internationally at major Implant Conferences. He maintains a private practice in San Francisco, CA and is President of Idonodivi, Inc., San Francisco, CA.

Introduction

Let's start with a question... Who does not need to use a surgical guide to place dental implants? The answer is: anybody who can place an implant in exactly the correct position 100 % of the time.

Now is that what we see in the real world? Not really, an experienced voice would say. Surgical guides have the goal to end up with a dental implant in the correct restorative position, while preventing harm to the patient during the surgical procedure. Harm is understood as damaging a nerve, hitting a neighboring tooth, invading the lingual undercut etc. Less ideal restorative positioning can mean compromised esthetics and forced use of custom abutments instead of screw retained restorations. A third aim for using a surgical guide is so that the surgeon can reduce his stress as a result of worrying about all of the previously mentioned.

Surgical guides come in many variations, non-restrictive; say a vacu-form shim that indicates the crown shape and buccal margin. Partially limited restrictive guides have a tube for only the pilot drill, while fully restrictive guides allow all the drills to be guided and even the placement of the implant itself can be guided.

A non-restrictive guide requires advanced surgical skills to place the implant, while the fully restrictive guide acts more like a drill press; all decisions have been made before the surgery. This means that all the users of these guides should have full knowledge of where the implant should be. The user of the fully restrictive guide does need only a fraction of the surgical skill. This is of utmost importance, as we see a new trend emerge: A larger group of clinicians, who place 50-100 implants per year, compared to the master clinicians who may place 1000 + implants per year. The inexperienced group does need a definitive tool to compensate for skill, while assuring a perfect outcome.

Fully restrictive guides are often generated via a CAD/CAM process (computer aided design and computer aided manufacturing). This required the use of a data set from the patient as is obtained from a CT (computerized tomography) or CBCT. While these guides can work well, the process is elaborate and costly. Consequently these types of guides are economically less attractive for small implant cases.

The 3D Click Guide®1 from Idonodivi, Inc., San Francisco, CA, has been developed specifically to simplify the fabrication of fully restrictive surgical guides for one to two implant cases. The concept is a model based system where the bucco-lingual information is derived from simple bone sounding, although CBCT can be easily used if desired.

The 3D Click Guide Kit (Fig. 1) consists of all the parts needed to make a surgical guide for the placement of one dental implant: A blue Buccal Lingual Positioner (BLP), a radio opaque Buccal and Lingual wing and three rotation-blocks. One of the three rotation-blocks is ultimately used depending on the need to correct the mesio-distal inclination. Drill guides will be placed into the hole of the rotation-block so the osteotomy can be gradually increased by using multiple drills of increasing diameter.

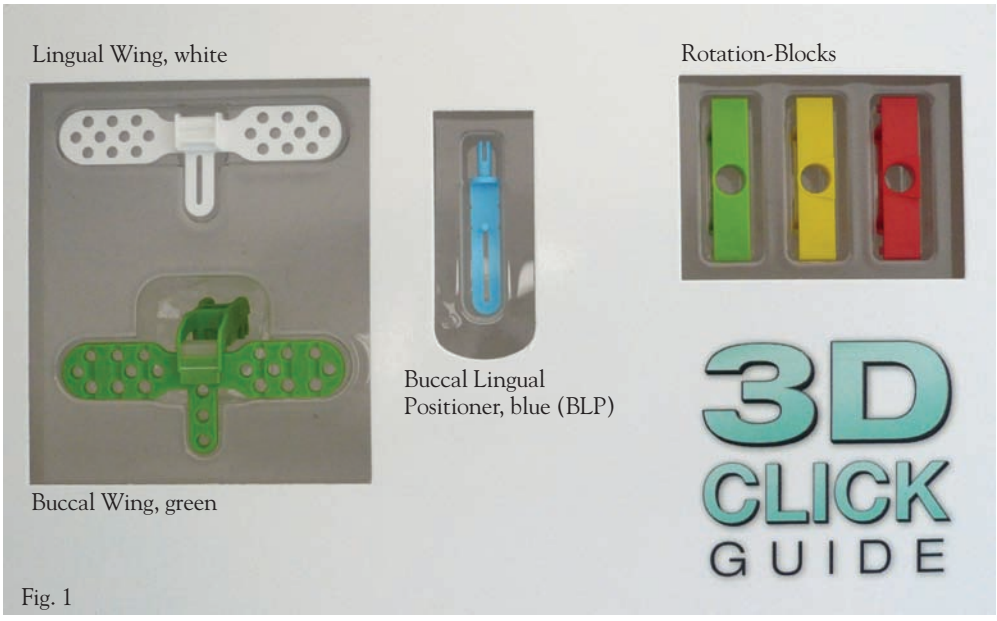


Fig. 1

Overview–Using the 3D Click Guide

BLP (Buccal Lingual Positioner)

- Once the bone sounding data are drawn onto the split cast, the Buccal Lingual Positioner (BLP), a measuring and positioning instrument, is placed and oriented against the split cast surface and affixed there by means of a pinhole fit and a drop of glue.
- The BLP is designed with several distinct features in its outline form that allow for precise visual confirmation: pin (& lower groove) = top of the implant; 3mm above is the 2nd groove for relating the implant shoulder to the buccal gingival margin.
- The top of the BLP fits into the correction slot of the buccal wing, allowing mesio distal corrections, while maintaining the established buccal lingual position.
- The BLP is 4mm wide; the length from the pin to the apex is 12mm.
- By design the BLP will position the top surface of the rotation-block 9mm above the implant shoulder, when the pinhole is drilled into the cast at the desired position corresponding to the implant shoulder. The addition of 1mm thickness of the drill guide creates the +10mm which should be added to the total drill length.

Rotation-Blocks

(Set of three - 0, 3, & 7 degrees)

- The rotation-blocks allow correction of the mesio-distal rotation. When radiographically it is determined that the laboratory selected trajectory needs modification a 3 or 7 degrees correction can be selected (Fig 2).
- If no correction is needed and the initial setup was correct, the 0 degree rotation-block is used.
- Material is radiolucent.
- The 3 and 7 degrees rotation-blocks have arrows indicating the angle correction for the drilling guide.
- The kits are sold individually for Narrow (ND), Regular (RD) or Wide diameter (WD) implants with corresponding rotation-block size.
- Within each 3D Click Guide kit, 3 rotation-blocks are provided (0, 3, and 7 degrees)

  Colors : 0 degree = green
  3 degrees = yellow
  7 degrees = red

Clinical Case

A 45 year old female presented with a failing three unit fixed partial denture. Radiographic evaluation showed an area of condensing osteitis at the missing lower molar site (# 30).

A VPS (Vinyl Poly Siloxane)[2] impression was taken, with finger pressure pushing the putty material down to capture a large part of the edentulous ridge. Bone sounding requires a short anesthetic needle (27G short[3]) with a rubber endodontic stop and some topical anesthetic. This very simple and precise technique is used by the author in 95% of these types of cases (Fig. 3).

Five soft tissue depth readings were taken, two on the buccal, two on the lingual and one occlusal. The VPS impression was poured in dental stone in an Accutrac Tray[4]. A vacuform carrier is made and the cast is sectioned at the estimated implant axis.

A putty matrix of a denture tooth created the outline of the future crown. The soft tissue readings were transferred to the cast. Now the relationship between the bony volume and the prosthetic outcome was visualized (Fig. 4).

Buccal and Lingual Wing Assembly

- Retention rail-'click' connection to the Rotation block.
- Horizontal wings perforated for retention with ortho resin to the vacuform carrier (splint).
- Cross bar with 'correction slot' into which the top of the BLP will fit.
- Radiographic Implant Replica (RIR), mimicking the implant trajectory on a periapical X-ray
- Designed and fabricated of materials demon starting both radioopacity and PMMA ortho resin adhesion.
- This Buccal Wing component is available in 3 sizes: Narrow (ND/ green), Regular (RD/yellow), and Wide (WD/red).

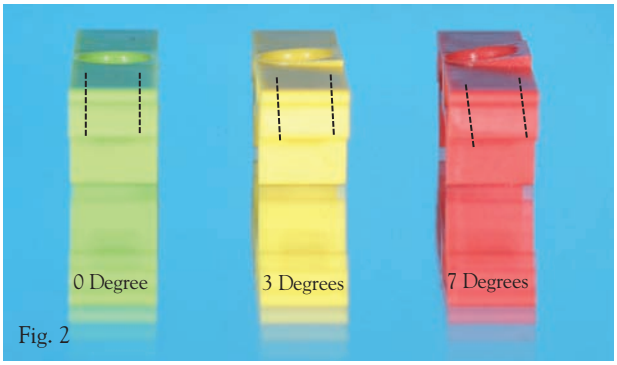


Fig. 2

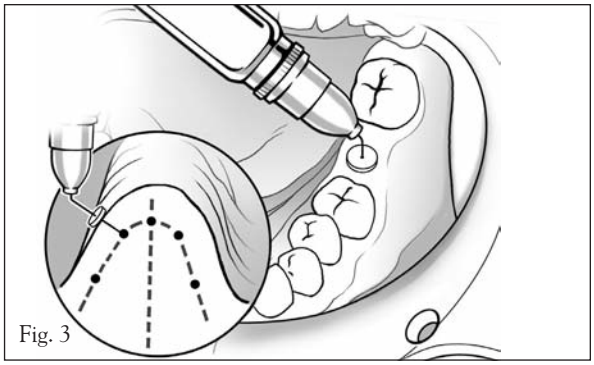


Fig. 3

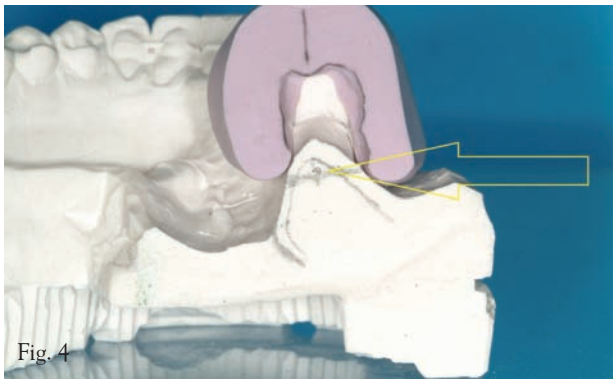


Fig. 4

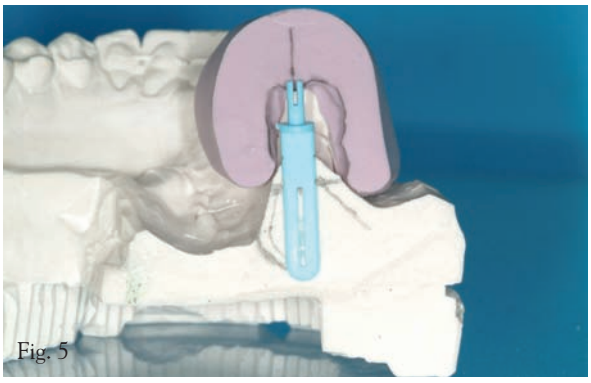


Fig. 5

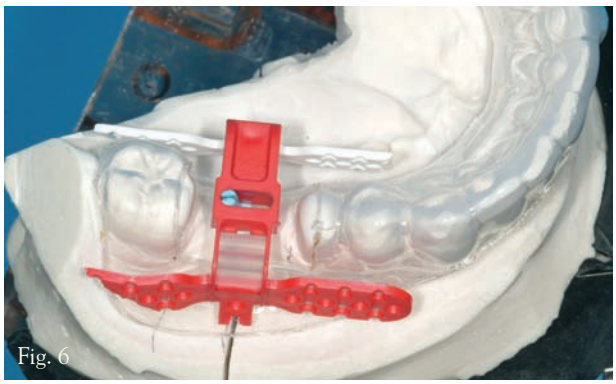


Fig. 6


Fig. 7


Fig. 8

The first step is to determine and lock in place the Bucco-Lingual position of the implant and the position of the shoulder of the implant. A pinhole is drilled indicating the top of the implant at the proposed implant axis. Next the blue BLP (Bucco-Lingual Positioner) is glued in placed with the pin into the previously drilled hole, and the axis lined up for a screw retained restoration (Figs. 4 & 5).

Once the cast is reassembled, the buccal and lingual wings can be placed on top of the BLP. The Mesio-Distal position can be easily selected while always maintaining the previously determined Bucco-Lingual orientation (Figs. 6, 7 & 8).

The MD position between the teeth can be seen and is thus confirmed; the only estimation is the MD angulation, as the roots cannot be seen on a cast. A pre-operative radiograph will help, but this is the only part of the positioning which is estimation, and thus needs to have a system to correct; that system is using one of the three rotation blocks. The green block is 0 degrees, when no correction is needed, the

Fig. 3: Bone sounding with a short dental needle and an endo stopper, is simple and reliable.

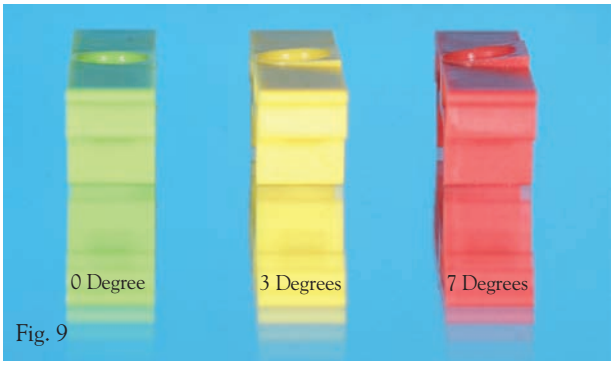
Fig. 4: The bone volume in relation to the prosthetic outcome. The arrow points to the pinhole indicating the shoulder of the implant. The pin of the BLP fits into that pinhole.

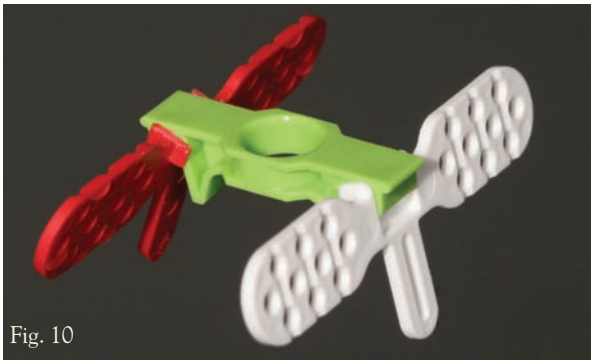
Fig. 5: The BLP is set for a screw retained restoration. An 8.5mm implant steers clear from the lingual undercut.

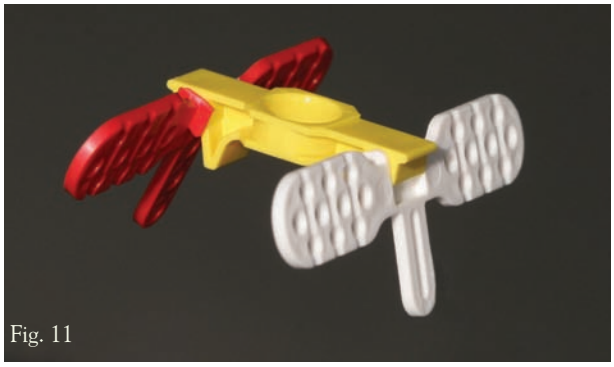
Fig. 6: The wing assembly fits on the top of the BLP. Note the pin indicating the shoulder of the implant.

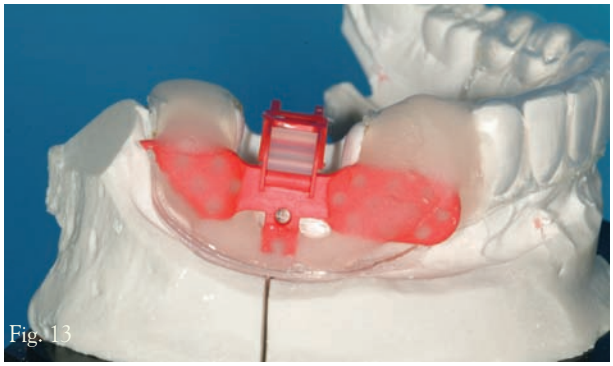
Fig. 7: The correction slot in the crossbar allows MD translation and rotation.

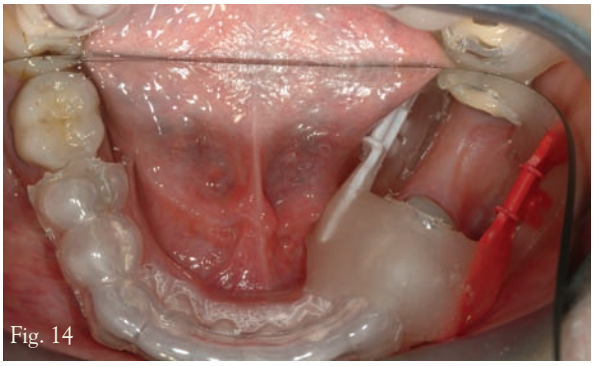
Fig. 8: The wing assembly can be placed in the exact MD position, while maintaining the previously set BL.

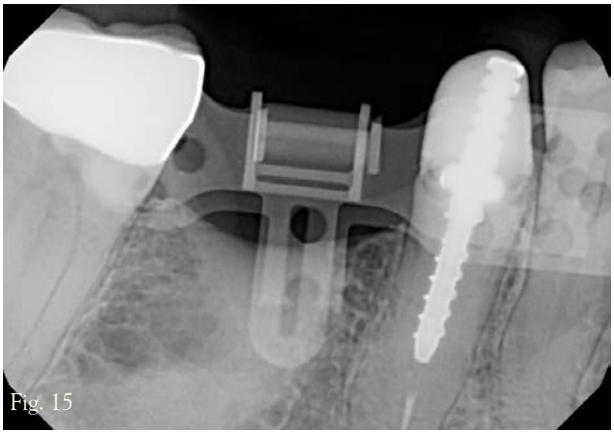












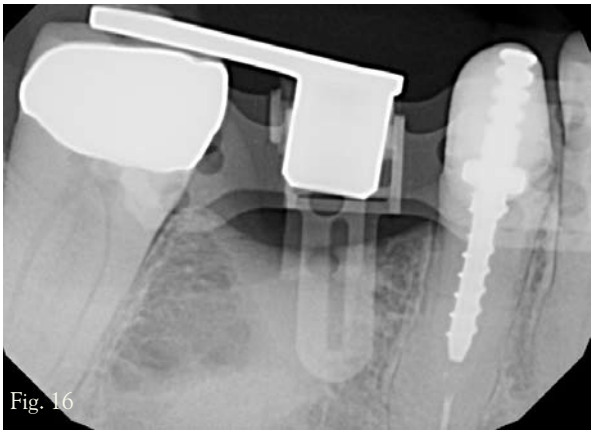


Fig. 9: Three Rotation-blocks, allowing a mesio - distal inclination correction of 0, 3 and 7 degrees.

Fig. 10: The green 0 degree rotation-block is clicked in.

Fig. 11: The yellow block allows a 3 degrees rotation adjustment.

Fig. 12: The red block allows a 7 degrees rotation adjustment.

Fig. 13: The wings are bonded to a vacuform carrier with Ortho Acrylic.

Fig. 14: Intra oral depiction of the surgical guide with cross-sectional bar removed. Note: without rotation-block.

Fig. 15: The RIR (Radiographic Implant Replica's) overlap, the X-ray is diagnostic, showing adjacent root inclinations.

Fig. 16: A red rotation block creates instant 7 degrees rotation, visualized with a stainless steel drill-guide in place.

Fig. 17

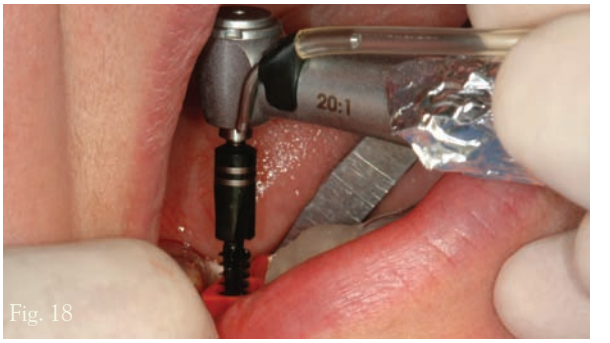


Fig. 18

Fig. 19

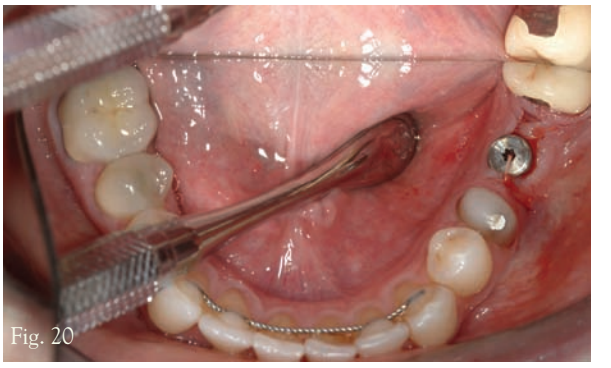


Fig. 20

Fig. 17: Sequential drill guides allow gradual enlargement of the osteotomy.

Fig. 18: Guided tap as recommended by the manufacturer.

Fig. 19: A 8.5 x 4.3 Nobel Active7 implant attached to a guided implant carrier is placed.

Fig. 20: A small flap allowed the transportation of attached tissue towards the buccal.

Fig. 21: The final implant, placed as planned. Safe, simple and affordable.

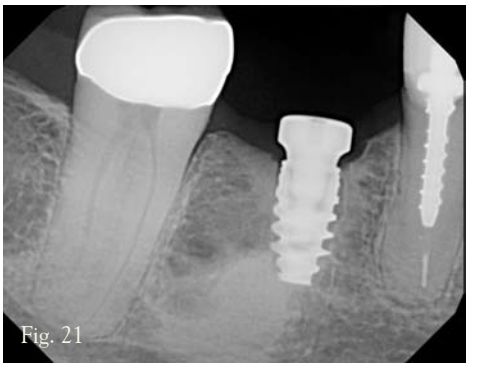


Fig. 21

yellow is 3 degrees and the red allows a 7 degrees correction (Figs. 9, 10, 11 & 12).

The wings are attached to the vacuform with ortho-acrylic (Ortho Resin)[5], and the cross-sectional bar is removed (Fig. 13).

The surgical guide can now be placed in the mouth (Fig. 14) and a periapical radiograph is taken (Fig. 15).

The buccal and lingual RIR's (Radiographic Implant Replica's) overlap, so we know for sure that the X-ray is shot straight on, thus not deformed.

Since the X-ray is diagnostic we now decide on which rotation-block to use. In this case a red rotation-block (7 degree) is chosen allowing for a perfect MD angulation (Fig. 16).

Universal Drill Guides from Idondivi, Inc, San Francisco, CA, were used to guide drills with fixed drill stops (Facilitate[6]) (Fig. 17).

A guided tap was used (Fig. 18) before the placement of a 8.5 x 4.3 Nobel Active[7] implant (Figs. 19, 20 & 21).

Summary

The 3D Click Guide system provides consistently reliable and cost effective guided surgery without the necessity of cone beam radiography and associated software, although CBCT can easily be integrated. SD

Acknowledgements:

1. The 3D Click Guide®1, registered trademark of Idonodivi, Inc., San Francisco, CA
2. VPS (Vinyl Poly Siloxane) Examix is registered trademark of GC, Alsip, IL
3. 27G short needle, Fairfax Dental, Miami, FL
4. Accutrac Tray, Coltene-Whaledent, Inc., Cuyahoga Falls, OH
5. Ortho Resin, Dentsply, York, PA
6. Facilitate, Astra Tech Inc., Waltham, MA
7. Nobel Active implant, Nobel Biocare, Yorba Linda, CA