# A New Bend in the Road to Successful Implant Placement from **Guide Right™** by DéPlaque

While we have sophisticated stereolithic guides at our disposal and multiple other providers of 3-D surgical templates there are still numerous implants that are being placed at other than the most desirable locations. Just ask any Lab technician about the number of cases they receive that they have to perform magic to produce an esthetic restoration. Either the sophisticated surgical guides are too costly to use, require too much time to deliver or the dentists just don't care if the implants are placed in difficult positions to restore or result in iatrogenic injury to the patient. Ideal placement between the buccal and lingual bone plates result in less pain and *higher success* rates.

Recent data suggests that over 50% of all general dentists are now placing either regular or mini implants. Literature is full of methods describing the fabrication of surgical templates to help surgeons place implants based on a prosthetic wax setup. Sometimes a set up is all that is necessary to create a perfect aligned surgical guide. Hopefully a pre-surgical X-ray indicates that the proposed angle of the long axis of the guide sleeve and planned implant placement is not in conflict with either the roots of adjacent teeth, maxillary sinus or nerve. The conflicts can easily be discovered in one plane by taking a peri-apical X-ray but more accurately in two planes with cone beam X-ray images. More than 10 manufactures are making and marketing cone beam X-ray machines offering us the opportunity to view 3-D information to evaluate our implant cases. The information we obtain from the X-rays can be used in addressing the conflicts between the axis of the planned implant placement and the anatomy of the underlying alveolar bone.

Figuring out the best location for the center of the implant is not extremely difficult when replacing a single tooth with an implant supported restoration. However, this is not always the case where **multiple implant sites** are involved. But, there are many options for the fabrication of surgical guides. One **solution** is a two step process, designed and developed by DéPlaque. The **Guide Right™ Surgical Guide System** is completed in-office or by the lab, requiring the **evaluation and correction** of the proposed positioning of the implant. The process involves the fabrication of a **diagnostic** guide followed by evaluation and correction to make the surgical guide for a more desirably placed implant. **The diagnostic template is fabricated** by making a wax setup using the position of the teeth on a partial denture or by guessing at the best location for the opening of an osteotomy on a patient's cast.

A **new approach to 3-D surgical guides** is to make a **diagnostic template** based on a prosthetic plan, by taking a radiograph of the guide and using the information from the X-ray to accurately correct and, if necessary, remake the template. This approach requires the use of a simple protractor and a superimposed line drawn through the long axis of the guide sleeve to indicate the axis of the proposed osteotomy. A second line is drawn to indicate a more desirable axis for the proposed implant placement. When the two lines intersect an angle is formed. This angle can be measured and used to correct the angle of the guide sleeve and a **new corrected surgical template made.** A cone beam X-ray gives us the information to correct the surgical template in two dimensions, both mesio-distal and bucco-lingual.

# The Guide Right Technique

## Diagnostic Template

In the following case a deciduous tooth with minimal residual root served as the set up on a plaster cast mad from the patient. (Figure 1)


Fig 1

Fabricating the **diagnostic template** began by *drilling through the crown of the tooth* to indicate the proposed long axis of the osteotomy or implant (Figure 2).


Fig 2

A *guide post* was placed in the holes to capture the proposed long axis of the osteotomy (Figure 3.


Fig 3

A radio-opaque cylindrical *guide sleeve* is placed over the guide post (Figure 4).


Fig 4

Triad® gel or other acrylic material was added to index the guide sleeve to the adjacent teeth (Figure 5).


Fig 5

The material can be placed over the occlusal and lingual or palatal surfaces of the teeth after the undercuts are blocked out and the cast is lubricated with a separating media such as petroleum jelly. I prefer to use Triad gel rather than the heavier Triad base plate material because it flows easily. The flow of the Triad gel is temperature dependant. If the lab is warm I recommend building the body of the template in layers and curing after each layer to prevent the gel from flowing over the buccal surface which would prevent the template from being removed from the cast. Once the **diagnostic template** is cured and cold sterilized in Betadyne, rinsed in water, placed in the patient and an X-ray was taken and analyzed. If the angle of the guide sleeve is not desirable, the template must be corrected as in this case. If a laboratory makes a prosthetically generated template it should be evaluated radio graphically prior to use. The following steps are taken to make the corrections to alter the planned axis of implant placement.

## Angle Corrections

The angle *of the axis of the guide sleeve* can be determined in *one plane* mesio-distal with a peri-apical X-ray. With a cone beam X-ray the angle and location of the guide sleeve can be visualized in *two planes*; mesio-distal and bucco-lingual (Figure 6 and 7).

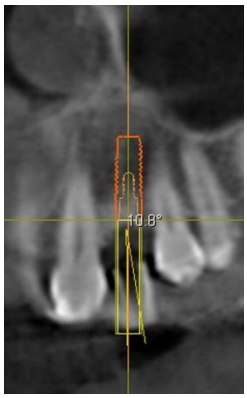


Fig 6


Fig 7

In this case, two corrections were necessary. The angles of the corrections were determined from the cone beam images. Some software programs (Galaxis by Sirona) allow this calculation to be made on the computer images. References and lines super imposed on the images make them easier to read. The green line represents the long axis of the planned implant axis. The orange line represents the long axis of the guide sleeve. The angle formed by their intersection is the angle used to make the correction with the bending tool. Corrections were easily made by placing a guide post in a *bending device,* the *Generation ll Bending Tool,* to correct the angle and bend the post in both planes (Figure 8).

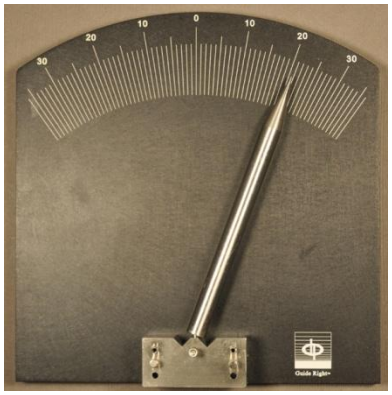


Fig 8

The lower half of a *magnetic guide post* which was used to correct the angle has *four flat surfaces* (Figure 9)

Fig 9

representing the four surfaces of the restoration: mesial, distal, buccal and lingual or palatal. A 0.5 mm *offset magnetic guide post* was placed in the holding block on the bending device to move the planned implant

placement 0.5 mm to the buccal. a set screw was tightened against one of the four flat surfaces to prevent rotation (Figure 10).

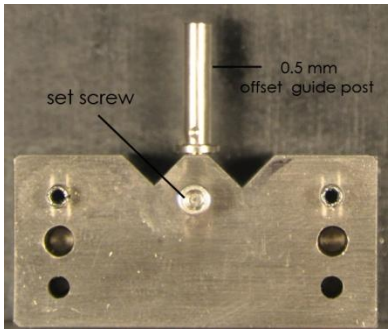

Fig 10

A *stylus* was placed over the upper portion of the guide post and the guide post was bent to the right to correct the first angle (Figure 8)).

The angle observed in the cross sectional image is used make a correction in the bucco-lingual plane, 21 degrees. The set screw was released and the four sided guide post is rotated 90 degrees until the stylus registers at the zero degree mark. (Figure 11)

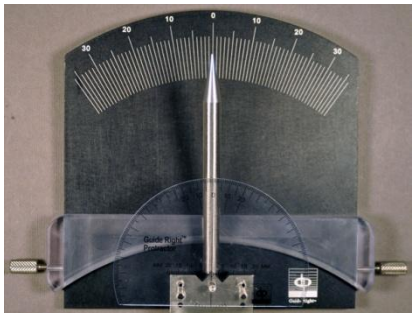
Fig 11

The set screw was retightened against the next flat surface to make the second correction of 10 degrees (Figure 12).

When a correction in the second plane is necessary, the angle of the first bend must be maintained while the second bend is being made. This is accomplished by using the *stylus support bar*. After the first bend is completed and the guide post is rotated 90 degrees, the bent post rises up off the surface of the bending plate. The *stylus support bar* is slid down the surface of the plate to support the angle of the first bend. The stylus is, again, placed over the guide post and the second bend is completed.

### Linear Corrections

A linear correction was needed for this case to move the planned implant axis 0.5 mm toward the buccal. if the angle of the long axis of the implant does not need to be changed but the proposed implant axis is too close to the root of an adjacent tooth, or needs to be moved to the buccal an *off set guide post* can be used to move the axis of the proposed implant placement 0.5, 1.0, 1.5, 2.0 or 3.0 mm in any of the four directions with or without changing the angle (Figure 13).


Fig 13

Fig 14

### Surgical Template

The angle *corrected guide post* is put back in the original hole in the cast and oriented so the buccal surface of *open guide sleeve* (Figure 15).

Fig 15

was placed on the corrected guide post and the new **Surgical Template** is made (Figure 16).

Fig. 16

Fig. 17

A new Periapical X-ray can be taken to verify the correction with a direction indicator after the initial 2 mm hole is made to verify the correction in a mesio-distal plane. After a few cases and corrections you will realize that geometry really does work and you will finally get to use it on a daily basis.

## Solving Conflicts

### Open Guide Sleeves

A conflict will exist if more than one guide post is used for the placement of more than one implant and the two corrected posts are at different angles *or* if the path of insertion is not parallel to the long axis of the corrected guide post the guide post or template will be impossible to remove from the cast.

If *cylindrical guide sleeves* are used, the second **surgical guide** cannot be removed from the cast. The only way the template can be removed is to use *guide sleeves* that have one open side (Figure 14.) Regardless of divergent guide posts or path of insertion, templates with guide sleeves open to the buccal surface can be removed in a medial direction, lingually or palatally. The Triad gel must not be extended beyond the occlusal surface onto the buccal surface of the adjacent teeth or, likewise, the template will not be removable from the cast. If the cast is not lubricated or the under cuts blocked out the same problem will occur.

### Magnetic Guide Posts

*Magnetic guide posts* are used for the fabrication of the **surgical template** to support the open guide sleeves which are made of a stainless steel that is attracted to the magnetic field of the guide post. The magnetic guide posts should not be autoclaved because the magnet will break down at temperatures greater than 180 degrees. After the **surgical template** is made it should be placed in Betadyne or other cold sterilization solution and rinsed with sterile water before using.

### Drills and Guide Sleeve Sizes

The initial 2 mm pilot hole was made with a drill designed with a drill stop that fits into the open guide sleeve. (Example of a 2 mm pilot drill with a 2.9 mm diameter depth stop used with a 3mm open guide sleeve) (Figure 18).

 Fig 18

The implant manufacturer's drills were used to enlarge the osteotomy by centering them in the arc of the open guide sleeve. A guide sleeve size should be chosen that is large enough to accommodate most, if not all, of the drills needed to place the implant. Larger implants require larger drills and larger guide sleeves.

## Clinical Results

*Clinical results* are illustrated in Figures 19 and 20.

 Fig 19

 Fig 20

The accuracy of the template is based on the accuracy of the initial 3/32" hole drilled in the cast and how many enlarging drills are used within the concavity of the guide sleeves. If only the initial 2 mm pilot drill is used the larger drills can change the axis. If the hole is too large the guide post will not fit tight in it and the accuracy will be compromised. It is a good idea to use sharp drills and a cast of plaster mixed with stone so the cast is not too hard to drill into with a 3/32" drill which fits in a lab hand piece. If dental stone is used to make the cast a smaller hole (2mm or 5/64") should be made first and enlarged with a 3/32" diameter drill, the same diameter as the small end of the guide post. A too high drill speed will cause the hole to enlarge quickly resulting in a loose fit which introduces error into implant placement. If this happens the hole must be filled with stone and a new hole drilled after it hardens.

The *advantages* of in-office fabrication of both a **diagnostic** and a corrected **surgical** guide outweigh the *disadvantages* of this technique when factoring in your time, cost, communication with dental partners, ease and accuracy.

**Time Factor:** With in-office minimal turn-around time, hours not days, are required to utilize this implant surgical guide system... Depending on your time the option to fabricate it yourself or add an additional patient fee to cover the cost of having your lab fabricates the templates.

**Cost Factor**: Cost is significantly less than having a stereolithic guide made. Your patient's insurance company may cover part or the entire fee for the template (radiographic implant index) according to the *ADA insurance index code: 9160.*

**Communication Factor**: This System offers the opportunity to communicate case expectations between surgeon, restorative doctor, and Lab.

**Anxiety Factor:** Knowing your implant restoration is only as good as your placement, you can depend on controlling your implant case without the anxiety that goes along with guess work. Technical support and advice is available online or only a phone call away.

**Accuracy Factor**: The accuracy of this technique which will be published in another article was less than three degrees . When the use of open and cylindrical guide sleeves was evaluated the accuracy between them was not significant.

*For more information* visit www.deplaque.com or call 1.800.314.0065 and ask for the free instructional DVD.

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