Simplistic Partially Limiting Surgical Guide for Flapless Implant Placement: A Case Report

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The accurate positioning of implant in bone is important in order to meet the biological, esthetic, and biomechanical requirements of the prosthesis. This becomes crucial in flapless implant placement. The combination of bone sounding and use of a surgical guide will allow precise placement of a dental implant, abutment, and provisional restoration in a minimally invasive manner. A technique to transfer the diagnostic information to the surgical guide is described in this report. The chief advantage of the procedure is the ability to apply flapless implant placement surgery and immediate loading.

Key Words: implant, surgical, guide

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INTRODUCTION

Determining the correct positioning of an implant in the bone to prevent encroachment on vital structures and adjacent teeth and to enable a prosthetic restoration that meets biological, esthetic, and biomechanical requirements is a challenge.[1] The challenge is increased with the "blind" procedure of flapless implant placement because the different angulations of the drills may perforate the cortical plates, especially on the lingual surface in the mandibular molar area and the anterior maxilla.[2]

Bone sounding has been used in clinical dentistry to determine the thickness of the soft tissue overlying the bone and available bone volume.[3] This provides the clinician with reliable information and a small margin of safety.

Many types of surgical guides have been proposed to achieve correct implant placement.[1,4] Information acquired in the preoperative planning phase is transferred to the surgical guide. Design concepts vary from simple nonlimiting, to partially limiting, and, finally, to completely limiting surgical guides. The nonlimiting design, in general, provides the surgeon with an indication as to where the proposed prosthesis is located in relation to the selected implant site. The partially limiting design offers the possibility of having a guide sleeve direct the first drill used for the osteotomy. The remainder of the osteotomy and implant placement is then finished freehand by the surgeon. The completely limiting design restricts all of the instruments used for the osteotomy in the buccolingual and mesiodistal plane. As the surgical guides become more restrictive, less of the decision making and subsequent surgical execution is done intraoperatively.[1] However, fabricating completely limiting guides may require advanced software (image-guided implantology[5]), may be expensive, or may require specialized training not amenable to all clinicians. Careful implementation of treatment plan will produce quality results even with partially limiting designs.

This combination of bone sounding and use of a surgical guide will allow precise placement of a dental implant, abutment, and provisional restoration in a minimally invasive manner. A technique to transfer the diagnostic information to the surgical guide is described in this report.

CASE REPORT

A 21-year-old patient with missing right lower first and second premolars (28, 29) and first molar (30)

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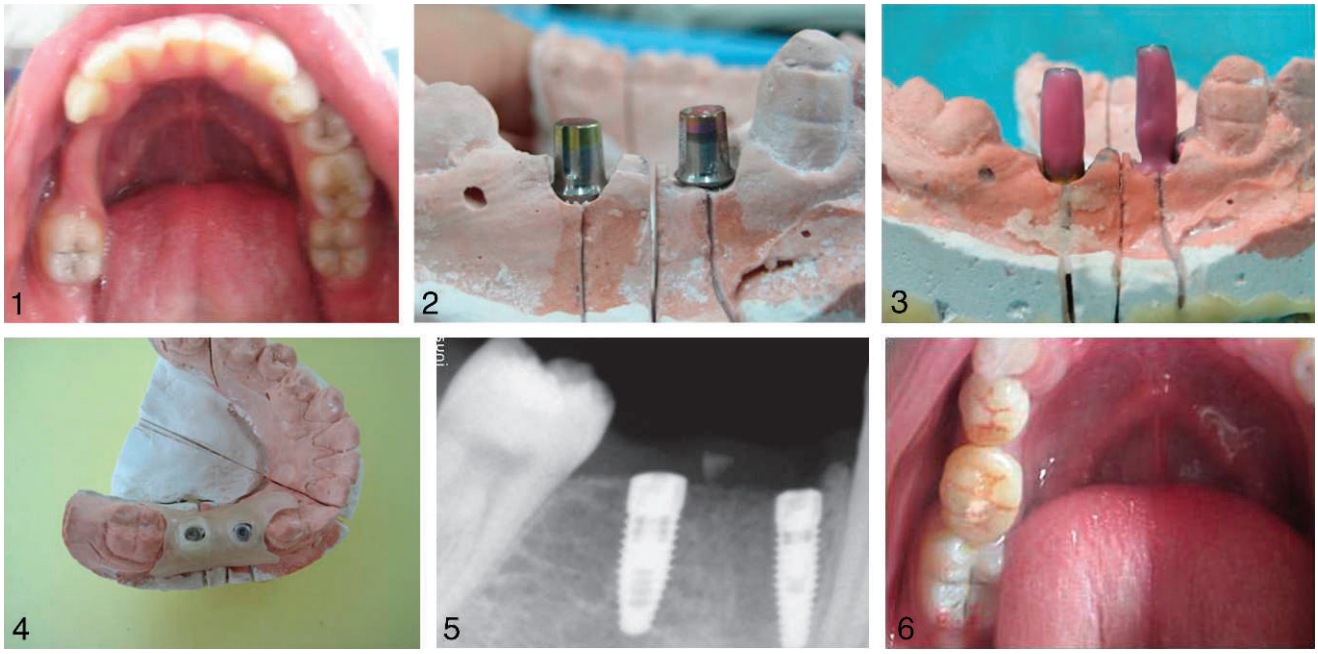
was prepared for immediate loading with provisional restoration (Figure 1). The patient had D2 (900–950 HU) of bone density in the edentulous span. After preliminary diagnosis and diagnostic impressions, a wax-up of the missing teeth was done against the antagonist arch to establish centric contacts and canine-guided occlusion. A putty index of this wax-up was then made. At the region of the centric contacts of the opposing molar and premolar, 2 lines were scribed on the cast to indicate the implant position. The casts were sectioned so as to obtain molar segment and premolar segment die. Stability of the die was ensured with the double die-pin technique. Two more sections were made in both of the dies individually at the site of prospective implant placement.

Bone mapping was then done on the patient. On the cross section obtained for each section, the soft-tissue thickness was outlined. The thickness was 1 mm on the buccal and lingual surfaces for both molar and premolars and 1.5 mm on the occlusal surface. The remaining portion was the bone, which was 6.5-mm thick in the molar region and 5.5-mm thick in the premolar region. This created a 3-dimensional representation of bone volume within which the correct position of the implant was established by mock surgery. Implant analogues were placed in the drilled sites. The abutments of the matching diameter were placed on the analogues (Figure 2) and, using the putty index, temporary restorations were fabricated. The abutments were then removed and impression posts (2 pieces) were then placed on the analogues with guide pins. Parallel block out was done on the impression posts to obtain a uniform diameter of 2 mm (Figure 3). This provided a guide for the direction of the drill during implant placement. A surgical template in cold cure resin was fabricated surrounding the impression posts (Figure 4).

To remove the impression posts, the resin guide with posts was placed in hot water. Once the wax used for parallel block out melted, the guide pin of the 2-piece impression post was undone to release the impression post from implant analogue. On inverting the surgical guide the post dropped out. This enabled correct angulation of the pilot drill during implant placement. The final drill was done without the guide (thus, this was a partially limiting guide). A confirmatory intraoral periapical radiograph was taken to check the implant position in bone (Figure 5). Because the initial torque placement was more than 35 Ncm, it was decided to continue with immediate loading soon after im-



Figures 1–6. Figure 1. Preoperative view. **Figure 2.** Abutments on implant analogues after mock surgery. **Figure 3.** Parallel block out of impression posts. **Figure 4.** Fabricated surgical template. **Figure 5.** Confirmatory intraoral periapical radiograph. **Figure 6.** Temporary restorations cemented on abutments.

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plant placement. The prefabricated temporaries were cemented with zinc oxide eugenol cement (Figure 6). Minimal adjustment was required in occlusion. Implant protected occlusion guidelines were followed.

The provisional restorations were left for 3 months, and the final restoration was definitive porcelain fused to metal crowns that were cemented 3 months after the implant placement.

Conclusion

Flapless implant placement was planned in the patient because it offers the following advantages: it causes minimal swelling, pain, and discomfort; eliminates a second surgical procedure; maintains the soft-tissue architecture; and leaves the periosteum intact on the buccal and lingual aspects of the ridge, which maintains a better blood supply and thus reduces the likelihood of bone resorption.[5,6]

To implement the flapless implant placement technique, a partially limiting surgical guide and bone mapping were used. All decisions regarding implant positioning had been previously made. The plan was executed according to the partially restrictive surgical guide. Although preplanning was more time consuming than when less restrictive guides are used, the more restrictive nature of guide allows for a short flapless procedure and the placement of a premade provisional restoration, increasing accuracy and patient comfort.

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