Case Report

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MOLAR BAND AS AN AID IN FABRICATING SURGICAL TEMPLATE FOR SINGLE TOOTH IMPLANT PLACEMENT: INNOVATIVE TECHNIQUE

Anshul Chugh[1],Punam Bhisnoi[2]
1. Associate Professor, Department of Prosthodotics and Crown and Bridge, Pandit Bhagwat Dayal Sharma Post Graduate Institute of Dental sciences, Rohtak, Haryana, India.
2. Demonstrator, Department of Prosthodotics and Crown and Bridge, Pandit Bhagwat Dayal Sharma Post Graduate Institute of Dental sciences, Rohtak, Haryana, India.

ABSTRACT:

The success of implant reconstruction depends on meticulous care being taken in diagnosis and treatment planning for the patient. Evaluation of the potential recipient sites for implant placement with computed tomography (CT) is invaluable. Templates with radiopaque markers are helpful guides in determining the necessary dimension, location, and angulation of the implant according to available bone, vital structures, and the predesigned prosthesis. The use of surgical templates or guides for correct implant placement can be a determinant for success. Radiographic templates that are then modified for surgical purposes have the advantage of transferring the radiographic information to the surgical guide. A technique is described for fabricating surgical template utilizing customized molar band keeping the radiographic template as a guide.

Key Words: Computed Tomography Scan, Radiographic template, Radioopaque marker, Surgical Template.

INTRODUCTION:

The posterior regions of the mouth often require the replacement of a single tooth. The first molars are the first permanent teeth to erupt in the mouth and unfortunately are often the first teeth to be lost as a result of decay [1]. They are important teeth for maintenance of the arch form and for proper occlusal schemes. In addition, the adult patient often has one or more crowns, as a consequence of previous larger restorations required to restore the integrity of the tooth. Longevity reports of crowns have yielded very disparate results. The mean life span at failure has been reported to be 10.3 years. [2] Other reports range from a 3% failure rate at 23 years to a 20% failure rate at 3 years.[3] The primary cause of failure of the crown is caries and/or endodontic therapy [4,5]. The tooth is at increased risk for extraction as a result of these complications, which are a leading cause of single posterior tooth loss in the adult.

In 1997, Gomez-Roman et al [6] published a 5-year report on 696 endosteal implants in 376 patients. Almost 300 of these were single tooth implants, with a 96% overall survival rate (with 97.6% recall rate). In 1998, Muftu and Chapman[7] published a 4-year

*Corresponding Author Address: Dr Anshul Chugh.Email: dr.anshulchugh@rediffmail.com

prospective study on replacing posterior teeth with freestanding implants using a press fit plateau implant design (Bicon). A total of 404 restorations were placed (170 in the maxilla and 234 in the mandible; 82 single tooth and 350 multiple tooth with implants unsplinted to each other) in 168 patients. A 90% survival rate in the maxilla and a 96.8% survival rate in the mandible was obtained. In 1999, Moberg et al [8] reported on 30 implants, with a cumulative success rate of 96.7% at 3 years.

The success of implant reconstruction depends on meticulous care being taken in diagnosis and treatment planning for the patient. Evaluation of the potential recipient sites for implant placement with computed tomography (CT) is invaluable. Templates with radiopaque markers, such as gutta percha,[9] metal bearings,[10] lead foil,[11] metal rods or tubes,[12] and resin teeth made with barium sulfate,[13] are helpful guides in determining the necessary dimension, location, and angulations of the implant according to available bone, vital structures, and the predesigned prosthesis.

The use of surgical templates or guides for correct implant placement can be a determinant for success. Radiographic templates that are then modified for surgical purposes have the advantage of transferring the radiographic information to the surgical guide. The rationale for the utilization of a surgical stent depends on the following objectives:

1. In the CT evaluation, the radiopaque markers incorporated into the radiographic template should provide proper guidance in determining the location and the axis of the implant and the abutment. Relevant data should be transferred to the working cast through the markers, which dictate accurate reorientation of the surveying table for guiding channel preparation. An effective radiopaque marker should stay in place during modification procedures. Thus, if the design of the guide utilizes removal of the markers for channel preparation, the procedure must also include another guide for accurate transfer of the data from 2 to 3 dimensions.

2. Conversion of the radiographic template to a surgical aid should facilitate correct placement of the implants with the desired path of insertion, which is correlated with the data obtained from a 2-dimensional scan image. The surgical guide should rest firmly on available structures and provide the surgeon with ease in site preparation and accurate visualization of the implant sites.

The objective of the aforementioned technique was to fabricate a surgical template that offers critical information about the location and angulations' of the implant, as well as the position and angulations' of the anticipated abutment relative to the predesigned superstructure with computed tomography evaluation.

CASE DETAIL:

A 25 year old male patient reported to the Department of Prosthodontics and Crown & bridge, Post Graduate Institute of Dental Sciences, Rohtak, India for replacement of missing lower right first molar tooth**.** The patient was in good general health. There was no significant medical finding. The intra-oral examination revealed missing lower right first molar tooth **[Figure 1]**.

After explaining all the treatment options to the patient , it was decided to restore the site with endosseous dental implant.

PROCEDURE

1. Diagnostic wax up done and over it a template fabricated using self cure acrylic resin material, which will be used later for the fabrication of radiographic template. On the working cast, tentative angulation is determined using adjacent teeth as a guide on a milling surveyor (Kavo milling surveyor) **[Figure 2,3].**

2. After determing the angulation, tripoding of the cast done for utilizing the same angulation in fabrication of surgical template. **[Figure 4]**

3. Drilling done on the template utilizing same angulation. The template was now converted into radiographic template by inserting Gutta percha radioopaque marker into the drilled hole. **[Figure 5, 6]**

4. Radiographic template was worn by patient and CT Scan of the site done using Seimen's Stomatom Volume Zoom machine. and CT findings evaluated for the angulation, density, distance from nearest anatomical structure . **[Figure 7]**

5. When it was confirmed that the angulation is perfect, the predetermined angulation is utilized for the fabrication of surgical template.

6. For fabricating surgical template the molar band is shaped and soldered to form a loop of diameter 2.5mm (0.5mm larger than pilot drill diameter) and luted on the cast utilizing same angulation on the surveyor. **[Figure 8]**

7. The surgical template was disinfected by keeping the template overnight in Betadine solution and then tried in patient's mouth. **[Figure 9]**

8. Mucoperiosteal flap raised and ridge exposed for implant placement.

9. After stabilizing the surgical stent in patient's mouth, drilling done through the same template and keeping the same angulation, further sequential drilling is done. **[Figure 10]**

10. Implant placed utilizing the same angulation. **[Figure 11]**

DISCUSSION:

Many different approaches are used for fabrication of radiographic and surgical template[14,15]. The

radiographic template is the information carrier for diagnostic wax up, imaging and surgical guidance. It is central to successful fixture placement and to outcome of implant therapy. The radiographic template can be converted into surgical template. If all the requisites are met by the radiographic template, then the same can be converted into surgical template, by securing the cast on the surveyor in the same orientation and removing the GP points and luting the customised molar band in the same angulation. This article describes a technique whereby a step by step approach results in a precise template for implant surgery.

The advantages of this technique is proper utilisation of the radiographic template for implant surgery by converting it into surgical template, cost effectiveness and easy to fabricate.

CONCLUSION:

A technique for fabrication of surgical technique by utilising customised molar band is given, which can be utilised in clinical practice for proper placement of implant placement. The advantages of this technique is proper utilisation of the radiographic template for implant surgery by converting it into surgical template, cost effectiveness and easy to fabricate. Using molar band prevents the accidental trim of the acrylic resin during surgery.

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FIGURES:

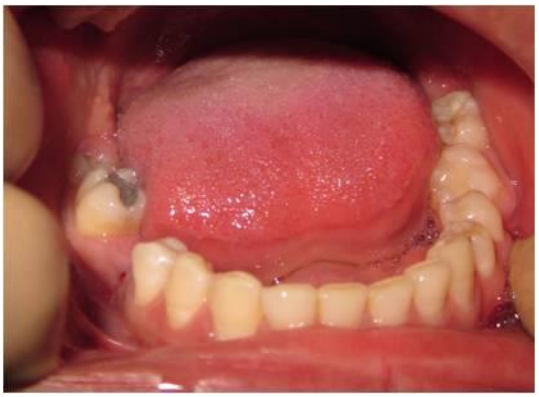

Figure 1

Figure 2

Figure 3

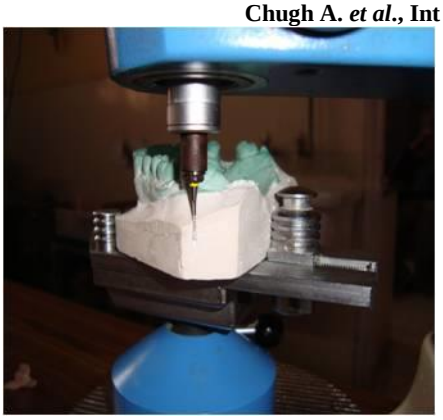

Figure 4

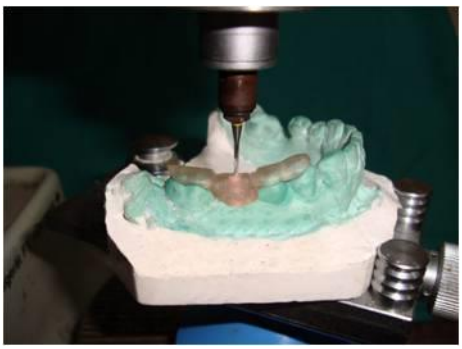

Figure 5

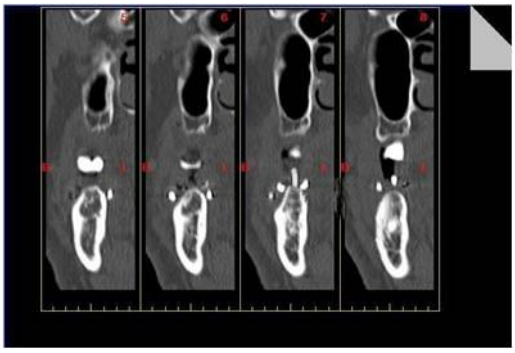

Figure 6

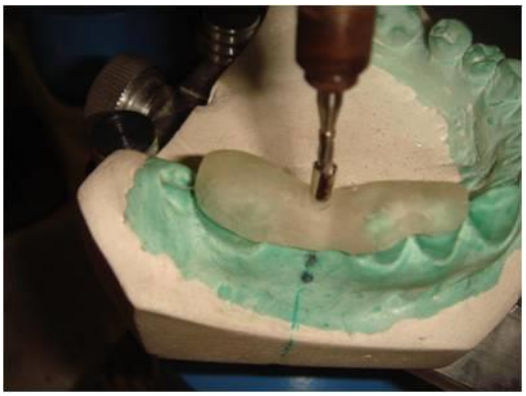

Figure 7

Figure 8

Figure 9

Figure 10

Figure 11