A Simple and Effective Technique to Fabricate Diagnostic and Surgical Stent

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Abstract
Prosthodontic rehabilitation of completely edentulous arch with implant supported prosthesis requires a stent, to evaluate the relationship between anatomical structures and to aid in implant placement for successful treatment result. The lengthy treatment procedure where the clinician has to duplicate the existing denture for stent fabrication has created a need for an improved simple and time saving technique. This article thus describes fabrication of a surgical stent with acceptable retention, stability and teeth arrangement using simple and time saving lab procedures.

Keywords: Complete denture, Surgical stent, Implant.

INTRODUCTION

Since the introduction of dental implant, the need for appropriate placement of the implant has been paramount. In the diagnostic and surgical stage of implant therapy, stents are needed to establish a logical continuity between diagnosis, prosthetic planning and surgical phases. The term “stent” was coined after an English dentist Charles R Stent. A stent is an appliance used either for radiographic evaluation during treatment planning for assisting in determining the dimension, location and angulation of implant according to available bone, vital structures and proposed prosthesis, or during surgical procedures to provide optimum implants placement.1-9 Prosthetically driven implant placement is best for simplification of abutment selection, ideal force distribution10 and long-term success.

Stent should be stable and rigid when in correct position. It should not be bulky, be simple to insert, and should not obscure surrounding surgical landmarks. The stent must not contaminate the surgical field during bone graft or implant placement, and should also be transparent and allow easy access to surgeon and assistant. The stent should relate to ideal facial contour. Many edentulous ridges have lost facial bone, and the stent can assist in determining the amount of augmentation required for implant placement or support of the lips and face. The surgical stents are used for placement of bone graft, implant, and again for implant uncovery.

Several methods have been reported for fabrication of radiographic or surgical stent.11-13 In an edentulous arch a vacuum form surgical stent can be fabricated from an existing removable prosthesis, if within accepted guidelines. A surgical stent for the complete edentulous arch also can engage the occlusal aspects of the opposing teeth.14 Computer assisted design and manufacturing of surgical guides15 with recent advancements in multiple engineering techniques, such as laser sintering are now available to fabricate 3D models.

This article describes a simple, time saving procedure for fabrication of surgical stent along with complete denture fabrication to be used for radiographic imaging and also for implant placement; thus it does not require a patient to leave complete denture with the clinician.

FABRICATION PROCEDURE

Step 1-Complete denture fabrication: The master cast is duplicated with elastomeric impression material. Here in this procedure customized teeth have carved with cone wax technique (Fig. 1). After that usual steps in complete denture fabrication are followed till dewaxing stage. Then the mold cavity is filled with putty and the flask is closed. Once putty sets flask is opened and putty denture is removed (Fig. 2). Tooth space of mold is then filled with desired tooth color acrylic using on sprinkle method (Fig. 3) and remaining space of mold is filled with heat cure pink acrylic, followed by normal denture fabrication procedures.
Step 2—Surgical stent fabrication: The putty denture is positioned over duplicate master cast followed by wax up and flasking. Once plaster sets, flask is opened and the putty denture is removed (Fig. 4). Mold cavity is filled with clear acrylic and flask is closed followed by normal denture fabrication procedures.

The processed denture and stent are removed, trimmed and polished (Fig. 5). Occlusal adjustment is done by selective grinding. Cast with stent is positioned on surveying table, with occlusal plane parallel to the horizontal plane. Holes are drilled at desired implant location; with use of slow speed hand piece attached to the surveyor (this will ensure parallelism of implant and subsequent implant abutment). These holes are filled with gutta-percha points or zinc oxide (ZnO) cement.

MODIFICATIONS
Modification in basic technique can be done to suit the purpose for which it is carried out.
1. If prefabricated teeth are used, stent can be prepared by removing teeth after dewaxing and later repositioning them back in mold after putty denture is fabricated.
2. Zinc oxide cement powder or BaSO₄ can be mixed in clear acrylic to make the radiopaque tooth on stent.
3. A duplicate denture can be made using a similar procedure.

DISCUSSION
There are several methods to fabricate a stent using complete denture duplication procedure which require, leaving complete denture with clinician for duplication; thereby it prolongs the treatment time period. In recent advancement, virtual planning of implant position is done with the use of computer-aided manufacturing guides. After that guides are delivered to surgeon before procedure, and no modification is possible during surgery but these require sophisticated instruments which are all expensive and not easily available.
This new proposed technique allows fabrication of similar sized and shaped stent of complete denture by using superior property of heat activated acrylic resin. This procedure does not require any special instrument and stent fabrication can be accomplished in the lab at the time of fabrication of complete denture. Here polyvinyl siloxane is used to duplicate the master cast and mould space which offers advantage of accurate detail reproduction. Elasticity of the material permits easy removal of putty denture from undercuts therefore can be used in, cast with deep undercuts. Moreover custom made waxed teeth carved according to opposing dentition allowed more stable and accurate denture fabrication. This is a simple and time saving procedure which fabricates the stent with acceptable retention, stability and teeth arrangement.

REFERENCES