

A Simple and Practical Approach to Evaluate Implant Positioning Immediately after Placement

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Abstract

With the use of the flapless technique in the placement of one-piece implants, determination of the angulation of implant placement becomes critically important. After the implant is placed, the cast is made, sectioned, and superimposed on the radiographic template to determine the angulation. This method will assist the clinician in determining the angulation of one-piece implants immediately after placement.

As advancements in precisely implemented surgical procedures for implant dentistry increase, the success rate for implantsupported restorations is also increasing. With flapless surgery in the placement of one-piece implants, surgical trauma has become minimal.¹

A critical factor in careful treatment planning is that for an optimal prognosis, the implant should be surrounded by at least 1 mm of bone on all sides.² Particularly in the anterior maxillary region, accurate assessment of bone dimension is complicated by irregular resorption patterns and the thickness of the overlying mucosa. Even the accuracy of intraoral periapical and panoramic radiographs must be questioned because of the possibility of image distortion and the inability to image buccolingual cross-sections.³ Cross-sectioned imaging can be achieved using computerized tomography (CT);⁴ however, significant differences in bone height measurements have been shown to occur in comparisons of panoramic radiography and two-dimensional orthoradially formatted CT images.⁵ Other problems with this technique include cumulative radiation dose to the head and neck area, the possibility of a distorted image because of metallic tooth restorations and/or patient movement, and higher cost.5

A simple and easy method to measure the ridge width while planning implant surgery is to use a ridge mapping procedure. Ridge mapping is a procedure that allows the implant surgeon to determine the thickness or width of the alveolar bone before a mucoperiosteal flap is reflected.^{3,6} This same methodology, described in the following paragraphs, will also help in determining the angulations of the implant immediately after it is placed.

Technique

- (1) When a flapless surgical procedure is planned, after local anesthesia infiltration, a tissue punch is used to remove the mucosa on the crest of the ridge, and an osteotomy is performed.
- (2) A one-piece implant (One-piece 3.0, Biohorizons, Birmingham, AL) of 3.0-mm diameter and 12.0-mm length is seated in the prepared osteotomy. One-piece implants will have the abutment portion fused to the implant, hence when the implant is completely seated in the prepared osteotomy site, the abutment will be aligned with the adjacent teeth in the arch.
- (3) An elastomeric impression (Aquasil, Dentsply, York, PA) of putty consistency is made of the abutment portion of the inserted implant, along with the adjacent teeth, by using an appropriate stock tray. The impression is poured with Type III gypsum (Kalstone, Kalabai, India) to obtain a cast (Fig 1).
- (4) The abutment portion of the implant, which will be duplicated in the stone cast, is highlighted with a goldencolored marker. The cast is cut just adjacent to the abutment portion in the coronal section (Fig 2), as is done in the ridge mapping technique.⁶ The markings showing the outline of the bone on the sectioned cast are obtained by



Figure 1 Cast showing implant seated immediately after placement.

transferring the measurements obtained by performing the ridge mapping technique. 3,6

- (5) Most implant systems provide a radiographic template that includes a set with the actual implant dimensions and another set with magnified images of the implant, supplied by the particular system that will be used with the orthopantography to select the implant size (Fig 3).
- (6) The abutment portion of the template image in the exact dimensions of the implant placed is superimposed on the

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gold-color-marked abutment portion along the sectioned portion of the cast (Fig 4). The implant portion of the template will lie on the coronally cut section of the cast, thus showing exactly where the implant will be positioned in the bone, thus indicating the angulation, extension of the implant, and the surrounding bone support. An interim crown may be placed on the abutment portion of the implant to evaluate the contours for the proposed restoration with the opposing cast (Fig 5). As further evaluation, a removable wax-up can be made to assess the crown position, thickness, and contour.

Discussion

Bone resorption is a continuous, irreversible phenomenon.⁷ The rate of bone resorption varies among individuals and even in different parts of the jaws in the same individual.¹ Hence, accurate placement of the implant in the ridge is most important.

Flapless implant surgery is a predictable procedure when patient selection and surgical techniques are appropriate. Correct bur angulations are critical in the procedure, because the chances of fenestration due to dehiscence related to incorrect bur angulation are greater.¹

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Figure 2 Sectioned portion of the casts (before and after placement of the implant).

This simple technique could be a method for determining the angulations of the implant immediately after placement and also for assessing the amount of bone surrounding the implant. It is also advantageous to examine the proposed restoration in relation to the opposing cast to assess the occlusion. By superimposing the template on the sectioned cast, adequate placement, apical perforations, and inadequate bone surrounding the implant will be shown, and the implant can be removed and repositioned for better angulation, or the flap can be reflected to confirm closure of the perforation with the graft.

Although a CT scan can be used to determine the angulation immediately after placement, image distortion is a problem, as



Figure 4 Radiographic template superimposed along the abutment portion of the sectioned cast.



Figure 5 Sectioned upper and lower cast showing the relation of the proposed restoration in occlusion.

is the increased cost, including cost to the dentist if he or she decides to invest in a CT scan machine.

Conclusion

The simple and practical approach to evaluate implant positioning immediately after placement described in this report will aid in one-piece implant surgery by allowing determination of the angulations of the placed implant, thus contributing to the long-term success of the procedure.

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