The Use of a Surgical Template in Impression Procedures

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Abstract

Introduction: The surgical stent is used to transfer the positional information in the diagnostic arrangement to the patient for accurate surgical placement of implants, which helps the practitioners place the implants in an optimal location. Aim: This case presentation describes the use of the surgical stent as a radiographic template, surgical stent, and the impression jig. Materials and Methods: The patient without the maxillary right premolar was treated with a dental implant. An immediate impression was obtained at the time of surgery with the aid of a surgical stent. The cast for temporary prosthesis, as well as the provisional prosthesis, were fabricated. The final abutment was selected using the PLAN solid abutment. The final abutment was connected and final prosthesis was delivered. The prosthesis was functioning well up to the final evaluation, and soft tissue health and the width of the ridge were well maintained with good esthetic result. Discussion and Conclusions: In this presentation, the surgical stent was used in the diagnosis step as a radiographic template, surgical stent, and impression jig. A reduction in time with less complicated steps may be achieved by obtaining an impression at the time with aid of surgical stent.

Key Words: Dental Impression Technique, Dental Implants, Oral Surgical Procedures

Introduction

Dental implants have become part of routine treatment plans in many dental offices because of their increasing popularity and acceptance by patients [1], and the replacement of teeth with implants has become the new standard of care [2]. The surgical stent is used to transfer the positional information in the diagnostic arrangement to the patient for accurate surgical placement of implants, and it helps the practitioners place the implants in an optimal location [3-5]. In this case report, the surgical stent was used in the diagnosis step as a radiographic template and the impression procedure.

Case Presentation

Case

A 21-year-old male patient was referred for evaluation of the upper right premolar region. The patient did not have any medical conditions and was not taking any medications that were associated with a compromised healing response. The clinical examination indicated missing maxillary first premolar (*Figure 1A*). The patient was given a detailed explanation concerning the present state, alternative treatment plans, and the procedure, and informed consent was obtained from the patient. Treatment with dental implant was planned after the consultation.

The impressions of both arches were made using irreversible hydrocolloid impression material, and the casts were poured into the dental stone. A diagnostic setup was prepared using the modeling wax.

A template was made using a vacuum-formed, thermoplastic material. The wax-up was removed from the cast, and the shell template was filled with resin down to the edentulous part of the case, and additional layers of the polymerized resin material to strengthen the template [6].

The laboratory handpiece was used for making an access hole through the template over the planned prosthetic implant site. The hole was enlarged until the final drill for the implant would move freely without friction, and gutta percha was condensed to fill the access hole (*Figure 1B*).

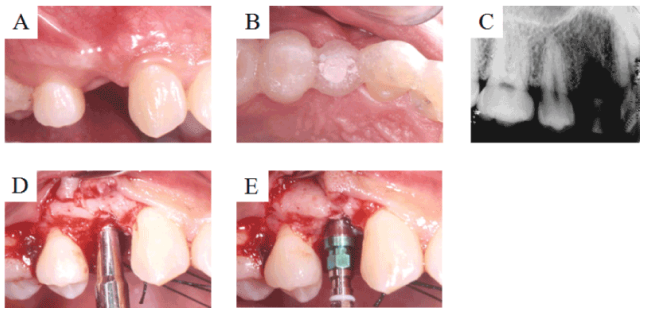

Figure 1: Figure 1A: The clinical photograph showing missing upper right fist premolar. Figure 1B: Surgical stent indexed to the occlusal, buccal, or palatal surfaces of the adjacent teeth. Figure 1C: Radiograph with template with radiopaque markers. Figure 1D: Ridge expansion was done with an osteotome. Figure 1E: The implant was placed with an insertion torque of 40 Ncm.

The surgical template was smoothed and polished, ultrasonically cleaned, and sterilized by using cold sterilization. A radiograph was taken with the template in position to show the potential implant site and the access hole (*Figure 1C*). Gutta percha in the access hole was removed with an explorer, and the unnecessary bulk of the surgical stent was removed to perform more efficient surgery [7].

Immediately before the procedure, the patient rinsed for two minutes with a 0.12% chlorhexidine digluconate solution. Following an injection of 2% lidocaine with 1:100,000 epinephrine local anesthetic, the full-thickness flap was raised. A surgical template was used to locate the desired implant position, and ridge expansion with an osteotome was done

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before implant installation (*Figure 1D*). The site was prepared to accept a 4.1 X 14 mm implant, and the implant was placed with the insertion torque of 40 Ncm (*Figure 1E*). An immediate impression was obtained at the time of surgery with the aid of the surgical stent. The implant holder was connected with the stent using autopolymerizing resin (*Figures 2A and 2B*).

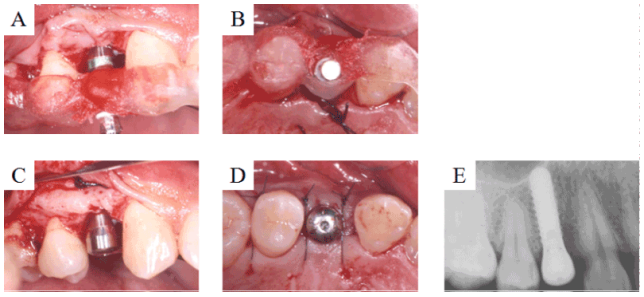

Figure 2: Figure 2A. The implant holder was connected with the autopolymerizing resin. Figure 2B. Occlusal view of surgical stent connected to the implant holder. Figure 2C. 4.5 mm-high healing cap was hand tightened. Figure 2D. The wound was closed with the sutures. Figure 2E. The radiograph after implant insertion.

A healing cap was placed and was hand tightened (*Figure 2C*). The wound was closed by means of single sutures (*Figure 2D*). The radiograph was taken just after implant insertion (*Figure 2E*). The patient was placed on amoxicillin 500 mg 3/day for 5 days, mefenamic acid 500 mg initially then mefenamic acid 250 mg 4/day for 5 days, and chlorhexidine digluconate 0.12% 3/day for 4 weeks. He was asked not to chew on or brush the surgical area for the first 4 weeks postoperatively.

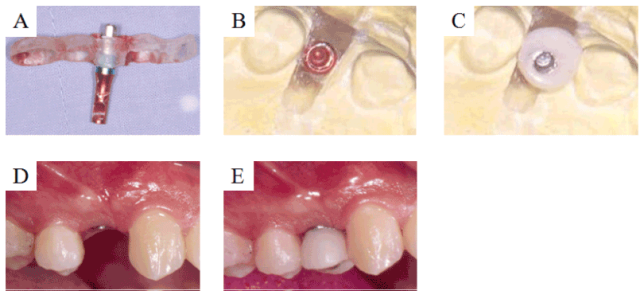

Figure 3: Figure 3A. The implant analog was fixed to the impression holder. Figure 3B. The cast was fabricated. Figure 3C. The provisional prosthesis was made. Figure 3D. Good healing of the soft tissue. Figure 3E. Temporary prosthesis was connected.

The implant analog was fixed to the impression holder and was sent to the laboratory for temporary prosthesis (*Figure 3A*).

The cast for temporary prosthesis was fabricated (*Figure 3B*), and the provisional prosthesis was fabricated (*Figure 3C*). Good soft tissue healing was achieved, which could be seen after the removal of sutures and healing cap (*Figure 3D*). The temporary prosthesis was connected, and the titanium compartment was visible at the buccal surface (*Figure 3E*). The final abutment was selected using the PLAN solid abutment (*Figure 4A*). The final abutment was connected and the temporary prosthesis was delivered (*Figure 4B*). Master cast was fabricated with gingival mask and the cast was mounted on the articulator with the anterior guidance table to make the optimal guidance (*Figures 4C and 4D*).

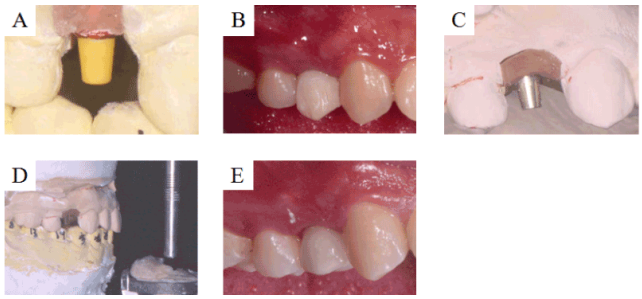

Figure 4: Figure 4A: The selection of final abutment was done with the PLAN solid abutment. Figure 4B: After connection of final abutment, the temporary prosthesis was delivered. Figure 4C: Master cast was fabricated with gingival mask. Figure 4D: The case was mounted on the articulator, and the anterior guidance table was used to make the optimal guidance. Figure 4E: The buccal view at the final evaluation showing good esthetic result.

The prosthesis was functioning well up to the final evaluation. The soft tissue health and the width of the ridge were well maintained with good esthetic result (*Figure 4E*).

Discussion

In this report, the surgical stent was used in the diagnosis step as a radiographic template and the impression procedure. A reduction in treatment time of one appointment was possible by obtaining an impression at the time of surgery (2). The impression was used for making temporary prosthesis with titanium cylinder, selecting the final abutment using the PLAN abutment, and fabricating the provisional crown for the final abutment. If an impression is obtained during the surgery, the impression material may have to be in contact with the soft and hard tissue. Additional procedures, such as applying the rubber dam, may be needed. This approach using the stent in the impression procedure may be applied with ease.

The guide channel preparation in the surgical template allowed the final surgical drill to pass through freely in this report. The dense bone in this case made it possible to use this template. Site preparation in bone with a low density will usually depend on the experience and prudence of the surgeon [7].

Fermit may be applied because it may allow a twist drill larger than the first one to be used through the same guide channel without loss of stability [8]. The temporary prosthesis was fabricated using titanium temporary abutment, because titanium has better tissue compatibility when it is contacted with the soft tissue [9].

A complete diagnostic wax-up was done to make a tooth similar to the contralateral tooth. Artificial teeth of a size of similar to the opposing or adjacent dentition may be used. This establishes the desired prosthetic orientation of each tooth in the edentulous area [6].

When a radiograph of the template is obtained, the data can be transferred to the laboratory to facilitate the fabrication of a surgical template [10,11]. The radiographic template may be used as a surgical stent, or an adjustment can be made at this period [5].

The surgical site is routinely assessed by visual examination and palpation with periapical and panoramic radiology [12], and operators should carefully palpate the regions of potential implant placement for bone undercuts, bone thickness, and morphology[13]. There are several methods to apply for the precise measurement of the buccolingual dimension of the bone or assessment of the location of unanticipated undercuts. It may be done by sounding the bone through the soft tissue from the buccal and lingual aspect of the alveolar ridge [13].

This can be done by locally anesthetizing the region and then inserting a 25-gauge needle, rubber endodontic stopper, or sharpened periodontal probe, perpendicular to the tissue surface and through the soft tissue until it touches the underlying bone. A stone model is sectioned buccolingual at the intended surgical site, and the soft-tissue thickness, which is obtained by sounding, is subtracted from the outer surface of the model. In this way, the buccolingual bone available for implant placement can be determined.

Cross-sectional radiographs can be used to evaluate the buccolingual dimensions from a variety of techniques, including panoramic tomography with a curved image layer; conventional tomography, including linear and multi-directional systems; computed tomography; and magnetic resonance imaging (MRI) [14]. Computed radiography (CT) is one of the most widely used methods, and the CT scan imaging procedure is recommended for complex cases, where multiple implants are required[12]. In this presentation, the surgical stent was used in the diagnosis step as a radiographic template and impression procedure. A reduction in treatment time of one appointment was possible by obtaining an impression at the time of surgery. This approach can be applied to less challenging situations, such as single missing area, and further clinical studies are needed to apply for the multiple missing area.

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