Abstract

Space analysis for retentive components is a critical part of a treatment plan for an implant-retained prosthesis. This article describes a technique to evaluate the retentive component space between the mucosa and intaglio surface of a removable prosthesis. This technique uses a silicone mold to represent the relieved space. Two silicone matrices are fabricated over the silicone space replica as a reference for selecting or fabricating retentive components for the implant-retained removable prosthesis.

Using attachments on implants to improve the retention and stability of a mandibular complete denture improves the treatment outcome. The selection of attachments depends on the size, resiliency, retention, position of implant, durability, and ease of replacement of the attachment system. To accommodate retentive components, which include the implant, abutment, the matrix or partix part of the attachment incorporated within the acrylic base, and the bar when it is used, space analysis is critical when planning an implant-retained removable prosthesis. Insufficient space for the retentive components may result in an overcontoured prosthesis, excessive occlusal vertical dimension, fractured teeth adjacent to the attachments, fracture of prosthesis, compromised esthetics, and overall patient dissatisfaction.

Ahuja and Cagna defined the restorative space as a space bounded by the occlusal plane, supporting tissues of the edentulous jaw, facial tissues, and tongue. This restorative space is important when evaluating the space for restoring missing teeth; however, the space needed for the retentive components is not the same as the space needed for the tooth arrangement. For an implant-retained removable prosthesis, the retentive component space is the space where the retentive components are surrounded by the relieved intaglio surface of the prosthesis and mucosa over the alveolar ridge or the implant above the mucosa. The retentive component space should be carefully evaluated after the wax try-in stage of making the removable prosthesis. Several authors recommend using a silicone putty matrix covering the denture teeth as well as the polished surface of the denture and sectioning the matrix in the facio-lingual direction to evaluate the space. A silicone matrix made from the occlusal and polished surfaces may mislead the clinician because it includes the space needed for the denture teeth. To maintain esthetics and function, the denture teeth need a certain amount of thickness. The dimension measured from this type of matrix could be completely occupied by the denture teeth. Lack of acrylic resin to support the denture teeth will increase the risk of denture fracture.

In addition, because the silicone matrix records the outer surfaces only, the prosthesis may need to be relieved greatly after the retentive components are inserted, especially when a bar is used. The relief may be on the denture teeth, and the esthetics could be compromised. This report presents a technique to evaluate the space for the retentive components after the verification of tooth arrangement. This technique can provide information about the thickness of the definitive prosthesis after the relief for retentive components, and any possible modification of the tooth arrangement can be made before processing the denture.

Technique

1. Estimate where the retentive components would be and use an acrylic bur (H77E; Brasseler USA, Savannah, GA)
to create a space on the intaglio surface of the record base after the verification of a wax trial denture. Keep at least 2 mm thickness for the denture teeth and acrylic resin (Fig 1).

2. Inject a low-viscosity poly(vinyl siloxane) (PVS) impression material (Aquasil Ultra LV; Dentsply Caulk, Milford, DE) into the relieved space and place the prosthesis on the cast. Ensure the complete seating of the prosthesis.

3. After the polymerization of the PVS material, remove the PVS space replica from the intaglio surface of the denture and place it on the cast (Fig 2).

4. Create several notches on the land area of the cast. Paint the PVS space replica and cast with a separating material (Vaseline; Chesebrough-Ponds USA Co., Greenwich, CT).

5. Mix the silicone putty (Splash; DenMat, Lompoc, CA) and cover the PVS space replica on the cast from the buccal surface to the occlusal surface (Fig 3).

6. Apply the separating material on the surface of the putty and mix another silicone putty to cover the PVS space replica from the lingual surface (Fig 4).

7. Make an additional section in the facio-lingual direction on the silicone putty matrix where the attachment assembly will be. Use the silicone putty matrices as the guide to select or fabricate the retentive components (Figs 5 and 6).

8. Remove all the block-out wax from the definitive cast with a steamer (Portable Steamer; Belle de St. Claire, Orange, CA).

9. After the fabrication and try-in of the definitive retentive components, insert them on the definitive case and cover them with a layer of baseplate wax (TruWax; Dentsply International, York, PA; Fig 7).

10. Apply a layer of tray adhesive on the intaglio surface of the trial denture and make a wash impression with the low-viscosity PVS impression material (Aquasil Ultra LV) on the definitive cast (Fig 8).

11. Fabricate a new definitive cast with type 3 stone (Microstone; WhipMix Co., Louisville, KY) and process the denture on this cast.

12. Deliver the denture and incorporate the attachments to the denture base.

Discussion

Although the locations and types of retentive components should be planned before the implants are placed, occasionally the implants may be placed at less-than-ideal ideal positions. A
restorative dentist may need to modify the original plan according to where the implants are placed. Evaluation of the available space for the retentive components becomes an important issue when fabricating a definitive prosthesis.

Using a matrix made from the facial surfaces of the tooth arrangement may not provide the correct information regarding the space needed for the tooth. Moving the denture teeth to the silicone matrix may be an alternative technique to evaluate the space; however, information regarding dimension for the acrylic base will still be missing. When the teeth are reset back to the record base, the positions may not be the same.

Compared to a matrix made from the polished and occlusal surfaces, this technique provides a view of the true space for the retentive components. If a silicone block-out material is used when fabricating the record base over the implant components (e.g., healing abutments) the silicone material can be removed before trimming the record base. The space created by the silicone block-out material will facilitate the record base relief. After relief on the intaglio surface, a clinician can visualize how much space is available and make additional adjustments to the tooth arrangement, if necessary. If the teeth are moved or additional wax is added to the polished surface of the prosthesis, another verification appointment may be needed to verify the change. After the modification to the tooth arrangement, the PVS space replica and matrices should be remade to represent the increased space. The retentive components, especially a bar-type attachment, could be fabricated lingually to the implants to provide more space for the tooth arrangement.

In addition to the advantages at the diagnostic and fabrication stages, this technique will also facilitate the delivery procedures. As the intaglio surface of the wax trial denture has been relieved, adding the wax spacer on the definitive retentive components and making a wash impression on the definitive cast will be a simple procedure. It has been reported that doing so will save time at chairside when delivering the prosthesis. A silicone-type occlusal registration can be made prior to the wash impression to prevent a possible change in the occlusal relationship. This occlusal record can also be used to mount the new cast from the wash impression.

A possible disadvantage of this technique is that the teeth may move while relieving the record base. Since the relief is on the intaglio surface, the record base will be removed, and the denture teeth will stay on the wax without the support of an acrylic base. A silicone-type occlusal record will minimize the possible movements of denture teeth when making the wash impression on the cast. The tooth arrangement must be reevaluated after the relief of the record base.
Summary

A technique for providing an evaluation of retentive components and facilitating the delivery of an implant-retained prosthesis is presented. This technique provides a guide when fabricating retentive components and minimizes the time and effort needed during the delivery appointment.

References


