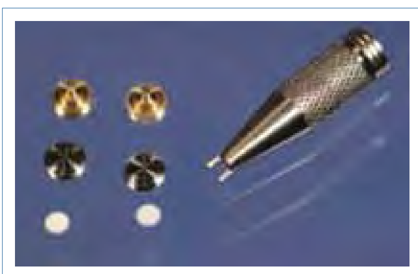
# Ultra Suction™ denture stabilizer system materials and methods

BY TED J. CARSON AND MONY PAZ

Ultra Suction system increases the retention of mandibular complete dentures. Their retentive capacity in comparison to conventional dentures has been positively demonstrated via retention tests and clinical observation (1).

A clinical study published in the *EDA Journal*, Jan. 2010 Vol. 56, showed a significant improvement in the denture retention after the application of Ultra Suction system. The aim of this article is to familiarize the clinician with the materials and methods through a comprehensive installation process.

Ultra Suction works on a simple mechanical principle: suction. Two tiny one-way valves embedded into the lingual or palatal aspect of the denture base draw air from beneath the denture via two air channels, collectively open to a retention chamber.



As the wearer bites firmly, the air trapped between the mucosa and the denture is expelled through the valves. Under negative atmospheric pressure, the diaphragms seal off the valve inlets. The pressure difference; that is, the lower pressure beneath the denture (2,3) exerts a pull and draws the denture closer to the borders. The result is a better fit to the tissues and an improved resistance to dislodging forces.

The documented dental literature teaches us that the supporting soft tissue under a well crafted maxillary complete denture is subjected to -80mmHg of negative atmospheric pressure. This is the suction level experienced by upper denture wearers (4). Ultra Suction valves have been developed to generate the same negative force when applied to mandibular dentures or to palateless maxillary dentures.

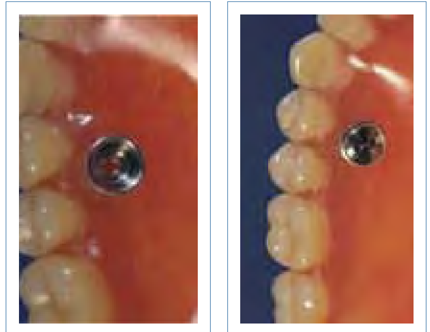
The system is commercialized as a full kit with illustrated mounting instructions. The components may be used for either upper or lower dentures, on completely new dentures or fitted on existing dentures during the reline/ rebase procedure.

## SYSTEM COMPONENTS

**The spacer bar** is used to create a retention chamber. Made of malleable metal, the bar is designed to sit intimately against the ridge. It can be easily bent, burnished and adapted to almost any alveolar ridge.

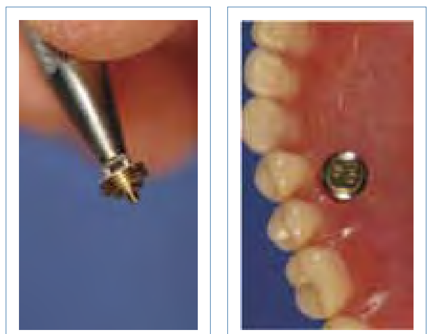
### Valves

Two one-way valves designed to expel the air beneath the dentures. The central hole in the valve body is described as the inlet and the valve cover as the exhaust.



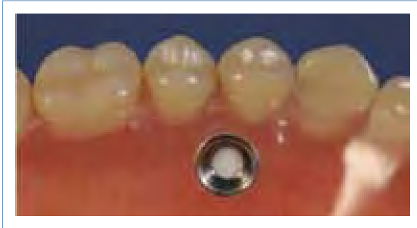
### Processing caps

As their names suggest, the caps are fitted onto the valve bodies before the installation procedure. Their role is to protect the valves. They are removed only after the polishing phase.



### Diaphragms

Two diaphragms and two spares come with the kit. These tiny plastic discs seal the inlet under negative atmospheric pressure and release the pressure under resting conditions, at the rate of 10mmHg per 15 sec.



**Service key** has two extremities. The upper part is used to grip, close and open both the valve covers and the processing caps. The lower part is a slightly larger replica of the valve and may be used as a gauge for depth and diameter.

The popular proverb "a picture is worth a thousand words" attributed to Confucius is certainly the philosophy adopted by the Korean Academy of Dental Technology. In his clinical and technical papers, Associate Professor Yi Cheong Jae aptly reinforces one of the main goals of visualization, namely making it possible to absorb large amounts of data quickly. This display of some interesting shots takes us through the installation process (5) starting with two light-body vinyl polysiloxane impressions loaded on special trays: Fig.1. The impressions were boxed, with particular attention to preserving accurate borders and to encompass the tuberosity protuberances: Fig.2

**Fig. 1** Vinyl Polysiloxane impressions

**Fig. 2** Boxed impressions

Yellow stone was used to pour the casts from the impressions and after setting, the cast models were trimmed (Fig. 3-4).

**Fig. 3** Impressions poured

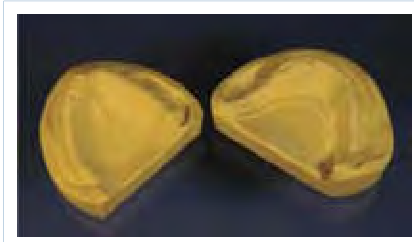


**Fig. 4** Casts are trimmed

On the ridge, the location of the spacer bar was pencil designed, making sure that the bar stopped at least 1 cm short of the end of the denture: Fig.5 - 6. The bar was stabilized using two to three small drops of cyanoacrylate and any undercuts were blocked-out (Fig. 7 -8).

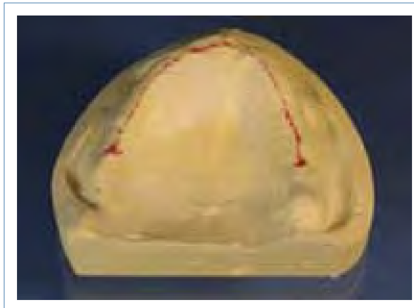


**Fig. 5** Spacer bar's location prepared

**Fig. 6** Minimum 1 cm short of the denture

**Fig. 7** Spacer bar adjusted and burnished

**Fig. 8** Any undercuts blocked out

Hard base plates were prepared on top of the spacer bars (Fig. 9-10) followed by bite blocks (Fig. 11). After bite registration, the casts were mounted on an articulator (Fig. 12) and teeth set-up for try-in was carried out (Fig. 13-14).

**Fig. 9** Maxillary base plate

**Fig. 10** Mandibular base plate

**Fig. 11** Bite blocks

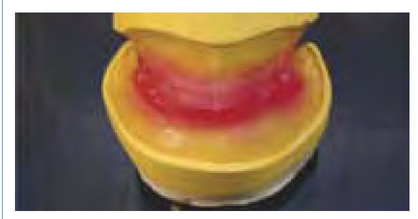


**Fig. 12** Casts mounted on an Articulator

**Fig. 13** Teeth set up

**Fig. 14** Ready for try in

In this case study, the Agar flasking technique and cold cure acrylic were used. However, all other flasking and packing techniques are acceptable.

Each model (cast) was packed in a two-part flask (Fig.15-16). The spacer bar remained on the model and any undercuts were blocked out (Fig. 17). Cold cure acrylic poured in (Fig. 18).

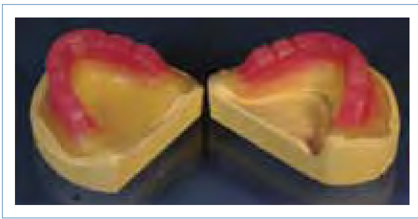


**Fig. 15** Flasking upper denture

**Fig. 16** Flasking lower denture

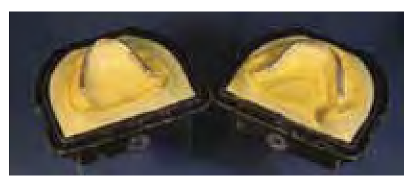


**Fig. 17** Undercuts blocked out

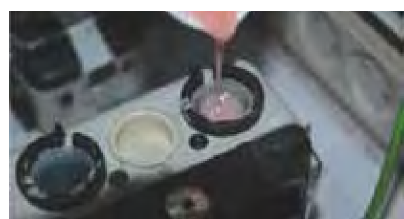


**Fig. 18** Optional pouring technique

After polymerization and de-flasking, the bars were removed from the dentures by digging prudently to prevent damage to the walls of the retention chamber (Fig. 19-22).

**Fig. 19** Post polymerization

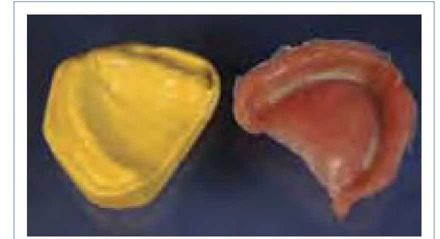


**Fig. 20** Deflasking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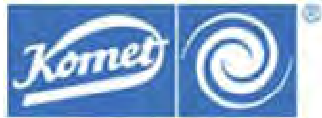


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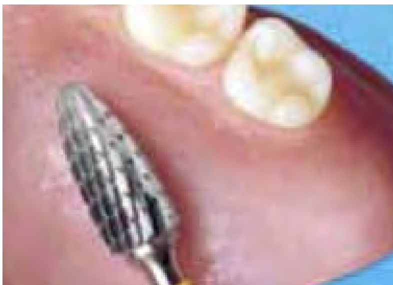

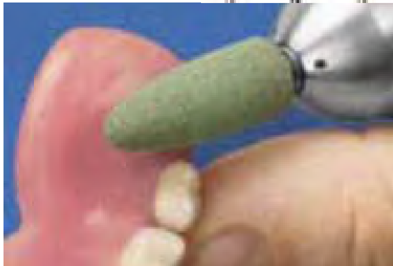

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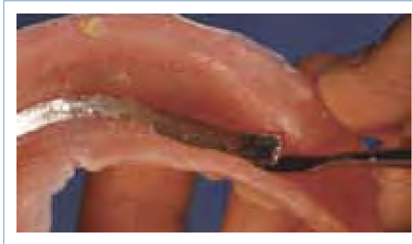

**Fig. 21** Bars carefully removed

**Fig. 22** Retention chamber obtained

The dentures were then trimmed and polished (Fig. 23). It should be noted that if the valves are mounted before polishing the dentures, there is a high risk of ending up with protruding valve covers, which is not a favourable outcome in terms of patient comfort.

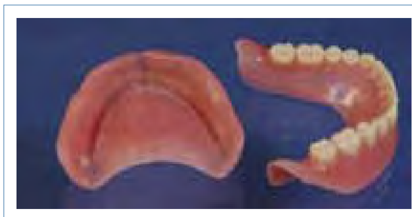

**Fig. 23** Dentures trimmed and polished

At the chosen lingual site, the location of the valves was drawn with a felt marker between first and second premolar, with the center of the valve preferably 1-1.5 mm above the highest point of the retention chamber (Fig. 24-25).

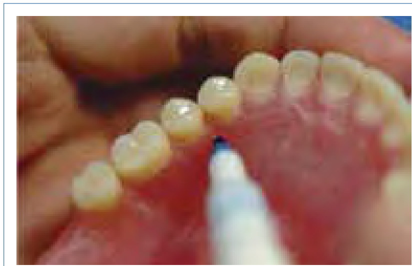

**Fig. 24** Location for valves marked

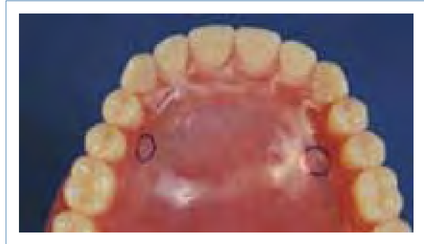

**Fig. 25** 1-1.5 mm above retention chamber

The cavities for the valves were prepared with a round bur (Fig. 26) intermittently using the gauge side of the service key for guidance i.e., depth and diameter (Fig. 27-28).

**Fig. 26** Housings prepared for the valves

**Fig. 27** Depth and diameter checked

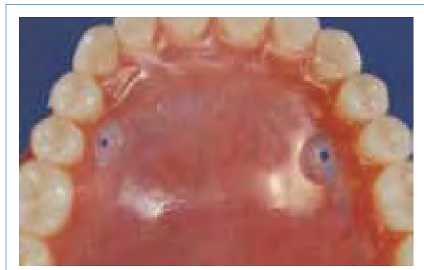

**Fig. 28** Housing for valves completed

Processing caps were then placed in the valves to protect the core from being filled with self cure acrylic and then tried in (Fig. 29a-30).

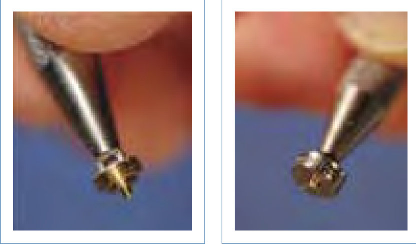

**Fig. 29a** Processing cap
**Fig. 29b** Mounted on the valve

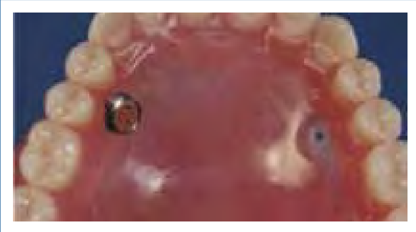

**Fig. 30** Try-in valve

The valves were installed with cold cure acrylic (Fig. 31-32). Soft rubber cylinder points were used to remove excess material and to polish around the valves (Fig. 33). The dentures were given a final sheen (Fig. 34)

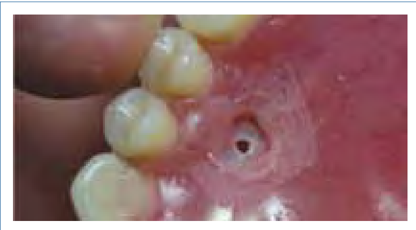

**Fig. 31** Small amount of self cure acrylic

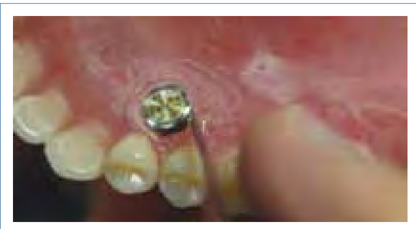

**Fig. 32** Valve inserted in stages

**Fig. 33** Excess removed and trimmed

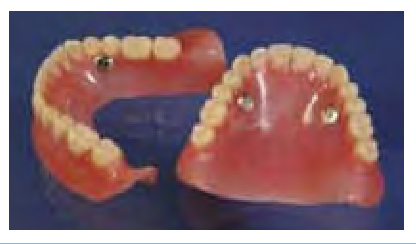

**Fig. 34** Dentures given final sheen

The processing caps were removed and the valve body inspected (Fig. 35-36).

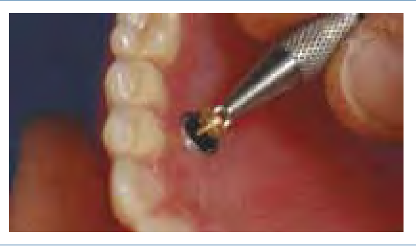

**Fig. 35** Processing caps removed

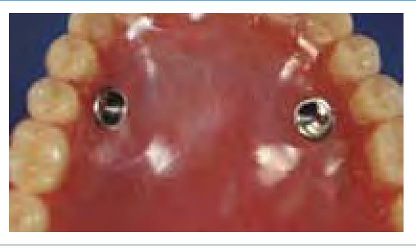

**Fig. 36** Valve body inspected

Using a 1 mm fissure, a communication channel was created between the valve and the high point of the retention chamber (Fig. 37-38). For dentures with a significant thickness of acrylic between the valves and the retention chamber, drilling is done on an obtuse angle.

**Fig. 37** Communication channel through valve

**Fig. 38** Joined via retention chamber

Each valve was rinsed and dried thoroughly to ensure a smooth placement of the diaphragm into its housing (Fig. 39-40). The perforated cover was fitted and tied up using the service key (Fig. 41-43).

**Fig. 39** Valve rinsed and dried

**Fig. 40** Diaphragms placed in their housing

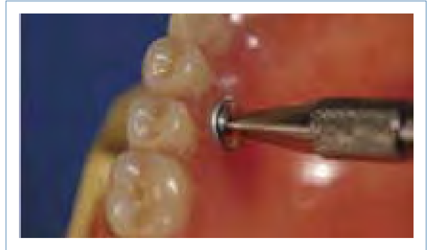

**Fig. 41** Perforated cover engaged in valve

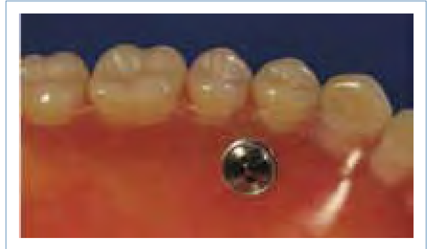

**Fig. 42** Cover tied up

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Fig. 43 Using the service key provided

## PREVENTIVE MAINTENANCE

Practitioners were encouraged to recall their patients every six months. This shows that the clinician cares, thus increasing patient loyalty and also income stream.

A simple and efficient recall system developed by Ted Carson consists of a computerized patient database and a recall postcard printed on both sides (Fig. 44-45). The patient's last visit was entered into the records. Six months later a pop-up window displayed the names due for check-up. A postcard was sent. Most patients responded positively to this follow up.

Fig. 44 Side A patient recall card

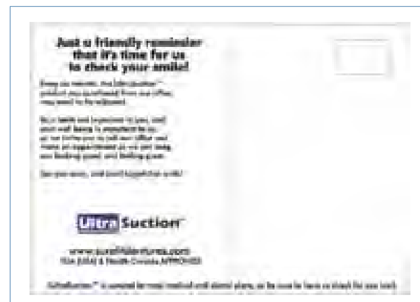


Fig. 45 Side B patient recall card

During the biannual visit, dentures were checked for their fit to the supporting tissue, followed by a general examination of the oral cavity. On this occasion, calculus deposits were removed from around the retention chamber and the air channels were thoroughly cleaned (Fig. 46).

Fig. 46 Air channel checked and cleaned

The valve covers were opened over a receptacle of water to avoid losing the components. The valves were cleaned and the diaphragms replaced. Patients were instructed to clean their dentures and the valves on a daily basis. Patients who had manual dexterity were given the service key, together with spare diaphragms and were instructed to perform routine maintenance in between the biannual visits (Fig. 47-51).

Fig. 47 Valve opened and cleaned

Fig. 48 Diaphragms inspected or replaced

Fig. 49 Valve covers cleaned

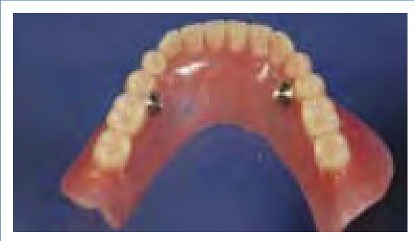

**Fig. 50** Valves closed

**Fig. 51** Hygiene is paramount

## DISCUSSION

Ultra Suction system appears to increase considerably the retention of complete dentures in both clinical observation and in statistical findings. Their retentive capacity is superior to that of conventional dentures (1).

The decrease in the rate of applied negative force by 10mmHg per 15 sec., attributed to the design of the diaphragms, suggests that we may have a more tissue friendly denture than we first thought. It is well known that the supporting tissue is subject to -80mmHg under conventional maxillary dentures, which caused an increase in epithelial width in the palate and attached gingiva, and a decrease in epithelial width in the alveolar mucosa (4) in most, if not all, complete denture wearers. This response is directly related to the functional demands of the tissue. In view of this documented evidence, it would be reasonable to conclude that Ultra Suction's negative force is less invasive than that of conventional dentures.

For more information contact: OnCore Dental Inc., 605 Goerig St. Woodland, WA. 98674, 360-841-8426, Fax 360-225-685, *www.oncore-dental.com*

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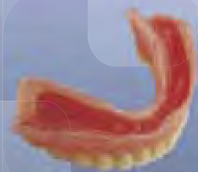

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