



# THE USE OF A PROSTHETIC TEMPLATE TO MAINTAIN THE PAPILLA IN THE ESTHETIC ZONE FOR IMMEDIATE IMPLANT PLACEMENT BY MEANS OF A RADIOGRAPHIC PROCEDURE

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Implant placement in the esthetic zone requires precise preoperative diagnosis and treatment planning combined with excellent clinical skills. One of the most important factors needed to achieve an optimal esthetic outcome, in addition to the 3-dimensional (3-D) positioning of the dental implant, is to maintain or regenerate the interproximal papilla. This article describes a technique to fabricate a template that includes important aspects of rehabilitation in this area. (J Prosthet Dent 2012;108:394-397)

Implant-supported fixed posterior prostheses in partially edentulous patients have become a well-recognized restorative treatment option over the past 20 years.<sup>1</sup> A high success rate has allowed the application of osseointegration principles to be extended to single-tooth edentulism, with similar survival rates and marginal bone stability to those observed in complete and partial edentulism.<sup>2,3</sup> Although this procedure may appear to be more easily performed, the restoration of an anterior tooth, especially a maxillary central incisor, is challenging. A major problem encountered after tooth extraction is the loss of hard and soft tissue.<sup>4</sup>

Immediate dental implant placement has shown several advantages, including reductions in surgical procedures, cost, and length of the edentulism period, when compared with conventional techniques.<sup>5,6</sup> To satisfy esthetic and functional demands, soft tissue contour with an intact papilla and a gingival outline that is harmonious with the gingival silhouette of the adjacent healthy dentition should be established in the final restoration.<sup>7</sup> To be considered successful, an implant-supported restoration in an esthetic

area must achieve a harmonious balance between functional, esthetic, and biological imperatives.<sup>8</sup>

Tarnow et al<sup>9</sup> determined the distance from the base of the contact area to the crest of the bone, and the reported results showed that when the distance was 5 mm or less, the papilla was present 100% of the time. This result obtained in natural teeth was confirmed for a single-tooth implant and the adjacent teeth<sup>10</sup> as well as for the interproximal papilla between adjacent implants.<sup>11,12</sup>

The esthetics of the periimplant tissue is dependent upon factors involving the periimplant biotype, the facial bone crest level, including the implant fixture angle and the depth of the implant platform.<sup>13</sup> To prevent incomplete proximal embrasure fill by the papilla, the shape of the proximal contour of the crown is adapted during the provisional phase in relation to the osseous peak, guiding the formation of the papilla. The definitive restoration is only fabricated after complete maturation of the papilla.<sup>14</sup>

A surgical template used in the anterior maxilla to place an implant in a healing or a healed site must be designed

with the final position of the implant shoulder according to the diagnostic waxing. It should indicate the facial surface, the final gingival margin position, and the embrasure of the desired restoration.<sup>15</sup>

This article illustrates a simple clinical procedure to apply these findings. The treatment approach described offers a number of advantages, including a less invasive surgical procedure, a shorter course of therapy, correct implant position, and the fabrication of an ideal provisional restoration. This technique also allows for the placement of a provisional restoration that respects the biological width and, consequently, preserves or regenerates the papilla. Figure 1 shows a patient with the maxillary central incisors to be extracted as an example of how this technique may be applied. The technique is summarized in 3 phases.

## TECHNIQUE

### Radiographic template fabrication and radiographs

1. Fabricate diagnostic casts (Vel-Mix Die Stone; Kerr Corporation, Orange, Calif).

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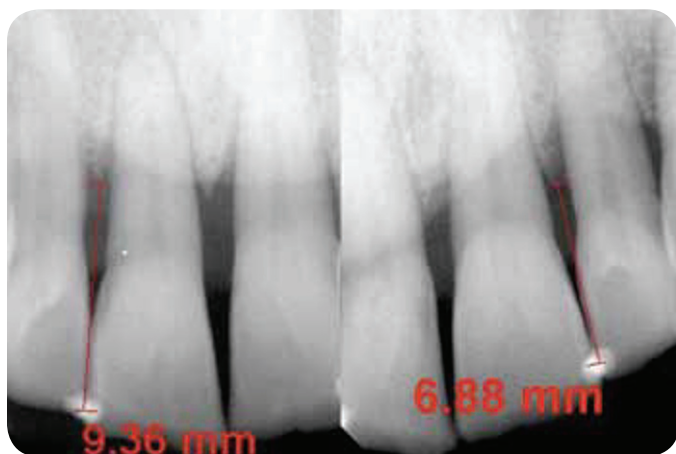
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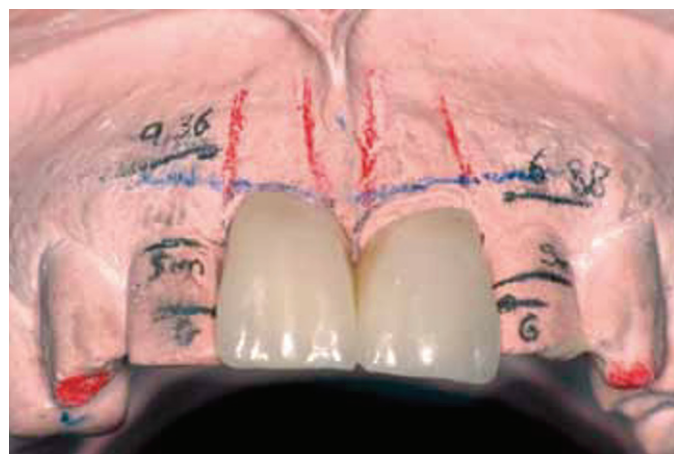
**1** Preoperative intraoral view of teeth to be extracted because of deep probing and loss of periodontal support, resulting in drifting and mobility.



**2** Radiographic template with gutta percha marks, including inspection windows.



**3** Periapical radiographs; measurements between marks to osseous peaks.



**4** Cast with complete measurements; dental laboratory technician can fabricate interim restoration with distance of contact point at 5 to 6 mm from osseous peak.

2. Fabricate a transparent template with a clear acrylic resin (ProBase Cold; Ivoclar Vivadent AG, Schaan, Liechtenstein) that covers the teeth involved. Inspection windows control placement.

3. Insert radiopaque (gutta percha) landmarks with a 1-mm round bur (Fig. 2).

4. Make a digital radiograph (Gendex GXS-700; KaVo Dental GmbH, Biberach, Germany) by using the parallel technique.

5. Calibrate the radiograph, measuring the possible magnification of the radiopaque landmarks by using software (VixWin Platinum Imaging Software; Gendex Dental Systems, Hatfield, Pa.).

6. Measure the distance between the landmarks and the osseous peaks (Fig. 3) and communicate this information to the dental laboratory technician.

#### Fabrication of the provisional restoration

1. Transfer measurements to the diagnostic cast and make a mark 5 to 6 mm from the osseous peak.

2. Fabricate the provisional acrylic resin (Telio Lab; Ivoclar Vivadent AG) restoration with the contact point at 5 to 6 mm from the osseous peak (Fig. 4).

3. Fabricate a template to rebase the provisional restoration intraorally, at the correct 3-dimensional (3-D) position, by using a photopolymerizing custom tray material (Elite LC Tray; Zhermack Spa, Badia Polesine, Italy).

4. Modify the template designed for the radiograph, if it corresponds to the desired final restoration, for use as a surgical template (Fig. 5).

#### Surgical and prosthodontic phase

1. Extract the teeth and place the implants (NobelActive TiUnite; Nobel Biocare AB, G  thenburg, Sweden).

2. Rebase the provisional restoration on the titanium provisional abutments (Non-Engaging Temporary Abutment; Nobel Biocare AB) by using the prosthetic template (Fig. 6).

3. Unscrew the provisional restoration and refine the restorations.

4. Insert the restoration (Figs. 7, 8).

#### DISCUSSION

The proposed technique is the fabrication of a prosthetic template designed by using a radiographic approach. This technique transfers the position of the osseous peak to the



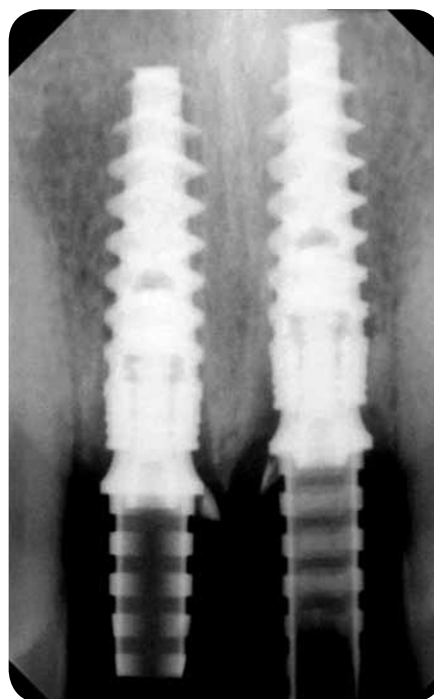
**5** Radiological template, modified by removing palatal part and leaving incisal edge as well as buccal part to be used as surgical template to transfer 3-D positions of implants.



**6** Provisional restoration realignment using prosthetic template to transfer 3-D position of prosthetic crowns intraorally.



**7** Provisional restoration immediately after insertion.



**8** Periapical radiograph immediately after insertion to confirm complete seating of titanium abutments.

cast and allows the dental laboratory technician to use this measurement in fabricating an optimal provisional restoration. Finally, a prosthetic template is fabricated to precisely transfer the provisional restoration position intraorally.

This technique, which controls the distance from the bone crest to the contact area of the restoration, is only one element in achieving predictable dental papilla-dependent esthetics.<sup>10-13</sup> Furthermore, the significance of placing the implant according to a

3-D position, which respects the comfort zone, has been previously reported.<sup>14</sup> The following factors also affect the facial marginal mucosal level: the periimplant biotype, facial bone crest level, implant angle, interproximal bone crest level, depth of implant platform, and level of first bone to implant contact.<sup>13</sup>

During the provisional phase, the shape of the proximal surface of the crown is adapted in relation to the osseous remodeling, thus guiding the formation of the papilla up to the

complete maturation of the papilla.<sup>14</sup> However, during the placement of an immediate implant, there are landmarks that can be used to reach the best 3-D position, including the bone walls of the extraction socket, the adjacent teeth, and the gingival margin. This surgical template helps to position the implant along a correct axis (mesiodistal and orofacial), while the position of the implant shoulder in the comfort zone is verified by using either an intraoperative radiograph and/or a periodontal probe.



**9** Provisional restoration after 8 weeks of healing.

The apicocoronal position of the implant must be consistent with the height of the bone, since the bone level on the tooth side determines the presence of a papilla and not the vertical position of the implant.<sup>10</sup> The contour of the facial aspect is also influenced by the height of the bone including the axis of the implant and must be considered during the implant placement. The measurements can also be made by using existing landmarks such as the incisal edge.

This technique has the disadvantage of requiring the fabrication of a radiological template with the cost involved; however, this template may also be modified and used as a surgical template. If the crown is not present, or the position of the final restoration needs to be changed, the surgical template must then be fabricated on the diagnostic waxing or on the interim restoration.

## SUMMARY

This article describes using a template to fabricate a provisional restoration that respects the distance of the contact point from the osseous peak. In addition, this prosthetic tem-

plate transfers the provisional restoration position intraorally from the cast. This also represents an alternative technique to performing an immediate dental implant placement. The combination of a provisional restoration with this technique and the correct 3-D placement of the implant may maintain or improve the esthetic outcome (Figs. 1, 9).

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