

## Moisture Chambers: Still A Viable Alternative

by Reid Oberer

The options available to treat the dry eye patient have been improving recently. With the introduction of new and better artificial tears that have increased retention time on the eye, and punctal plugs or punctal occlusion being used more frequently, an older therapy often gets overlooked; namely, the use of moisture chamber spectacles.<sup>1</sup>

Tsubota has shown that simply wearing spectacles can increase the humidity above the cornea by 14% on patients with dry eyes, and by adding side shields an increase of 45% humidity can be achieved.<sup>2</sup>

R. Linsy Farris, MD, advocates the use of moisture chamber spectacles in his article entitled "Staged Therapy For The Dry Eye". Dr. Farris recommends a three stage therapy in the treatment of dry eye; he considers moisture chambers during stage two.<sup>1</sup>

The use of dental wax,<sup>3-4</sup> or facial moulage<sup>5</sup> with thick plastic frames, come to mind when the term moisture chamber is used. That is not necessarily the case. The moisture chamber spectacles produced and presented by Robert H. Davis, M.D. and Edward VanOrman in the American Journal of Ophthalmology 1982,<sup>6</sup> is a fine improvement over wax molds and unsightly side shields used for creating a barrier against tear evaporation. I have found their method to be very effective, but I have made several modifications which I believe not only make the job faster and easier to reproduce, but offer a much larger choice of styles to the patient.

Davis and VanOrman begin with a sheet of clear vinyl from which the moisture chamber is fabricated.<sup>6</sup> I was able to obtain this material from a local hardware store. Small cuticle scissors are used by Davis and VanOrman for trimming the vinyl, which I've found work well. The hilco tap, screw and nut, size 25-405, I employ on the eyewire of the frame.

Fabricating the moisture chamber must begin with a proper frame selection. Davis and VanOrman use only one frame style,<sup>6</sup> which can make the fitting easier; however, it severely limits the patient's options. My alternate method is versatile enough to allow several different frame styles, allowing the patient more variety.

My experience has lead me to select a shape big enough to get good coverage of the ocular adnexa. Frame shapes that extend beyond the side of the face in the temple region, or those that ride low onto the cheeks, will not be as successful as a frame shape that is smaller and has more rounded corners. I have found that the rounded corners tend to limit the amount of puckering of the vinyl.

The frame style follows the thought of the shape and size, but it must be a metal frame. The best metal frames for this job have at least a 2mm eyewire width in order to be stable and hold the moisture chamber in place. The eyewire should also be deep enough to accommodate a "V" bevel on the lens and extra material equivalent to that of a thin gauge lens washer.

The eyewire and the temple screws should not share the same hinge. This allows for both adjustments to be made to the frame and moisture chamber, and for temples to be changed, without dismantling the entire pair of eyeglasses.

Davis and VanOrman use a unifit bridge in their version,<sup>6</sup> but I found that to be limiting to patients for the obvious reason that not all noses are created equal. The unifit bridge limitation led me to create my own variation of their chamber design. The variations I've made allow me to use frames with adjustable nose pads. This creates much more flexibility, both in terms of fitting options and adjustment options.

Once the frame is selected, I like to measure from the temple side of the frame back to the face, and from the bridge back to the face. With these two measurements, some basic trimming can be made on the vinyl before calling the patient in for the final custom fitting.

I order the lenses with a 1/3 front and 2/3 back bevel, primarily for cosmetic reasons, and then hand edge a "V" bevel. Davis and VanOrman suggest the opposite bevel configuration<sup>6</sup> because they claim it avoids puckering, but in my experience, it is the frame shape that has the greatest impact on puckering, not the bevel placement.

The majority of the moisture chamber should be prepared before the patient comes in. The following outlined procedures can be accomplished without the patient present.

- 1) Davis and VanOrman suggest removing the temples and working with the front of the frame alone.<sup>6</sup> This is a great advantage because maneuvering the vinyl and lens into place can be a tricky procedure. Therefore, I also remove the temples when beginning.

- 2) I take the hilco large tap size used for the 25-405 screw and re-thread the eyewire on both sides. I then insert the 25-405 screw leaving the eyewire open about 3-5mm. This will stabilize the assembly until the vinyl and lenses are inserted.
- 3) I measure the circumference of the lens and subtract 5mm. This measurement is then used to cut a rectangle of vinyl off of the larger sheet. I subtract 5mm from the circumference to allow a small gap in the vinyl, which I locate in the nose pad region. This allows nose pad adjusting without interfering with the vinyl. Davis and VanOrman add an unspecified amount of material and allow it to overlap.<sup>6</sup> This works fine for the unfit bridges because there is nothing to adjust, but when adjustable nose pads are present, the vinyl will be distorted and wrinkled.
- 4) The vinyl is now rolled into a cylinder and slipped into the eyewire (see fig. 1). Neither method differs on this point. Davis and VanOrman recommend leaving about 1 cm of the vinyl hanging out the front at this stage,<sup>6</sup> but I like to leave about twice that amount because it eases insertion of the lenses. While holding the vinyl, I slowly work the lens in place by sandwiching the vinyl between the lens and the eyewire; this mimics Davis and VanOrman.<sup>6</sup> I make certain, if the frame has a nose pad, to keep the small space between edges of the vinyl at the solder point of the nose pad. Once the lens is in place, the screw needs to be tightened a few turns. This will firm up the assembly.
- 5) I now take the measurements from the frame to the face and mark the vinyl. I then cut an arc connecting the two points on the vinyl. The vinyl hanging over the front of the frame is now used as a safety net of extra material should too much vinyl accidentally be trimmed. If more vinyl is needed, I loosen the eyewire screw slightly and work the vinyl backward; therefore, the front piece of vinyl is the last part to be trimmed. Davis and VanOrman recommend trimming the front off before the final fitting.<sup>6</sup> However, this risks a slip of the scissors and cutting too much off the back, and having no more material to make up the deficit.

The spectacles at this stage will begin to resemble the final chamber, and the patient should be called in for the final fitting.

- 6) I like to have the temples on the frame when I start. I then mark the vinyl with a felt tip pen in areas that need trimmed. Most often I can trim the vinyl without taking the temples off, but it depends on the frame (see fig. 2). During this final trimming I will often ask the patient to smile or make some other facial expression in order to check for contact between the face and the vinyl. Davis and VanOrman fit the vinyl directly against the skin.<sup>6</sup> I, on the other hand, always leave about 2mm of space between the patient's skin and vinyl in order to avoid rubbing, irritation, and most of all avoid fogging. The fogging often occurs when the vinyl is fit too close to the face. Davis and VanOrman have the patient sit 15 minutes after the chambers are finished to check for further adjustments. They report adding to, or trimming away vinyl after this short period of time.<sup>6</sup> I found it's better to have the patient wear the glasses a few days, then both the moisture chamber and the glasses can be adjusted based on important feedback from the patient.
  
- 7) My final steps are to trim the front of the vinyl flush to the front of the frame, put the 25-405 nut on the tightened screw, cut and file the top of the screw and nut, and finally place a drop of super glue on top of the nut. This works well because it holds everything in place until the next moisture chamber is needed, typically after 10-12 months. At that time, I remove the nut and slip the old vinyl out (see fig. 3). This old vinyl makes a fine template for the next piece of vinyl used on the moisture chamber. This simple step can eliminate several of the above-mentioned procedures, because a starting shape is provided. Davis and VanOrman glue the vinyl to itself,<sup>6</sup> making it impossible to re-use as a template since the glue deforms the vinyl in the area of contact.

The final chamber (see fig. 4) really is effective and not bad looking either. The customary fee for this is around \$30.00. You won't get rich making these but your patient will think the world of you, not to mention the word of mouth referrals this kind of service can generate.

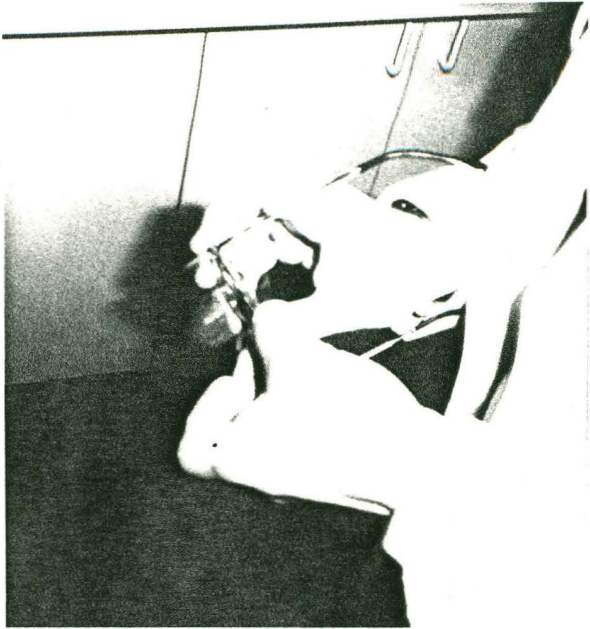


Figure 1

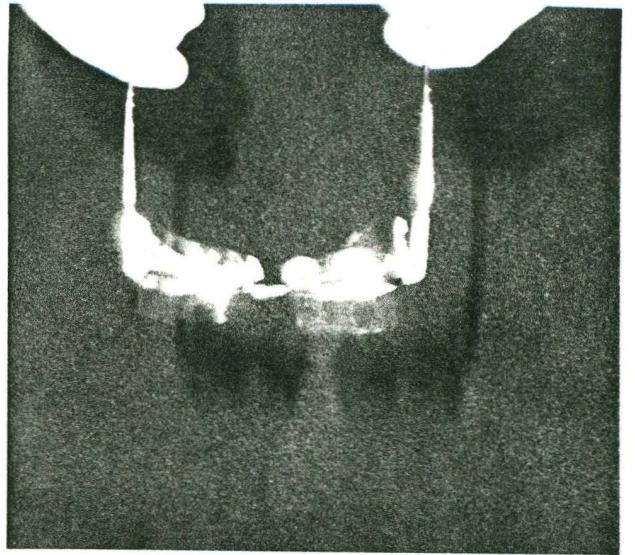


Figure 2

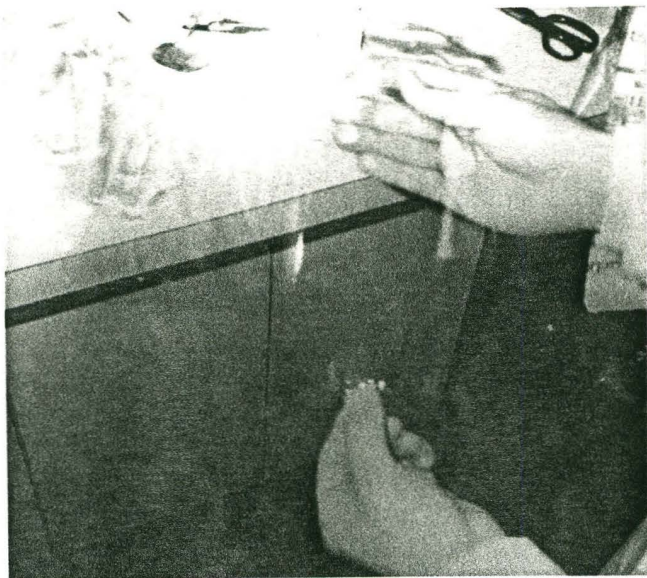


Figure 3

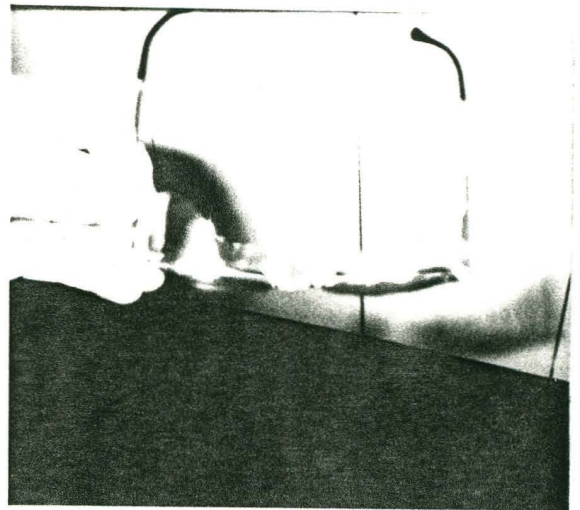


Figure 4

## References

1. Farris RL: Staged Therapy for the Dry Eye. The CLOA journal. 1991 Jul; 17(3): 207-15
2. Tsubota K: The Effect of Wearing Spectacles on the Humidity of the Eye. Am-J-Ophthalmol. 1989 Jul 15; 108(1): 92-3
3. Savar, DE: A New Approach to Ocular Moisture Chambers. J-of-Pediatric Ophthalmol and Strab. 1978 vol 15; 51-3
4. Savar DE, Runacre P, Godfrey CM: Moisture Chamber Spectacles. A Practical Guide to their Construction. Arch Ophthalmol 1979; 97:1347-1348.
5. Tautin FS, Hauser r, Ryan D. Schmidt C: Fabricating Moisture Chamber Spectacles with a Facial Moulage. 1981 J-of-Prosthetic Dent. 45:183.
6. Davis RH, VanOrman EW: Making Moist-Chamber Spectacles. AM J Ophthalmol 1982; 94:256-257.