

# An Alternative Treatment Approach for Enhancing Retention in Resorbed Ridges “Octopus Tentacle”

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## ABSTRACT

The basic concern of edentulous patients is retention of their dentures. The success or failure of prosthesis is dependent on its ability to stay firmly in place in order to be able to perform the functions desired of it. The basic retention needs of denture wearers has led to considerable experimentation and research efforts trying to perfect dentures that compensate for natural tooth loss and to enhance retention by any means possible, such as attachments, springs, magnets, clasps, adhesive paste and powder. All have been tried with minimum success. This article describes unique and creative option in removable prosthetic retention by use of a soft denture lining material surfaced with multiple miniature suction cups, providing an alternative to ill-fitting poorly retentive dentures.

**Keywords:** Octopus tentacles, Suction cup denture, Denture retention.

## INTRODUCTION

According to GPT-8,<sup>1</sup> retention is defined as quality inherent in the dental prosthesis acting to resist the forces of dislodgement along the path of insertion.

Complete denture wearers may be one of the largest underserved dental patient populations; a significant number of these patients have dentures with decreased denture base support and retention of the prosthesis. While it is possible to enhance the resorbed ridge and/or place implants, not all patients are surgical candidates, especially the elderly and the medically compromised. This large group of patients must resort to improving denture retention with a variety of nonsurgical alternatives, the most common of which includes the use of denture adhesive pastes, powders and pads.

In the 1700s, steel springs were used to hold the upper and lower dentures together while applying pressure to the lower denture. More recent innovations have made use of existing anatomy to aid in retention. These have included lingual muscular pressure against lingually positioned, denture-retained stainless steel clips; bendable flanges engaging the undercuts of the mylohyoid ridge; silicone-lined dentures; small projections that engage the soft tissue; the prong denture; and transitional mini-implants with ball attachments, among others. All of these techniques have both positive and negative attributes and cannot be used with complete success in all patients.

This article describes a technique that offers a unique and creative option in removable prosthetic retention, providing an alternative to ill-fitting, poorly retentive dentures.

This unique concept in denture retention was conceived and patented by Dr J Spyer and RS Ingalls in 1885; after falling into disuse for several decades, this technique was reintroduced to dentistry in 1967 by Dr AC Jermyn.<sup>2</sup> A suction cup denture looks like a regular denture, except that on the underside of the denture there are numerous small suction cups that are formed from a soft resilient silicone rubber.<sup>3</sup> The best results were obtained with a cup shaped with straight sides and a tapered interior angle of 12.5°. The underside of suction cup dentures look like the underside of an *octopus tentacle*.

## CLINICAL REPORT

A 65-year-old female reported to the Department of Prosthodontics with a chief complaint of loose denture and inability to chew food properly. The patient could only retain the lower denture using an adhesive powder. The patient's complaints were verified and confirmed. On history and examination, it was revealed that she was an old denture wearer since last 3 years, the teeth of the dentures were attrited and there was discoloration of the dentures. The maxillary and mandibular ridges were resorbed, which might be one of the primary causes of the loose dentures (Fig. 1).

The treatment modalities available were:

- a. Relining of the old dentures



Fig. 1: Maxillary and mandibular resorbed ridges



Fig. 2: A special drill

- b. Fabrication of new set of dentures
- c. Implant-supported dentures.

Implant-supported dentures were ruled out due to age factor and bone morphology, relining of old dentures was not taken into consideration because of the attrition of teeth. So, a new treatment modality that is silicone lined suction cup denture was planned as an alternative approach.

## METHOD

The thickness of the soft tissues was assessed at the time the impressions were made. Following the conventional method a new set of complete dentures were fabricated. A special drill (Fig. 2) was designed and used to make circular depressions of uniform size and shape on the cast which reproduced suction cup. Suction cup holes were not drilled over frenum attachments, and were kept away from the denture borders by at least 2 mm.

The holes were drilled with a definite planned outline. The holes were spaced 1.0 to 1.5 mm apart, so the silicone cup edges will not overlap each other when they would be compressed against the soft tissues. The ideal depth of cut in the stone varies from 0.010 to 0.015 of an inch, depending upon the type and thickness of the tissues. Approximately 1 to 1.5 mm of acrylic was trimmed from the intaglio surface keeping the borders intact. A butt joint on the borders is preferred to simplify trimming and polishing. The butt joint is also necessary to act as a seal around the entire border during the packing of the silicone material. It serves to contain the silicone, and forces the soft material into the suction cup holes, filling them completely.

Tin foil substitute was applied to the prepared flanged cast. Isopropanol (99%) was applied to the prepared acrylic denture and aerated for 1 minute which acts as a degreasing agent.

A layer of Ufi adhesive was applied to the prepared acrylic denture and allowed to aerate for 1 minute (Fig. 3).

Using a clean stainless steel spatula equal lengths of Ufi Gel P (silicone based permanent soft relining material) base and catalyst were mixed on a clean glass slab for 30 seconds (Fig. 4). The material was loaded on the tissue surface of the denture and closed under pressure. The flasks were placed for



Fig. 3: Ufi Gel P

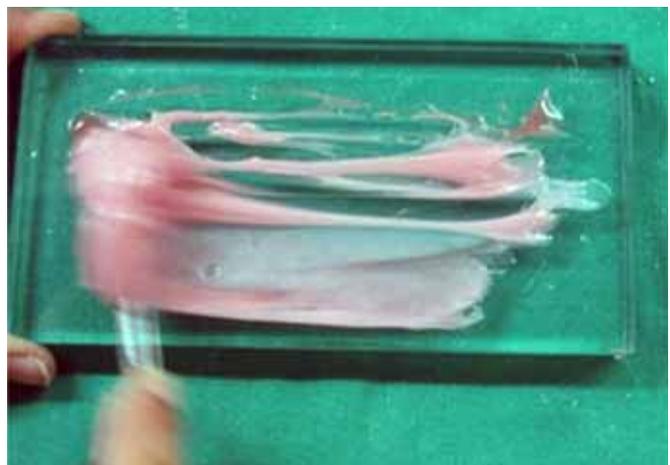


Fig. 4: Manipulation of Ufi Gel P on a glass slab

15 minutes into a pressure pot (40-45°C). The flasks were allowed to cool down for approximately 20 minutes.

The dentures were retrieved from the flask and any excess material was carefully removed with fine sharp pair of scissors and the margins were finished using a polishing disk (Fig. 5) and mixed glazing base and catalyst was applied on the freshly cut surface of Ufi Gel P.



Fig. 5: Trimming and finishing the borders

The new dentures were soaked in the fungicide solution for at least 15 minutes, and then rinsed with clear tap water before being placed in the patient's mouth. The patient was asked to maintain a closing pressure on the dentures for several minutes, in order to allow the suction cups to flare out and partly settle into the tissues (Fig. 6). The occlusion was then checked with articulating paper for gross occlusal discrepancies if any, they were corrected by selective grinding.

The postdenture placement instructions were given to the patient and recalled after 24 hours for check-up. After a follow-up appointment to equilibrate the occlusion and adjust a minor denture sore in the upper buccal vestibule, the patient reported that the suction cup dentures remained secure during function. Patient was instructed to keep the denture lined area clean by rinsing after every use, so that the longevity of the line of treatment could be prolonged. Relining could be considered whenever necessary.

## DISCUSSION

Retention is the quality inherent in a denture that resists the force of gravity, the adhesiveness of food and the forces associated with the opening of the jaws. When the residual alveolar ridges have resorbed and become flat, the adaptation of the denture base to the ridges is poor.

Flat denture-bearing surfaces offer greater suction cup retention compared to ridges. This interesting phenomenon occurs in the same way that suction cups pressed against a flat pane of glass stay in place. The squeezed elastic cups seek to return to their larger shape, thereby causing air pressure within the cups to be less than the pressure outside the cups. This in turn prevents the introduction of suction-breaking air common to the adhesive properties of nonflat surfaces. In addition, because the suction cup surface contains a minimum of 150 suction cups, there is an overwhelming increase in the denture-bearing surface area. Because the amount of retention provided by suction cup adhesion is proportionate to the area covered by the denture, there is a definitive advantage in maximizing the surface area covered by the denture.



Fig. 6: Dentures maintained under closed pressure

## Clinical Indications for Suction Cup Dentures

- Resorbed alveolar ridges
- Undercuts
- Rotational paths of insertion
- Salivary dysfunction
- Neurological disorders
- Resective surgery
- Traumatic changes of the oral cavity
- A history of head and neck irradiation
- Systemic disease
- Disease of the salivary glands
- Neurological diseases
- Cerebrovascular accident (stroke)
- Diminished tactile sensation
- Partially or wholly paralyzed oral musculature
- Orofacial dyskinesia (a prominent side effect of phenothiazine-class tranquilizer).

However, this is not recommended for patients with flabby gum tissue or dry mouth conditions.

The suction cups can be processed during the fabrication of new dentures or in the relining of existing dentures. The suction cup liner can be applied to both upper and lower

dentures, with a maxillary denture having up to 200 suction cups and a mandibular denture with more than 150. This prosthetic system is also highly beneficial for edentulous patients with uneven ridge morphology, flat ridges, poor healing, post-infection tissue healing, long-term denture wear and age.

## CONCLUSION

This article describes a simple technique for enhancing the retention and stability of dentures. A large number of small suction cups formed from soft, resilient silicone are processed in an otherwise conventional denture. These suction cups grip the oral tissue, providing an increased surface area for enhanced retention and a suction force for increased resistance. The

procedure requires working with a laboratory that is technologically advanced in the construction of this technique-sensitive procedure. When properly done, this can offer an alternative to patients who seek a successful prosthetic result.

The follow-up was done for the first 6 months and complaints were not reported by the patient.

## REFERENCES

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