Case Report

An assistant guide for accurate placement of dental implants

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Abstract
A surgical stent is essential for the correct placement of implants during surgery. The optimal positioning of implants facilitates the fabrication of prostheses, and achieves a better prognosis. However, even with a surgical stent, the implant placement is not always as intended. To eliminate such discrepancies, we describe a technique to fabricate an assistant guide to help surgeons evaluate the parallelism and inclination between each drill bit, and the predetermined direction during implant surgery.

Keywords: surgical stent, surgical guide, dental implant.

Introduction
When performing implant surgery, it is crucial to place implants in an optimal position, with consideration of the bone contour and the future prosthesis. One method to achieve better implant positioning is to use surgical stents. Various types of stent and technique are described in the literature.1-7

Because of the limited size of a stent channel, the use of a round bur and pilot drill often causes difficulties with subsequent twist-drill usage. To address this, surgeons usually place indicators at implant sites to assess parallelism between implants; however, because of local bone anatomy, not all implants are parallel, particularly in the buccal-lingual direction. Improper positioning of implants makes fabrication of the prosthesis more complex, and worsens the prognosis for the implant by increasing the risk of surgical, periodontal, and prosthodontic problems.

Several factors, including the length and diameter the surgical-stent channel, affect the accuracy of implant placement.8, 9 It is necessary to extend the channel length to improve the accuracy of implant placement. However, longer channels often make it difficult for surgeons to accurately place drills in the area of the posterior ridge, because of insufficient interocclusal distance.

There are often discrepancies between the predetermined and actual implant positions, even when surgical stents are used, and particularly in areas with low bone density. This article describes a simple method to fabricate an assistant guide. Surgeons employing the assistant guide will be confident in accurately placing implants in their predeter-
mended positions, with the correct angulation. During surgery, after preparation with a round bur and pilot drill, twist-drill bits can be used in conjunction with the assistant guide to more precisely prepare the stent channel.

**Procedure**

1. Make an irreversible hydrocolloid (Jettrate; Dentsply, York, PA) impression and pour dental stone (Microstone; Whip Mix Corp, Louisville, Ky) to make diagnostic casts.
2. Outline the size and position of the future prosthesis on the diagnostic cast. Place vinyl polysiloxane on the lingual side of the cast (Fig. 1). Mix the vinyl polysiloxane impression material (Affinis; Coltene Whaledent, USA) and shape it as the future prosthesis (Fig. 2).
3. Prepare notches in the buccal side of the diagnostic cast and place vinyl polysilox-

Fig.1 Diagnostic cast with vinyl polysiloxane on the lingual side

Fig.2 Shape vinyl polysiloxane as a future prosthesis

Fig.3 Pins in vinyl polysiloxane teeth and buccal vinyl polysiloxane are parallel

Fig.4 Vinyl polysiloxane to cover vinyl polysiloxane teeth and neighboring teeth as an index for CBCT checking

Fig.6 Metal tubes are parallel to the index pins in the buccal side

Fig.5 CBCT reveals the path of metal pins inside the vinyl polysiloxane index

ane in the notches. Insert metal pins in the vinyl polysiloxane teeth at optimal positions and angles, according to the anatomy of the alveolar bone and future prosthesis. Insert metal pins in the vinyl polysiloxane of the buccal side, parallel to the pins in the vinyl polysiloxane teeth individually as a reference index, and then remove the index (Fig. 3).

4. Cut the metal pins in the vinyl polysiloxane teeth to the height of the occlusal plane and prepare a new vinyl polysiloxane mold to cover the vinyl polysiloxane teeth and neighboring teeth, as an index (Fig. 4). With the index in the patient’s mouth, check the path of the pins by using cone beam computerized tomography (CBCT) (Fig. 5).
5. Using a surveyor, place 3.2 mm diameter metal tubes in the cast, individually parallel to the metal pins in the buccal-side vinyl polysiloxane mold (Fig. 6).
6. Using the surveyor, place metal pins in the lingual-side vinyl polysiloxane mold, in-
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Fig. 7 Metal pins in the lingual side are individually parallel to the metal tubes. 

Fig. 8 Assistant guide

Fig. 9 Surgical stent

dividually parallel to the metal tubes (Fig. 7).

7. Mix clear autopolymerizing resin (Orthodontic Resin; Dentsply Caulk, Milford, DE, USA) and apply it to surround the metal pins on the lingual side and neighboring teeth, to fabricate an assistant guide (Fig. 8). Allow the resin to polymerize, then remove it. Apply the same method to surround the metal tubes and neighboring teeth with resin to fabricate the surgical stent (Fig. 9). The axes of the tubes and metal pins in the two appliances must be identical and parallel.

Discussion

The described procedure can be used to simply and inexpensively fabricate an assistant guide suitable for both upper and lower ridges. With the aid of the assistant guide, surgeons can precisely place an implant in its predetermined position and with the intended angulation. Additionally, the guide facilitates the fabrication of the dental prosthesis.

Surgeons can easily evaluate the parallelism between the surgical drill and the assistant guide pins from any viewpoint during the entire surgical process. Even an inexperienced surgeon can achieve better results by using this appliance. One disadvantage of the technique is the time required to fabricate the appliance, nonetheless, the time spent is worthwhile.

References