



## Impression techniques for fixed prosthetics

Lieutenant Erin K. Zizak, DC, USN and Captain Craig M. Neitzke, DC, USN

### Introduction

Prosthodontics focuses on the restoration of form and function of the stomatognathic system. Due to the confined space within the oral cavity and the materials used, it is necessary to fabricate restorations through indirect techniques. When using an indirect technique, making a good impression is a key step in the production of a quality fixed restoration. It is important to select the appropriate impression material and technique for each clinical situation. This clinical update will discuss impression techniques utilizing polyvinyl siloxane (PVS) impression materials.

Impression techniques described in the literature include variation on both the dual and single arch techniques.

### Dual arch impression techniques

The dual arch impression technique was first described by Wilson and Werrin in 1983.<sup>1</sup> Advantages of the technique include: less time and material required, built-in interocclusal record, and patient comfort. Dual arch impressions are indicated when the patient has an intact dentition, class I occlusion, canine guidance and a stable MI position. They can be made for single crowns, onlays or intracoronal inlays, assuming that the restoration is not on the most distal tooth in the arch.<sup>2</sup>

Many trays are available for use with this technique. They include: plastic, metal, with walls, without walls and custom shapes for specific locations in the arch. Materials utilized in making the impression include low, medium, heavy body, putty and bite registration PVS. There are conflicting opinions concerning the accuracy of the different combinations; however, there is general consensus that a more rigid tray will produce a more accurate impression for single restorations. Errors encountered in a well-made impression with proper technique can most likely be compensated for when two coats of die spacer are used before fabrication of the restoration.<sup>3</sup>

#### One-step technique:

The one-step technique using a dual arch impression tray requires that a low viscosity impression material be injected around the teeth while the tray is loaded with a bite registration or heavy-body PVS material. A depression is made in the tray material and filled with low-viscosity impression material to reduce burn-through of tray material. The patient then closes down into MI.

#### Two-step techniques:

The two-step technique can be broken down into two subcategories:

Hydraulic pressure technique: In this technique, an impression of the quadrant prior to tooth preparation or with the provi-

sional in place acts as a highly accurate custom tray. Confirm that there are no interferences in reseating the tray. Impression material is injected around the tooth and into the preoperative impression. The patient is then instructed to close down into MI.<sup>4</sup>

Laminar impression technique: In this version of the two-step technique, holes are drilled into the facial, mesial and distal aspects of the pre-operative impression of the tooth to be restored. .5 mm should be removed around the anticipated margin area to allow for bulk of new impression material. The impression is then re-inserted into the mouth. Impression material is injected into the facial hole, with the two remaining holes allowing for the escape of excess material. This technique is a good choice for locations that are difficult to isolate.<sup>5</sup>

The dual arch techniques have their advantages, but they are also very technique sensitive. Special care must be taken to ensure that the final product is accurate.<sup>6,7</sup>

Make sure the tray fits. Select a tray that will wiggle when the patient is closed in MI. If there is resistance, modify the tray by grinding away the interference. The mesh can also be cut in the area of impingement to allow the tray walls to flex away from the interference.

Check for distortion: The impression surface should be completely covered with PVS. If the tray burns through, the tray is distorted during the impression process by flexing against a resistant object. The impression of the preparation should be captured in a single viscosity of impression material. If the low-viscosity material is displaced, distortion will occur at the interface of the two materials on the preparation.

How far forward should the impression extend: The guidance of the patient should be captured in the extent of the impression. For example, an impression of a patient with mutually protected occlusion must extend to include the canine.

Confirm that the patient is closed in MI: In some cases, the presence of the impression material will cause the patient to close in an altered position. There are two techniques that are described in the literature to confirm MI. First, locate a contact on the contralateral side that holds shim stock. The same contact should still hold the shim stock when the impression is in place. The second technique involves the fabrication of a guidance jig for the contralateral side made out of acrylic. If patient cannot close reliably into MI with the tray in the mouth, a single arch technique should be used.<sup>7</sup>

### Complete arch impression techniques

Several techniques are available for making a full arch final impression.

#### One step techniques:

One-step techniques involve the application of multiple viscosities of PVS at the same time. This is normally done with a heavy body or putty material placed in the tray and a light or medium body PVS injected around the tooth preparation. It is important that the

margin of the preparation be fully captured with the light or medium-body impression material.

#### Two-step techniques:

The two-step technique is described in two categories: two-step putty-wash technique and two-step putty-wash technique with a polyethylene spacer. A preliminary impression is made with PVS putty prior to tooth preparation or with provisional restorations in place. Either a stock tray or custom tray can be used. A polyethylene sheet can be placed between the putty and the dentition to prevent close adaptation. In the second step of the procedure, light body impression material is injected around the tooth and placed in the pre-made impression before seating. There is concern about the effects of these techniques on the accuracy of the working die. The critical factor that influences the accuracy of the two-step putty technique is the control of the wash bulk. This control is not present in the one-step or the two-step with polyethylene sheet. It is ideal to have a standardized thickness of material around the preparation impression.<sup>8</sup> The two-step putty wash technique without the polyethylene sheet was found to be more accurate than the one-step technique and the polyethylene putty wash technique when evaluating full arch impressions.<sup>8</sup>

#### Single tooth impressions with full arch pick-up impression:

Dimashkieh described a method that uses a preformed polycarbonate provisional shell or aluminum crown to make the single tooth impression that is then picked up in a full arch impression. Gingival displacement is accomplished by having the shell fit loosely past the finish line, avoiding the need for displacement cord, hemostatic agents or electro surge. It is suggested that the hydrostatic pressure of the material will displace and air or fluid will contact the tooth. Adhesive must be placed on the internal and external surfaces of the polycarbonate crown. This technique is suggested for impressions that will involve multiple abutments.<sup>9</sup>

#### Matrix technique:

A matrix of occlusal registration material is made over the tooth preparations. The matrix is trimmed, retraction cord is placed, and an impression of the preparations is made in the matrix with a high-viscosity impression material. A stock tray is then filled with medium-viscosity impression material and seated over the matrix and remaining teeth to produce the full arch impression.<sup>10</sup>

#### **Summary**

With all of the techniques available, which technique is the best? The answer is: It depends. There is conflicting research concerning the comparative accuracy of the impression techniques described. In general, the dual-arch techniques have been found to be as accurate if not more accurate than the single arch techniques when used in limited clinical situations.<sup>11,12</sup> Single-arch impressions are very versatile, and can be applied in any situation. If a single-arch impression technique is chosen, special care should be taken when fabricating and articulating the opposing cast. "The most common problem with high occlusion using a full-arch impression was the inaccurate opposing casts..."<sup>13</sup> It is important that the dentist find a tech-

nique that works consistently in their hands, and be able to adapt when a clinical situation warrants a different approach.

#### **References**

1. Wilson EG, Werrin SR Double arch impression for simplified restorative dentistry. *J Prosthet Dent.* 1983 Feb;49(2):198-202.
2. Tucker RV, Miya DM. Conservative cast gold restorations: The Tucker tech. In: Summitt: J.B, Robbins JW, Schwartz RS, Dos Santos J, eds *Fundamentals of Operative Dentistry 2<sup>nd</sup> ed.* Carol Stream, Ill.: Quintessence; 2001:526-45.
3. Ceyhan JA, Johnson GH, Lepe X, The effect of tray selection, viscosity of impression material, and sequence of pour on the accuracy of dies made from dual-arch impressions. *J Prosthet Dent.* 2003 Aug;90(2):143-9.
4. Pensler AV. Sense and nonsense about impression materials (II). The impression techniques (combined bite and patient bite). *Quintessence Int Dent Dig.* 1978 Dec;9(12):17-24.
5. Schoenrock GA. The laminar impression technique. *J Prosthet Dent.* 1989 Oct;62(4):392-5.
6. Imbery T. Simplifying dual arch impressions. *J Am Dent Assoc.* 1998 Nov;129(11):1599-600.
7. Kaplowitz GJ. Trouble-shooting dual arch impression II. *J Am Dent Assoc.* 1997 Sep;128(9):1277-81.
8. Nissan J, Laufer BZ, Brosh T, Assif D. Accuracy of three polyvinyl siloxane putty-wash impression techniques. *J Prosthet Dent.* 2000 Feb;83(2):161-5.
9. Dimashkieh MR, Morgano SM. A procedure for making fixed prosthodontic impressions with the use of preformed crown shells. *J Prosthet Dent.* 1995 Jan;73(1):95-6.
10. Livaditis GJ. Comparison of the new matrix system with traditional fixed prosthodontic impression procedures. *J Prosthet Dent.* 1998 Feb;79(2):200-7.
11. Davis RD, Schwartz RS. Dual-arch and custom impression accuracy. *Am J Dent.* 1991 Apr;4(2):89-92.
12. Ceyhan JA, Johnson GH, Lepe X, Phillips KM. A clinical study comparing the three-dimensional accuracy of a working die generated from two dual-arch trays and a complete-arch custom tray. *J Prosthet Dent.* 2003 Sep;90(3):228-34.
13. Christensen GJ. Making fixed prostheses that are not too high. *J Am Dent Assoc.* 2006 Jan;137(1):96-8.

Lieutenant Zizak is a 2008 prosthodontic graduate at the Naval Postgraduate Dental School. Captain Neitzke is the Chair of the Prosthodontic Department at the Naval Postgraduate Dental School.

The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, nor the U.S. Government.