

# A Technique for Improving the Retention of Dentures Retained by Ramus Frame Implants

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Retention for a denture on a ramus frame implant is usually less satisfactory. The friction between the frame and denture is not reliable. Locking-type attachments require manual dexterity, which could be a problem for many patients. This article presents a technique of cementing the stud-type attachments to the ramus frame to convert the retention mechanism from one that uses the friction between the acrylic resin and ramus frame to a conventional resilient precision attachment. The retention can also be adjusted by changing the nylon inserts.

**Key Words:** attachment, ramus frame, retention, resorbed mandible

## INTRODUCTION

The long-term success rate of a ramus frame implant may not be as good as that for a root form implant;<sup>1</sup> however, in situations such as severely resorbed ridge or when a patient refuses to have a ridge augmentation procedure, the ramus frame implant will still be an option for patients. Many patients have acceptable results with dentures retained by ramus frames implants, but a common complaint is their loose fit. The denture is mainly retained by the friction between the vertical wall of the ramus frame and the acrylic resin.<sup>2-4</sup> Frequent removals and insertions of the denture cause wear on the acrylic resin and result in a loose denture. To regain the retention, the denture needs to be relined frequently, which frustrates both the clinician and the patient.<sup>5</sup> Locking-type attachments, such as the Lew passive attachment (Attachments International, San Mateo, Calif), have been used,<sup>3</sup> and there have been many reports of success, but it requires a degree of manual dexterity to open or lock the attachments, and these procedures could

be difficult for certain patients, such as those with arthritis.

Metal clips have been suggested as attachments on the metal frame; however, the parallel walls of the frame are not retentive for the clips.<sup>6</sup> To improve retention, cementing the denture to the ramus frame implant has been proposed,<sup>7</sup> but this will compromise the hygiene. This article presents a technique of making stud-type attachments on the ramus frame and converting the retention from metal-acrylic resin friction to metal-nylon dental attachments. Metal-nylon attachments last longer and are more durable; when wear happens, the attachment can be replaced easily without relining the denture.<sup>8</sup>

## PROCEDURE

1. Block out the undercuts around the ramus frame and make a final impression with the polyvinyl siloxane (PVS) impression material. Pour the impression with a type IV stone (SilkyRock, WhipMix, Louisville, Ky).
2. Apply a layer of baseplate wax on the ramus frame of the definite cast as a spacer and make a record base.
3. Follow conventional complete denture procedures until the teeth are arranged and verify the arrangement intraorally.

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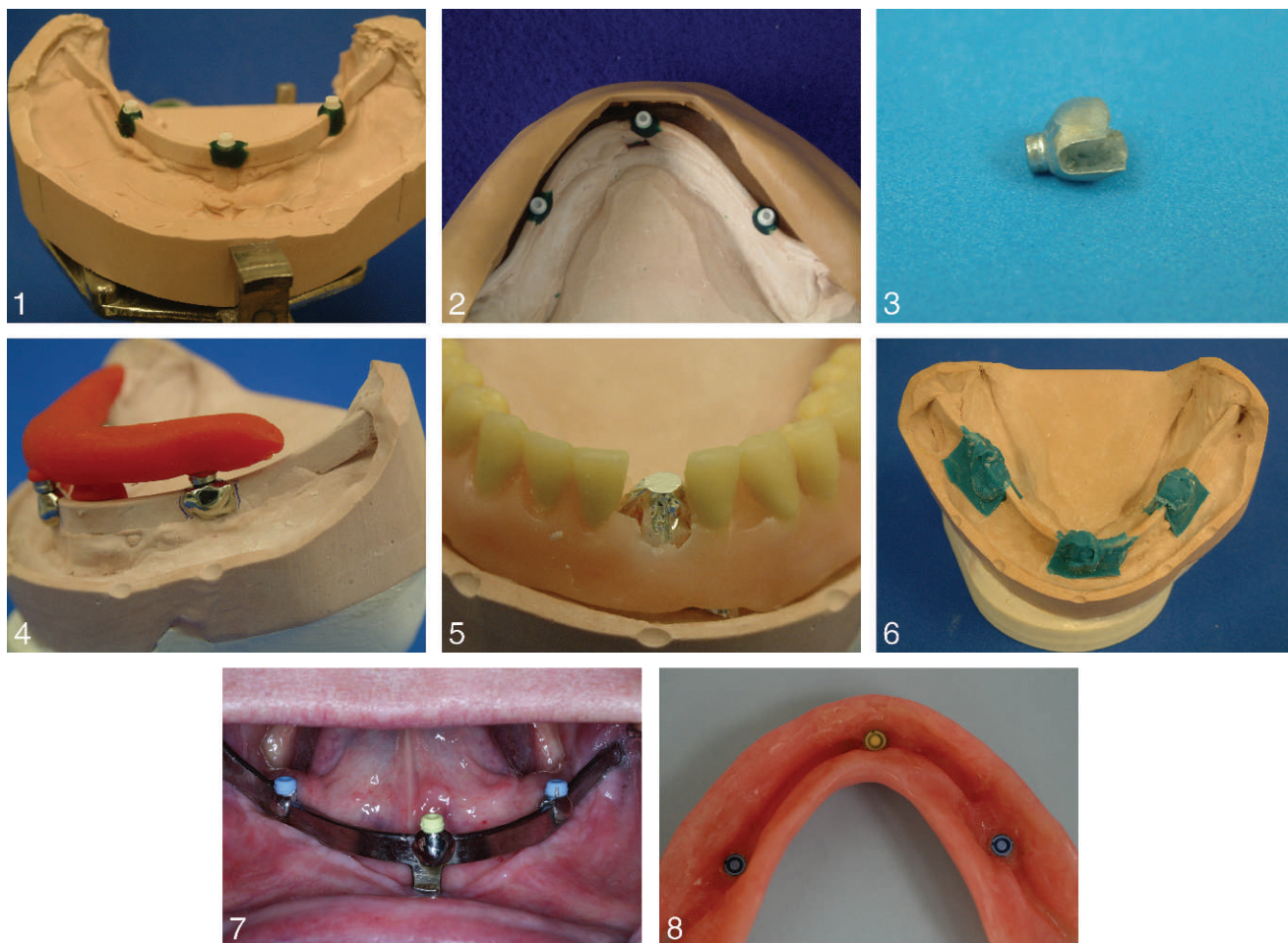
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4. Create several notches on the land area of the definite cast and make a silicone putty mold to cover the denture. Cut the mold with a knife into labial and lingual parts through the incisal edge and central grooves of the posterior teeth.
5. Place the definite cast on a surveyor table, placing the top surface of the ramus frame parallel to the surveyor platform. Use the silicone mold to select appropriate locations for the attachments. If possible, have 2 on the molar areas and 1 on the anterior teeth area.
6. Remove the wax spacer on the stone cast with a steamer machine and paint several layers of lubricant on the locations where the attachments will be.
7. Attach the plastic pattern of matrix (Micro ERA, Sterngold, Attleboro, Mass) on the mandrel (Micro ERA Paralleling Mandrel, Sterngold) and place the plastic pattern on the top of the bar. Add about 1 mm thickness of wax on the facial and lingual surfaces of the ramus frame (Figure 1).
8. Place the labial and lingual parts of the silicone putty mold on the cast to evaluate the available space for attachments (Figure 2). Make additional attachment patterns on the other selected locations.
9. Cast the attachment patterns with Co-Cr alloy (Beta, Sterngold) and finish the casting following the manufacturer's instruction (Figure 3).
10. Make a transfer index with autopolymerizing acrylic resin (Duralay, Reliance Dental, Worth, Ill) on the attachments (Figure 4).
11. Remove the transfer index and place the patrices on the matrices. Cover the attachments and patrices with aluminum foil and relieve the record base to accommodate the attachments (Figure 5).
12. Remove the cast attachments from the definite cast. Paint the adhesive for the PVS impression material on the corresponding areas of the ramus frame on the definite cast. Fill the relieved space with PVS impression material and place the record base on the definite cast. Remove excess material after the impression material sets (Figure 6). Process the denture over the definite cast with the silicone spacer according the conventional techniques.
13. Place the attachments on the transfer index and cement the attachments with a resin cement (Panavia 21, Kuraray America Inc, New York, NY).
14. Block out the undercut around the attachments and the ramus frame with a blockout material (Kool-Dam; Pulpdent, Watertown, Mass). Use an aerosol indicator marking spray (Occlude, Pascal International, Bellevue, Wash) to check if there is any contact between the ramus frame attachment assembly and the acrylic resin denture base.
15. Use an autopolymerizing acrylic resin (Repair Material, Dentsply Prosthetics, York, Pa) to transfer the patrices to the denture. Replace the processing patrices with the appropriate nylon patrices<sup>9</sup> (Figures 7 and 8).
16. Remount the dentures and adjust the occlusion.

### DISCUSSION

The friction between the denture base and ramus frame may provide the retention for the denture, but the retention will decrease when wear happens.<sup>10</sup> The friction is usually greater in the beginning after delivery as a result of the polymerization shrinkage from the acrylic resin during the processing. The tightness could be interferences from the acrylic resin and ramus frame and would prevent the seating of a denture. If a denture is not fully seated, the occlusal relationship and border seal will be changed. Stud-type attachments are commonly used in implant overdentures, and the retention of the attachments is from the undercut design between the patrices and matrices.<sup>10</sup> Many stud-type attachments are available in the market. The advantages of Micro ERA are the small dimension and the ease of replacing the nylon patrices when wear occurs or a higher level of retention is expected from the patients. Other types of attachments could be used as long as the interarch space is sufficient. The number and location of the attachments are based on the interarch space and the expectation of retention. The spatial distribution of attachments is more important than the number of attachments, however. Quadrilateral or tripod distribution will be better than bilateral or unilateral distribution.<sup>11</sup> Although the posterior areas are better locations for the attachments, the interarch space for the attachments is usually limited. Using a silicone matrix from the teeth arrangement will provide the information for the practitioner to select the ideal locations for the attachments.



**FIGURES 1–8.** **FIGURE 1.** Plastic matrices and wax extension on cast. **FIGURE 2.** Evaluate space for denture teeth. **FIGURE 3.** Cast attachment and metal extension. **FIGURE 4.** Acrylic resin position index. **FIGURE 5.** Relieve record base for attachment. **FIGURE 6.** Silicone material for attachment space. **FIGURE 7.** Cemented attachment with matrices. **FIGURE 8.** Matrices transferred to denture.

Using the base metal to cast the plastic pattern of attachment may increase the difficulty of finishing procedures; however, the bond strength with resin cement between the base metal and the ramus frame will be more predictable.<sup>12</sup> The accuracy of the attachment design could vary through the casting procedures.<sup>13</sup> An alternative solution is fabricating a base and welding a prefabricated attachment to the base; however, the weldable attachments usually require more occlusogingival space. The defects on the matrix and the appropriate matrix inserts should be evaluated before cementing the attachments.<sup>9</sup> The surface of the ramus frame could be microabraded (Ultra-blaster, Ultradent, South Jordan, Utah) before cementation to increase the bonding.

The attachments are fabricated with the same path of insertion and removal to minimize wear on

the nylon inserts. A transfer index is important to ensure that the positions of the attachments on the cast are similar to those in the mouth and to ensure the parallelism of the 3 attachments. The denture should be placed over the attachment assembly before and after the cementation to ensure the correct positions of the attachments. After cementation, the denture needs to be evaluated again for any possible interference. There should be no contact between the attachment and denture before the matrices are incorporated into the denture.

The limitations of this technique include the space available to accommodate the attachments and the accuracy of the casting procedures. Evaluating the space with the silicone mold and the relief of record base to accommodate the attachments will be important for the treatment

plan. The accuracy of the castings should be carefully examined before cementation. If there is any defect on the casting or the retention is not sufficient from the selected patrix, the attachment needs to be remade. Patients also need to be informed that the attachments will wear over time and that the patrix will need to be replaced in future maintenance visits.

### CONCLUSION

A technique of making several stud-type attachments over the ramus frame to improve the retention of the denture is presented. This technique simplifies the retention mechanism and after-delivery care for patients and clinicians.

### ABBREVIATION

PVS: polyvinyl siloxane

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